

# GEOGRAPHY (GEOG)

## Courses

### **GEOG 1001 (4) Environmental Systems: Climate and Vegetation**

Lect. and lab. Introduces the atmospheric environment of the Earth: elements and controls of climate and their implications for hydrology, vegetation, and soils. Emphasizes distribution of physical features across the Earth's surface and interactions between humans and their environment, especially those leading to global change on the decade to century time scale.

**Additional Information:** GT Pathways: GT-SC1 - Natural Physical Sci:Lec Crse w/ Req Lab

Arts Sci Core Curr: Natural Science Sequence

Arts Sci Core Curr: Natural Science Lab

Arts Sci Gen Ed: Distribution-Natural Sci Lab

Arts Sci Gen Ed: Distribution-Natural Sciences

Departmental Category: Physical Geography

MAPS Course: Natural Science Lab or Lab/Lec

MAPS Course: Natural Science

### **GEOG 1011 (4) Environmental Systems: Landscapes and Water**

Lect. and lab. Introduces landscapes and flowing water, emphasizing the formation and geographic distribution of mountains, volcanoes, valleys, and deserts, and their shaping by rivers and glaciers. Includes field trips.

**Additional Information:** GT Pathways: GT-SC1 - Natural Physical Sci:Lec Crse w/ Req Lab

Arts Sci Core Curr: Natural Science Sequence

Arts Sci Core Curr: Natural Science Lab

Arts Sci Gen Ed: Distribution-Natural Sci Lab

Arts Sci Gen Ed: Distribution-Natural Sciences

Departmental Category: Physical Geography

MAPS Course: Natural Science Lab or Lab/Lec

MAPS Course: Natural Science

### **GEOG 1962 (3) Geographies of Global Change**

Familiarizes students with a geographic understanding of conflicts around the globe and of economic, political and cultural globalization. Analyzes the relationship between global forces, regions and local interests in contemporary territorial and geopolitical tensions and conflicts, emphasizing issues such as nationalism, migration, labor and natural resources. Formerly GEOG 2002.

**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

Arts Sci Gen Ed: Diversity-Global Perspective

Departmental Category: Asia Content

MAPS Course: Geography

### **GEOG 1972 (3) Environment-Society Geography**

Examines interactions between humans and the environment across the globe from a geographical perspective. Introduces different analytical perspectives through which to understand nature-society relationships, with a focus on social, cultural and political-economic dimensions, and examples from different natural resource sectors (e.g., water, agriculture) and countries. Formerly GEOG 2412.

**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective

Arts Sci Gen Ed: Distribution-Social Sciences

Departmental Category: Environment-Society Geography

MAPS Course: Geography

### **GEOG 1982 (3) Global Geographies: Societies, Places, Connections**

Introduces a comparative framework for recognizing and understanding the diversity of the world's societies and cultures. Units explore both local scale issues such as economic growth, inequality, political conflict, ethnic and racial dynamics, and climate change impacts, as well as broader scale trends associated with globalization, international development, migration, and the historical legacies of colonialism and imperialism.

**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

Departmental Category: Asia Content

MAPS Course: Geography

### **GEOG 1992 (3) Human Geographies**

Examines social, political, economic, and cultural processes creating the geographical worlds in which we live, and how these spatial relationships shape our everyday lives. Studies urban growth, geopolitics, agricultural development and change, economic growth and decline, population dynamics, and migration exploring both how these processes work at global scale as well as shape geographies of particular places.

**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

MAPS Course: Geography

### **GEOG 2001 (1-4) Topics in Physical Geography**

Examines various topics in physical geography that are not typically covered in the curriculum for lower division students; offered intermittently depending on student demand and availability of instructors.

### **GEOG 2053 (3) Mapping a Changing World**

Examines roles that maps, geospatial data and technology play in understanding and explaining our world with a focus on geospatial literacy. Emphasizes critical thinking about the use of natural and social science data and discusses maps used for social and political purposes. In hands-on exercises students learn how to critically read and evaluate maps for expanding spatial awareness of nature and society.

**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

Arts Sci Gen Ed: Distribution-Social Sciences

Departmental Category: Techniques (Skills)

### **GEOG 2092 (3) Advanced Introduction to Human Geography**

Provides a rigorous introduction to key analytical concepts of human geography - place, space, scale, regions, nature, landscapes and territory - while giving an overview of topics addressed in subfields including economic geography, political geography, cultural geography and development geography. Specific topics may vary slightly from semester to semester but will likely include borders and migration, maps, tourism, climate change and the Anthropocene, geopolitical conflict, development, urbanization, nationalism, gender, race, inequality and identity.

**Grading Basis:** Letter Grade

**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

MAPS Course: Geography

### **GEOG 2271 (3) Introduction to the Arctic Environment**

Rising temperatures and shrinking sea ice are only the most visible indications of a rapidly changing Arctic. This course addresses the climate of the Arctic and the changes being observed at a non-mathematical level. It is intended to provide students with a basic understanding of the Arctic physical environment.

**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

Departmental Category: Physical Geography

**GEOG 2692 (3) Foundations in Public Health**

This course provides a comprehensive overview of public health as well as an in-depth review of specific public health-related topics. Beginning with historical overview, students will explore major public health concepts such as the basic principles of epidemiology, the biomedical basis of disease, social and behavioral determinants of health, and systems thinking. Students will be introduced to the concepts of measuring and evaluating the health of the populations, principles of communicable and non-communicable diseases, environmental and occupational health, the economics of health, and the role of public health workers in society.

**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 2692

**GEOG 2852 (3) Contemporary Southeast Asia: Environmental Politics**

Examines globally pressing questions of environmental sustainability, regional inequality and development in the dynamic and heterogeneous landscapes of contemporary Southeast Asia. Focuses on interactions between histories of uneven development and contemporary debates over energy and infrastructure, food security, governance and access to land, forest and water-based resources.

**Equivalent - Duplicate Degree Credit Not Granted:** ASIA 2852

**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective

Arts Sci Gen Ed: Distribution-Social Sciences

Departmental Category: Environment-Society Geography

**GEOG 3022 (3) Climate Politics and Policy**

Engages students in exploring the realm of contemporary and historical climate policy at three major levels of government: international, national and local/regional. Through course lectures, discussions, readings and activities, students will become conversant with the actors, mechanisms and concerns involved in climate policy and politics and develop their own sense of how to judge the success of climate policies. Fulfills intermediate social science requirement in Environmental Studies Major.

**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 3022

**Recommended:** Prerequisite ENVS 1000 or GEOG 1972.

**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

Departmental Category: Environment-Society Geography

**GEOG 3023 (4) Statistics and Geographic Data**

Introduces computational and statistical tools to solve problems in the geographic domain. Provides an understanding of introductory statistical concepts and applies them to real world problems through lab exercises. Emphasizes spatial data, which requires specialized descriptive and predictive analysis techniques. Demonstrates how to manipulate and visualize data, and make inference using state-of-the art statistics software, applied to various social and earth science problems.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 3023

**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

Arts Sci Gen Ed: Quantitative Reasoning Math

Departmental Category: Techniques (Skills)

**GEOG 3053 (4) Geographic Information Science: Mapping**

Introduction to Geographic Information Systems (GIS) and the fundamentals of cartographic design. Emphasis on the science and art of map design in a GIS environment. Students will learn how to build a spatial database, implement best practice for processing various types of environmental and social data and apply basic visual analytics to understand spatial patterns.

**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).

**Recommended:** Prerequisite basic familiarity with computers and an introductory course in statistics (may be taken concurrently).

**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

Arts Sci Gen Ed: Distribution-Social Sciences

Departmental Category: Techniques (Skills)

**GEOG 3251 (3) Mountain Geography**

Surveys mountain environments and their human use with illustrations from temperate and tropical mountain areas.

**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

Arts Sci Gen Ed: Distribution-Social Sciences

Departmental Category: Physical Geography

**GEOG 3301 (3) Analysis of Climate and Weather Observations**

Discusses instruments, techniques and statistical methods used in atmospheric observations. Covers issues of data accuracy and analysis of weather maps. Provides application to temperature and precipitation records, weather forecasting and climate change trends. Uses computers to access data sets and process data.

**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 3300

**Requisites:** Requires prerequisite courses of APPM 1340 and 1345 or APPM 1350 or ECON 1088 or MATH 1081 or MATH 1300 or MATH 1310 and ATOC 1050 and ATOC 1060 or GEOG 3601 or ATOC 3600 or ENVS 3600 or GEOG 1011 (all minimum grade D-).

**Recommended:** Prerequisites ATOC 1050 or ATOC 1060 or ATOC 3600 or GEOG 3601 or ENVS 3600 or GEOG 1001 and one semester calculus.

**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence

Arts Sci Gen Ed: Distribution-Natural Sciences

Departmental Category: Physical Geography

**GEOG 3351 (3) Biogeography**

Surveys and analyzes plant and animal distributions on a world scale from ecological and historical perspectives. Emphasizes human impact on species.

**Requisites:** Requires prerequisite course of GEOG 1001 (minimum grade D-).

**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

Departmental Category: Physical Geography

**GEOG 3402 (3) Natural Hazards**

Explores the impacts of extreme geophysical events on human society. Emphasizes adaptations to extreme events and ways of reducing vulnerability and damage.

**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

Departmental Category: Environment-Society Geography

**GEOG 3412 (3) Conservation Practice and Resource Management**

Studies policy and management of natural resources. Emphasizes practical approaches to the conservation and management of soil, land, water and air resources.

**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

Departmental Category: Environment-Society Geography

**GEOG 3422 (3) Political Ecology**

Introduces students to political ecology, an influential approach to understanding society-environment relationships. Explores issues including different philosophies of nature and wilderness, the politics of conservation, causes of environmental degradation, environmental conflict and indigenous ecological knowledge.

**Recommended:** Prerequisite GEOG 1972.

**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences  
Departmental Category: Environment-Society Geography

**GEOG 3511 (4) Introduction to Hydrology**

Examines hydrologic processes in the surface environment, emphasizing the environment of the western United States. Emphasizes natural processes and their management to augment water resources.

**Requisites:** Requires a prerequisite course of GEOG 1011 or GEOL 1010 (minimum grade D-).

**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence  
Arts Sci Gen Ed: Distribution-Natural Sci Lab  
Arts Sci Gen Ed: Distribution-Natural Sciences  
Departmental Category: Physical Geography

**GEOG 3601 (3) Principles of Climate**

Describes the basic components of the climate system: the atmosphere, ocean, cryosphere and lithosphere. Investigates the basic physical processes that determine climate and link the components of the climate system. Covers the hydrological cycle and its role in climate, climate stability and global change.

**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 3600 and ENVS 3600

**Requisites:** Restricted to Geography (GEOG) or Environmental Studies (ENVS) majors or Atmospheric Oceanic Sciences (ATOC) minors only.

**Recommended:** Prerequisites one semester of calculus and ATOC 1060 or ATOC 3300 or GEOG 3301 or GEOG 1001.

**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence  
Arts Sci Gen Ed: Distribution-Natural Sciences  
Departmental Category: Physical Geography

**GEOG 3612 (3) Geography of American Cities**

Introduces geography of American cities, highlighting urban development as a contested, socially and spatially uneven process; emphasizes the intersection of urban space with categories of difference such as race and class.

**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences  
Arts Sci Gen Ed: Diversity-U.S. Perspective

**GEOG 3622 (3) Cities of the Global South**

Examines the geographies, processes, structural forces and everyday forms of urban life that are at the core of rapid urban transformation in the global South. Through using interdisciplinary scholarship, empirical case studies and key theoretical work, the course covers themes such as migration and urbanization, informality and governance, infrastructures of everyday life and urban environmental politics.

**Equivalent - Duplicate Degree Credit Not Granted:** IAFS 3670

**GEOG 3662 (3) Economic Geography**

Presents theories of the spatial organization of economic production, consumption and exchange systems. Geographical dynamics of industrialization, urbanization and economic growth. Examination of property, labor and social conflict, with a focus on political economy.

**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**GEOG 3672 (3) Who Runs the World? Sex, Power, and Gender in Geography**

This course will examine how gender and sexuality is constructed locally, nationally, and globally, drawing on conversations about feminist pasts, presents, and futures. We will focus on how gender intersects with race, class, sexuality, ability, religion, ethnicity, and geopolitical location to structure the lived experiences of women across the globe. We will apply critical geographic perspectives to gender inequality, exploring the overlaps and differences in women's and LGBTQ+ struggles as they are shaped by ongoing socio-cultural, political, and economic conditions globally.

**Equivalent - Duplicate Degree Credit Not Granted:** WGST 3672

**Recommended:** Prerequisite GEOG 1962 or GEOG 1972 or GEOG 1982 or GEOG 1992 or GEOG 2092 or WGST 2000 or WGST 2600.

**Additional Information:** Arts Sci Core Curr: Human Diversity  
Arts Sci Gen Ed: Diversity-Global Perspective  
Arts Sci Gen Ed: Distribution-Social Sciences  
Departmental Category: Human Geography

**GEOG 3682 (3) Geography of International Development**

Compares and contrasts global characteristics and processes of development, emphasizing the developing countries of the world. Integrates theories of development, specific development topics, and case studies to explore the problems of development.

**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.

**Recommended:** Prerequisite GEOG 1962 or GEOG 1972 or GEOG 1982 or GEOG 1992 or GEOG 2092.

**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective  
Arts Sci Gen Ed: Distribution-Social Sciences  
Departmental Category: Human Geography  
Departmental Category: Asia Content

**GEOG 3692 (4) Introduction to Global Public Health**

Introduces global health by putting its contemporary definition, determinants, development and direction as a field into a broad global context. The course is divided into four core topics: 1) the burden and distribution of disease and mortality; 2) the determinants of global health disparities; 3) the development of global health policies; and 4) the outcomes of global health interventions. Required for the Public Health Certificate.

**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective  
Arts Sci Gen Ed: Distribution-Social Sciences

**GEOG 3742 (3) Place, Power, and Contemporary Culture**

Examines the relationship between places, power, and the dynamics of culture. Explores how the globalization of economics, politics, and culture shapes cultural change. Looks at how place-based cultural politics both assist and resist processes of globalization.

**Recommended:** Prerequisite GEOG 1962 or GEOG 1982 or GEOG 1992 or GEOG 2092.

**Additional Information:** Arts Sci Core Curr: Contemporary Societies  
Arts Sci Gen Ed: Distribution-Arts Humanities  
Arts Sci Gen Ed: Diversity-Global Perspective  
Arts Sci Gen Ed: Distribution-Social Sciences  
Arts Sci Gen Ed: Diversity-U.S. Perspective  
Departmental Category: Human Geography

**GEOG 3782 (3) Environmentalism, Race, and Justice**

Examines spatial inequalities in environmental problems and their relationships to environmentalism and racism. Examines the implications for human health, well-being, and sense of place. Identifies factors that contribute to environmental inequalities, with particular attention to environmentalism and racism. Explores efforts to reduce environmental inequality, including by social movements, researchers, students, journalists, political leaders, and government agencies. Introduces students to research methods for documenting and analyzing environmental inequality. Focuses geographically on the United States. Formerly offered as a special topics course.

**Recommended:** Prerequisite GEOG 1972.

**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**GEOG 3812 (3) Mexico, Central America, and the Caribbean**

Introduces the geography of Latin America, focusing on the lands and peoples of Mexico, Central America, and the Caribbean. Examines regional and national culture, history, environment, and population, as well as ongoing environmental and socioeconomic changes.

**Recommended:** Prerequisite GEOG 1962 or GEOG 1972 or GEOG 1982 or GEOG 1992 or GEOG 2092.

**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective

Arts Sci Gen Ed: Distribution-Social Sciences

Departmental Category: Human Geography

**GEOG 3822 (3) Geography of China**

Surveys the world's most populous country, examining physical and historical geography, urbanization and regional development, agriculture, population, energy, and the environment. Seeks to situate China's development in a broader Asian and global context.

**Recommended:** Prerequisite GEOG 1962 or GEOG 1972 or GEOG 1982 or GEOG 1992 or GEOG 2092.

**Additional Information:** Arts Sci Core Curr: Human Diversity

Arts Sci Gen Ed: Diversity-Global Perspective

Arts Sci Gen Ed: Distribution-Social Sciences

Departmental Category: Human Geography

Departmental Category: Asia Content

**GEOG 3832 (3) Geographies of South Asia**

Examine the geographies of South Asia through four interrelated themes: Territory, Trade, Transportation, and Tributaries. Learn about territory including physical features, political conflicts and changing borders.

Explore trade, transportation routes, and tributaries to understand economic, social/cultural and political geographies. Investigate culture and society through analyses of gender roles/relations.

**Recommended:** Prerequisites GEOG 1962 or GEOG 1972 or GEOG 1982 or GEOG 1992 or GEOG 2092.

**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

Departmental Category: Human Geography

Departmental Category: Asia Content

**GEOG 3840 (1-6) Undergraduate Independent Study**

Provides an independent study opportunity, by special arrangement with faculty, for students presenting strong geography preparation. Instructor consent required.

**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.

**Requisites:** Restricted to Geography (GEOG) majors only.

**GEOG 3842 (3) Human Geography of Czechia: Political, Economic and Social Transitions**

Excursions in Prague will begin with an understanding of Czech history through various imprints on the landscape, such as city planning, design, architecture and culture. This will be followed by a discussion of Prague in the 20th century and the various political, economic and social transitions. These transitions will be explored through field based study in and outside of Prague.

**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**GEOG 3862 (3) Geography of Africa**

Studies physical and cultural regions of Africa. Analyzes and compares the development of present nation-states and contemporary geographic issues including globalization, conservation, public health and food security.

**Recommended:** Prerequisite GEOG 1962 or GEOG 1972 or GEOG 1982 or GEOG 1992 or GEOG 2092.

**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective

Arts Sci Gen Ed: Distribution-Social Sciences

Departmental Category: Human Geography

**GEOG 3882 (3) Geography of the Former Soviet Union**

Examines the contemporary social, political, population, cultural, ethnic and resource geography of the former Soviet Union. Relations between Russia and neighboring countries are also considered. Historical and physical geography are introduced as background to understanding post-Soviet developments and challenges.

**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**GEOG 3930 (3) Internship**

Provides an academically supervised opportunity for advanced geography or environmental studies majors to work in public and private organizations on projects related to the student's career goals and to relate classroom theory to practice. Instructor consent required.

**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**Requisites:** Restricted to Geography (GEOG) or Environmental Studies (ENVS) majors only.

**GEOG 4001 (1-4) Topics in Physical Geography**

Examines various topics in physical geography that are not typically covered in the curriculum. Offered intermittently depending on student demand and availability of instructors.

**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.

**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOG 4002 (1-4) Topics in Human and Environment/Society Geography**

Examines various topics in human and environment / society geography that are not typically covered in the curriculum. Offered intermittently depending on student demand and availability of instructors.

**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.

**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**GEOG 4003 (1-4) Topics in Geographic Skills**

Examines various topics in geographical skills and techniques that are not typically covered in the curriculum. Offered intermittently depending on student demand and availability of instructors.

**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.

**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences



#### **GEOG 4023 (4) Advanced Quantitative Methods for Spatial Data**

Reviews fundamental statistical and quantitative modeling techniques and introduces more advanced statistical techniques widely used in geography today. Emphasizes geographic examples and spatial problems teaching hands-on skills in statistical programming. Topics covered include generalized linear models, spatial autocorrelation, spatial regression methods, and working with complex datasets.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5023

**Requisites:** Requires prerequisite course of GEOG 3023 (minimum grade D-).

**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences  
Departmental Category: Methods

#### **GEOG 4043 (4) Advanced Geovisualization and Web Mapping**

Advanced technical course in web-based cartography and geovisualization stressing the important role digital cartography plays in cyberspace and society. Focuses on principles of effective cartographic design in multimedia and hypertext environments. Labs are organized around hands-on active learning projects demonstrating skills in geovisualization and cartographic practice.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5043

**Requisites:** Requires prerequisite course of GEOG 3053 (minimum grade C-).

**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences  
Arts Sci Gen Ed: Distribution-Social Sciences  
Departmental Category: Methods

#### **GEOG 4093 (4) Remote Sensing of the Environment**

Covers acquisition and interpretation of environmental data by remote sensing. Discusses theory and sensors as well as manual and computerized interpretation methods. Stresses infrared and microwave portions of the spectrum.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5093 and GEOL 4093 and GEOL 5093

**Requisites:** Requires prerequisite course of APPM 1340 1345 or APPM 1350 or 4570 or ECON 1088 or 3818 or MATH 1081 or 1300 or 1310 or 2510 or ANTH 4000 or BCOR 1020 or GEOG 3023 or GEOL 3023 or PSCI 2075 or PSYC 2111 or SOCY 2061 or 4061 (minimum grade D-).

**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab  
Arts Sci Gen Ed: Distribution-Natural Sciences  
Departmental Category: Methods

#### **GEOG 4103 (4) Geographic Information Science: Spatial Analytics**

Explores advanced topics in geospatial databases, spatial analytics and geoprocessing in a Geographic Information System (GIS). Emphasizes how geographic concepts are linked to methodological frameworks for recording, transforming, storing/retrieving, analyzing, and processing geographic data as well as various forms of uncertainty. Exercises demonstrate the application of GIS-based methods to real world scenarios in interdisciplinary settings.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5103

**Requisites:** Requires prereq (GEOG3053) any one of the following (ANTH4000 or APPM4570 or BCOR1020 or ECON3818 or GEOG3023 or GEOL3023 or MATH2510 or PSCI2075 or PSYC2111 or SOCY2061 or 4061) (all min grade C-). Restricted to students with 57-180 credits (JR/SR).

**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab  
Arts Sci Gen Ed: Distribution-Natural Sciences  
Departmental Category: GIScience

#### **GEOG 4173 (3) Research Seminar**

Examines the nature of research and develops pregraduate skills for geographic research, emphasizing problem definition, methods, sources, data interpretation, and writing. Recommended for students pursuing honors.

**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Geography (GEOG) or Environmental Studies (ENVS) majors only.

**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences  
Departmental Category: Methods

#### **GEOG 4201 (3) Biometeorology**

Interdisciplinary science, studying the interactions between atmospheric processes and living organisms (plants, animals, and humans).

Discusses how organisms adapt to a changing environment. Uses a practical, problem-solving approach to explore these interactions.

**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 4201

**Requisites:** Requires prereq of GEOG 1001 any of APPM 1340 1345 or APPM 1350 or 4570 or ECON 1088 or 3818 or MATH 1081 or 1300 or 1310 or 2510 or ANTH 4000 or BCOR 1020 or GEOG 3023 or GEOL 3023 or PSCI 2075 or PSYC 2111 or SOCY 2061 or 4061 (min grade D-).

**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences  
Departmental Category: Physical Geography

#### **GEOG 4203 (4) Geographic Information Science: Spatial Modeling**

Focuses on the use and development of advanced models for human and environmental applications in a geospatial environment integrating raster and vector data models. Covers terrain and hydrologic modeling, geostatistical modeling, dasymetric modeling, as well as multi-criteria modeling. Group projects critically design, implement and test spatial models to develop independent skillsets in a chosen problem setting.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5203

**Requisites:** Requires prerequisite course of GEOG 4103 (minimum grade C-).

**Recommended:** Requisite working knowledge of GIS software.

**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab  
Arts Sci Gen Ed: Distribution-Natural Sciences  
Departmental Category: GIScience

#### **GEOG 4241 (4) Principles of Geomorphology**

Studies weathering, mass-wasting, fluvial, wind, and marine processes and the resulting landforms.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4241

**Requisites:** Requires prereq crs GEOG 1011 or GEOL 1010 or 1020 or 1030 or 1040 or 1060 and APPM 1340 and 1345 or APPM 1350 or ECON 1088 or MATH 1081 or 1300 or 1310 (min grade D-). Restricted to students with 57-180 credits (Jr/Sr) EVOC, GEOG, GEOL, ENVS mjrs only

**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence  
Arts Sci Gen Ed: Distribution-Natural Sci Lab  
Arts Sci Gen Ed: Distribution-Natural Sciences  
Departmental Category: Physical Geography

#### **GEOG 4251 (4) Fluvial Geomorphology**

Emphasizes landscapes formed by running water. Includes basic fluid mechanics, sediment transport, hillslope and channel erosion, and sediment yield.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5251

**Requisites:** Requires prerequisite courses of GEOG 1011 and GEOG 3511 (minimum grade D-).

**Recommended:** Prerequisite GEOG 3023.

**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab  
Arts Sci Gen Ed: Distribution-Natural Sciences  
Departmental Category: Physical Geography

**GEOG 4261 (3) Glaciers and Permafrost**

Surveys the major terrestrial components of the cryosphere, including permafrost, glaciers and ice sheets. Emphasizes physical processes involving ice, including thermal behavior, ice deformation and mass balance, but also considers biogeochemical processes and landforms associated with ice. The climate context, including human interactions and recent climate history, will be considered. Taught in a combination lecture-seminar format.

**Requisites:** Requires prerequisite course of GEOG 1011 or GEOL 1010 (minimum grade D-).

**Recommended:** Prerequisite GEOG 4241.

**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences  
Departmental Category: Physical Geography

**GEOG 4271 (3) The Arctic Climate System**

Understanding the climate of the Arctic requires a synthetic, system oriented approach. The course focuses on the intimate linkages between the atmosphere, ocean and land that give the Arctic region its unique character, link the Arctic to the larger global climate system, and promote understanding the rapid changes occurring in the Arctic.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5271

**Requisites:** Requires prerequisite course of GEOG 1001 or ATOC 1050 or ATOC 1060 (minimum grade D-).

**Recommended:** Prerequisites GEOG 3511 or GEOG 3601 or ATOC 3600 or ENVS 3600 and statistics.

**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences  
Departmental Category: Physical Geography

**GEOG 4292 (3) Migration, Immigrant Adaptation, and Development**

Examines historical and current patterns of migration with an emphasis in international movement. Looks at leading migration theories related to both origin- and destination-based explanations while critically looking at the role of development as a potential cause and consequence of population movement. Finally, covers some aspects of immigrants' social and economic adaptation to their host society.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5292

**Recommended:** Prerequisite GEOG 1962 or GEOG 1972 or GEOG 1982 or GEOG 1992 or GEOG 2092.

**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective  
Arts Sci Gen Ed: Distribution-Social Sciences  
Arts Sci Gen Ed: Diversity-U.S. Perspective  
Departmental Category: Human Geography

**GEOG 4303 (4) Geographic Information Science: Spatial Programming**

Focuses on the extension of geographic information systems (GIS) through programming as well as on the development of algorithms for spatial analysis and information extraction in vector and raster data using open source tools. Covers concepts, principles and techniques of programming and solving spatial problems in natural and social science settings. Group projects will foster skillsets in implementing solutions to complex spatial problems.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5303

**Requisites:** Requires prerequisite course of GEOG 4103 (minimum grade C-).

**Recommended:** Prerequisite GEOG 4203.

**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab  
Arts Sci Gen Ed: Distribution-Natural Sciences  
Departmental Category: GIScience

**GEOG 4311 (3) Watershed Biogeochemistry**

Emphasizes terrestrial-aquatic linkages in headwater catchments, focusing on hydrologic pathways, isotopic and geochemical tracers, nutrient cycling, water quality, experimental manipulations, and modeling.

**Requisites:** Requires prerequisite courses of GEOG 1011 and GEOG 3511 (minimum grade D-).

**Recommended:** Requisite parametric statistics.

**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences  
Departmental Category: Physical Geography

**GEOG 4321 (3-4) Snow Hydrology**

Offers a multidisciplinary and quantitative analysis of physico-chemical processes that operate in seasonally snow-covered areas, from the micro- to global-scale: snow accumulation, metamorphism, ablation, chemical properties, biological aspects, electromagnetic properties, remote sensing, GIS and quantitative methods.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5321

**Requisites:** Requires prerequisite course of APPM 1340 1345 or APPM 1350 or 4570 or ECON 1088 or 3818 or MATH 1081 or 1300 or 1310 or 2510 or ANTH 4000 or BCOR 1020 or GEOG 3023 or GEOL 3023 or PSCI 2075 or PSYC 2111 or SOCY 2061 or 4061 (minimum grade D-).

**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab  
Arts Sci Gen Ed: Distribution-Natural Sciences  
Departmental Category: Physical Geography

**GEOG 4331 (3-4) Mountain Climatology**

Surveys and analyzes climatic characteristics of mountain environments worldwide.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5331

**Requisites:** Requires prerequisite course of GEOG 1001 or ATOC 1050 or ATOC 1060 (minimum grade D-).

**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences  
Departmental Category: Physical Geography

**GEOG 4371 (3) Forest Geography: Principles and Dynamics**

Surveys principles of forest geography and ecology. Includes both individual tree responses to environmental factors and species interactions within communities. Emphasizes forest dynamics and their relation to management problems.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5371

**Requisites:** Requires prerequisite course of GEOG 1001 (minimum grade D-).

**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences  
Departmental Category: Physical Geography

**GEOG 4401 (3) Soils Geography**

Discusses chemical and physical properties of soils, soil development, distributions and management relevant to understanding plant-soil relationships in natural and human-altered landscapes.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5401

**Requisites:** Requires prerequisite course of GEOG 1011 (minimum grade D-).

**Recommended:** Prerequisite inorganic chemistry.

**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences  
Departmental Category: Physical Geography

### **GEOG 4403 (3) Geographic Information Science: Space Time Analytics**

Focuses on understanding processes (human, natural, social or physical) through data driven analysis of patterns in spatio-temporal data. Covers a wide range of topics relevant to space time data, including pattern analysis, modeling and visualization as well as time geography and various contemporary issues in space time analytics. Utilizes a hands-on, flipped classroom approach with in-class development of technical skills.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5403

**Requisites:** Requires a prerequisite course of GEOG 3023 or GEOG 4023 (minimum grade C-).

**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences  
Departmental Category: GIScience

### **GEOG 4430 (3) Seminar: Conservation Trends**

Provides environmental studies or geography majors with an undergraduate format for interdisciplinary discussion and research into current and future directions of conservation.

**Repeatable:** Repeatable for up to 6.00 total credit hours.

**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences  
Departmental Category: Environment-Society Geography

### **GEOG 4463 (3) Earth Analytics Data Science Bootcamp**

Learn key skills to automate data processing and visualization workflows that support both repeatable analysis and collaborative project approaches using scientific programming, version control and project management tools. Covers working with heterogeneous, large spatio-temporal data derived from space, airborne and ground based sensors and other sources. Gain applied experience through group projects that address real world problems.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5463

**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**Grading Basis:** Letter Grade

**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences  
Departmental Category: Methods

### **GEOG 4501 (3) Water Resources and Water Management of Western United States**

Interprets and analyzes hydroclimatic data, surface and groundwater. Critically evaluates water use, emphasizing problems associated with geographic maldistribution, appropriations, irrigation, industry, pollution and regional development.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5501

**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences  
Departmental Category: Environment-Society Geography

### **GEOG 4503 (3) Geographic Information Science: Project Management**

Managing a geospatial project encompasses problem identification, project design, analysis and supporting team dynamics. The class mixes lectures and class exercises with student-selected projects and works through all stages of a project from articulating an initial idea to project planning and scoping, building a work plan, timeline and budget, executing the work plan and evaluating a project's progress.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5503

**Requisites:** Requires prerequisite course of GEOG 3053 or GEOG 4103 (minimum grade C-).

**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences  
Departmental Category: GIScience

### **GEOG 4563 (3) Earth Analytics**

Introduce students to major unanswered questions in Earth science and to the analytical tools, including data management, analysis and visualization, necessary to explore 'big data' from a suite of sensors. Aligns with Earth Lab, a new initiative of the University's Grand Challenge (<http://www.colorado.edu/grandchallenges/>) to use our expertise in space-based observation to address our world's most pressing problems. Comparable programming course work may be substituted for GEOG 4463 with instructor approval.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5563

**Requisites:** Requires prerequisite course of GEOG 4463 (minimum grade C-).

**Grading Basis:** Letter Grade

**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences  
Departmental Category: Methods

### **GEOG 4603 (3) GIS in the Social and Natural Sciences**

Introduces Geographic Information Systems and their underlying principles through interactive lectures and lab exercises. Students get basic skills for working in a GIS environment and learn how to handle and manage geospatial data, create maps and conduct geospatial analysis focusing on project tasks typically encountered in the social and natural sciences.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5603

**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences  
Departmental Category: GIScience

### **GEOG 4622 (3) City Life**

Analyzes social, behavioral, political and demographic factors that influence development and maintenance of communities in contemporary urban environments, with primary emphasis on U.S. cities.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5622

**Recommended:** Prerequisite GEOG 1962 or GEOG 1972 or GEOG 1982 or GEOG 1992.

**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

### **GEOG 4632 (3) Development Geography**

Provides an overview of development policy and practice, surveying foundational works in Development Studies as well as critical interventions. Required for Graduate Certificate in Development Studies.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5632

**Requisites:** Requires prerequisite course of GEOG 1962 or GEOG 1972 or GEOG 1982 or GEOG 1992 (minimum grade D-).

**Recommended:** Prerequisite GEOG 1962 or GEOG 1972 or GEOG 1982 or GEOG 1992 or GEOG 2092 (minimum grade D-).

**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences  
Departmental Category: Human Geography

### **GEOG 4712 (3) Political Geography**

Systematic study of relations between geography and politics, especially as background for better understanding of international affairs. Includes topics such as frontiers and boundaries, power analysis, geopolitics, international political economy, and strategic concepts.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5712

**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.

**Recommended:** Prerequisite GEOG 1962 or GEOG 1972 or GEOG 1982 or GEOG 1992 or GEOG 2092 or IAFS 1000 or PSCI 2012 or PSCI 2223.

**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences  
Departmental Category: Human Geography

**GEOG 4722 (3) Field Methods in Human Geography**

Examines research methods associated with field work in human geography. Prepares students for fieldwork by focusing on geographic and interdisciplinary field work techniques; interpretation of field data; discussion of the politics, ethics and gender, race, class and cross-cultural issues related to field work.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5722

**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences  
Departmental Category: Methods

**GEOG 4732 (3) Population Geography**

Emphasizes spatial aspects of population characteristics including fertility, mortality, migration, distribution and composition. Includes both theoretical and empirical considerations, in addition to field work and computer simulations.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5732

**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.

**Recommended:** Prerequisite GEOG 1962 or GEOG 1972 or GEOG 1982 or GEOG 1992 or GEOG 2092.

**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective  
Arts Sci Gen Ed: Distribution-Social Sciences  
Departmental Category: Human Geography

**GEOG 4742 (3) Topics in Environment and Society**

Studies peoples and their environments, including human modification of nature and cultural interpretation and construction of rural and urban landscapes.

**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.

**Recommended:** Prerequisite GEOG 1962 or GEOG 1972 or 1982 or GEOG 1992 or GEOG 2092.

**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences  
Departmental Category: Environment-Society Geography

**GEOG 4762 (3) Geographies of Political Islam**

Explores the postcolonial landscape of political Islam through the lens of political and cultural geography. Develops a critical anti-essentialist framework for understanding the political crisis of the Muslim world in relation to broader questions of empire, nationalism, democracy, revolution, security, terrorism, globalization and modernity. Focuses on the post-1979 period, several key Muslim nation-states (Saudi-Arabia, Egypt, Iran, Turkey, Pakistan) and movements (Taliban, ISIS).

**Recommended:** Prerequisite GEOG 1982 or GEOG 1992 or GEOG 2092 or GEOG 3742.

**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences  
Departmental Category: Human Geography

**GEOG 4772 (3) The Geography of Food and Agriculture**

Course examines geographies of food systems through consideration of food as both a commodity and as culture. Topics covered include the political economy of global food systems, alternative food movements, and environmental factors, as well as interactions between food and gender, race, class, and culture. Previously offered as a special topics course.

**Recommended:** Prerequisites GEOG 1972 or GEOG 1982 or GEOG 2092.

**GEOG 4812 (3) Political Ecology & Latin America**

Presents theoretical approaches to the links between environment and development in Latin America and focuses on analytical discussion of contemporary (and controversial) issues in sustainable development in Latin America. Examines social, ecological, economic, and political forces influencing the use of natural resources.

**Recommended:** Prerequisite GEOG 1962 or GEOG 1982 or GEOG 1992 or GEOG 2092 or GEOG 3682 or GEOG 3422 or GEOG 3812 or ANTH 3110 or PSCI 3032.

**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective  
Arts Sci Gen Ed: Distribution-Social Sciences  
Departmental Category: Environment-Society Geography

**GEOG 4822 (3) Environment and Development in China**

Examines key environmental problems in relation to China's rapid modernization and development.

**Recommended:** Prerequisite GEOG 1962 or GEOG 1982 or GEOG 1992 or GEOG 2092 or HIST 1618.

**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences  
Departmental Category: Environment-Society Geography  
Departmental Category: Asia Content

**GEOG 4832 (3) Geography of Tibet**

Rigorously examines contemporary Tibetan society, culture and nature from a geographical perspective. Uses readings on contemporary Tibet as an entry point into scholarly research about nationalism, representation, diaspora, landscape and place, sustainable development, natural resource management, identity and environmentalism.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5832

**Recommended:** Prerequisite GEOG 3822 or other classes on China.

**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences  
Departmental Category: Asia Content

**GEOG 4842 (3) Global Frontiers in Southeast Asia**

Uses the theme of the global frontier to examine and compare three key moments in the modern history of Southeast Asia: the colonial encounter, the rise of the modern territorial state, and the age of contemporary globalization. Examines case studies from earlier eras to analyze emerging global frontiers at the junction of state territoriality and transnational economic expansion.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5842 and ASIA 4842

**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities  
Arts Sci Gen Ed: Distribution-Social Sciences

**GEOG 4852 (3) Health and Medical Geography**

Examines geographical patterns of health and disease with an emphasis on global health issues. Focuses on three major approaches to medical geographic research: ecological approaches, which systematically analyze relationships between people and their environments; social approaches, including political economy and socio-behavioral approaches; and spatial approaches, which employ maps and spatial analysis to identify patterns of health and disease. Elective course for Public Health Certificate.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5852

**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**Recommended:** Prerequisites GEOG 1001 or GEOG 1011 and GEOG 1962 or GEOG 1972 or GEOG 1992 or GEOG 2092.

**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences  
Departmental Category: Human Geography



**GEOG 4892 (3) Geography of Western Europe**

Provides a regional survey of cultural, political, economic, social, and physical geography of Western Europe, emphasizing the distinctive character and problems of each major area and the relationship of the region to the world.

**Recommended:** Prerequisite GEOG 1962 or GEOG 1972 or GEOG 1982 or GEOG 1992 or GEOG 2092.

**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences  
Departmental Category: Human Geography

**GEOG 4990 (3) Senior Thesis**

Offers thesis research under faculty supervision. Instructor consent required.

**Repeatable:** Repeatable for up to 6.00 total credit hours.

**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) Geography (GEOG) majors only.

**GEOG 5003 (4) Elements of Geographic Information Systems**

Discusses incorporating GIS methods into graduate thesis or dissertation research. Reviews basic mapping concepts (scale and projections), acquiring different types of spatial data (raster and vector), building an error-free database, making simple queries, overlays, charts, and maps. Intended for students who want to learn GIS but lack background skills in computing or cartography.

**Requisites:** Restricted to graduate students only.

**Recommended:** Prerequisite some experience with Mac or Windows.

**Additional Information:** Departmental Category: GIScience

**GEOG 5023 (4) Advanced Quantitative Methods for Spatial Data**

Reviews fundamental statistical and quantitative modeling techniques and introduces more advanced statistical techniques widely used in geography today. Emphasizes geographic examples and spatial problems teaching hands-on skills in statistical programming. Topics covered include generalized linear models, spatial autocorrelation, spatial regression methods, and working with complex datasets.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4023

**Requisites:** Restricted to graduate students only.

**Additional Information:** Departmental Category: Methods

**GEOG 5043 (4) Advanced Geovisualization and Web Mapping**

Advanced technical course in web-based cartography and geovisualization stressing the important role digital cartography plays in cyberspace and society. Focuses on principles of effective cartographic design in multimedia and hypertext environments. Labs are organized around hands-on active learning projects demonstrating skills in geovisualization and cartographic practice.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4043

**Requisites:** Restricted to graduate students only.

**Additional Information:** Departmental Category: Methods

**GEOG 5093 (4) Remote Sensing of the Environment**

Covers acquisition and interpretation of environmental data by remote sensing. Discusses theory and sensors as well as manual and computerized interpretation methods. Stresses infrared and microwave portions of the spectrum.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4093 and GEOL 4093 and GEOL 5093

**Requisites:** Restricted to graduate students only.

**Additional Information:** Departmental Category: Methods

**GEOG 5100 (1-4) Special Topics: Geography**

Covers various topics outside of the normal curriculum; offered intermittently depending on student demand and availability of faculty.

**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.

**Requisites:** Restricted to graduate students only.

**GEOG 5103 (4) Geographic Information Science: Spatial Analytics**

Explores advanced topics in geospatial databases, spatial analytics and geoprocessing in a Geographic Information System (GIS). Emphasizes how geographic concepts are linked to methodological frameworks for recording, transforming, storing/retrieving, analyzing, and processing geographic data as well as various forms of uncertainty. Exercises demonstrate the application of GIS-based methods to real world scenarios in interdisciplinary settings.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4103

**Requisites:** Restricted to graduate students only.

**Additional Information:** Departmental Category: GIScience

**GEOG 5113 (3) Seminar: Geographic Information Systems**

Focuses on the current research topics in geographical information systems and selected areas of application. Includes major journal articles related to each topic. Students complete and present a seminar paper.

**Requisites:** Restricted to graduate students only.

**Recommended:** Prerequisite GEOG 4103 or GEOG 5103 or instructor consent required.

**Additional Information:** Departmental Category: GIScience

**GEOG 5152 (3) History and Theory of Geography**

History of ideas and institutions that have shaped contemporary geographic inquiry. Examines the evolving relations among human geography, physical geography, environment-society relations, and geographic information processing. Designed to situate graduate student research within major subfields and intellectual currents of geography.

**Requisites:** Restricted to Geography (GEOG) graduate students only.

**GEOG 5161 (3) Research Design in Geography**

The human section reads and discusses contemporary research philosophies and methodologies in human geography. Practices the development of research proposals and presentation of research ideas and results. The physical section reads and discusses contemporary research philosophies and methodologies in physical geography (climatology, geomorphology, biogeography, and soils geography). Practices the development of research proposals and presentation of research ideas.

**Requisites:** Restricted to Geography (GEOG) graduate students only.

**Additional Information:** Departmental Category: Physical Geography

**GEOG 5203 (4) Geographic Information Science: Spatial Modeling**

Focuses on the use and development of advanced models for human and environmental applications in a geospatial environment integrating raster and vector data models. Covers terrain and hydrologic modeling, geostatistical modeling, dasymetric modeling, as well as multi-criteria modeling. Group projects critically design, implement and test spatial models to develop independent skillsets in a chosen problem setting.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4203

**Requisites:** Restricted to graduate students only.

**Recommended:** Prerequisite GEOG 4103 or GEOG 5103 or working knowledge of GIS software or instructor consent required.

**Additional Information:** Departmental Category: Methods

**GEOG 5211 (3) Seminar: Physical Climatology**

Involves a research seminar concerned with problems of mass and energy exchange in the Earth-atmosphere system. Selects topics from such areas as air quality, bioclimatology, hydrology, climate change, and the climates of urban, agricultural, and natural environments.

**Requisites:** Restricted to graduate students only.

**Additional Information:** Departmental Category: Physical Geography

**GEOG 5221 (3) Synoptic and Dynamic Climatology**

Examines global climates from the standpoint of synoptic and dynamic climatology.

**Requisites:** Restricted to graduate students only.

**Additional Information:** Departmental Category: Physical Geography

**GEOG 5241 (1-3) Topics in Physical Geography**

Presents recent research topics that vary from year to year. Consult the online Schedule Planner for specific topics.

**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**Requisites:** Restricted to graduate students only.

**Additional Information:** Departmental Category: Physical Geography

**GEOG 5251 (4) Fluvial Geomorphology**

Emphasizes landscapes formed by running water. Includes basic fluid mechanics, sediment transport, hillslope and channel erosion, and sediment yield.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4251

**Requisites:** Restricted to graduate students only.

**Additional Information:** Departmental Category: Physical Geography

**GEOG 5271 (3) The Arctic Climate System**

Understanding the climate of the Arctic requires a synthetic, system oriented approach. The course focuses on the intimate linkages between the atmosphere, ocean and land that give the Arctic region its unique character, link the Arctic to the larger global climate system, and promote understanding the rapid changes occurring in the Arctic.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4271

**Requisites:** Restricted to graduate students only.

**Additional Information:** Departmental Category: Physical Geography

**GEOG 5292 (3) Migration, Immigrant Adaptation, and Development**

historical and current patterns of migration with an emphasis in international movement. Looks at leading migration theories related to both origin- and destination-based explanations while critically looking at the role of development as a potential cause and consequence of population movement. Finally, covers some aspects of immigrants' social and economic adaptation to their host society.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4292

**Requisites:** Restricted to graduate students only.

**GEOG 5303 (4) Geographic Information Science: Spatial Programming**

Focuses on the extension of geographic information systems (GIS) through programming as well as on the development of algorithms for spatial analysis and information extraction in vector and raster data using open source tools. Covers concepts, principles and techniques of programming and solving spatial problems in natural and social science settings. Group projects will foster skillsets in implementing solutions to complex spatial problems.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4303

**Requisites:** Restricted to graduate students only.

**Recommended:** Prerequisite GEOG 4203/5203.

**Additional Information:** Departmental Category: GIScience

**GEOG 5321 (3-4) Snow Hydrology**

Offers a multidisciplinary and quantitative analysis of physico-chemical processes that operate in seasonally snow-covered areas, from the micro- to global-scale: snow accumulation, metamorphism, ablation, chemical properties, biological aspects, electromagnetic properties, remote sensing, GIS and quantitative methods.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4321

**Requisites:** Restricted to graduate students only.

**Additional Information:** Departmental Category: Physical Geography

**GEOG 5331 (3-4) Mountain Climatology**

Surveys and analyzes climatic characteristics of mountain environments worldwide.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4331

**Requisites:** Restricted to graduate students only.

**Additional Information:** Departmental Category: Physical Geography

**GEOG 5371 (3) Forest Geography: Principles and Dynamics**

Surveys principles of forest geography and ecology. Includes both individual tree responses to environmental factors and species interactions within communities. Emphasizes forest dynamics and their relation to management problems.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4371

**Requisites:** Restricted to graduate students only.

**Additional Information:** Departmental Category: Physical Geography

**GEOG 5391 (3) Seminar: Biogeography**

Considers in detail current research themes in biogeography. Includes intensive reading of current research literature and preparation of research papers. Topics vary.

**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**Requisites:** Restricted to graduate students only.

**Additional Information:** Departmental Category: Physical Geography

**GEOG 5401 (3) Soils Geography**

Discusses chemical and physical properties of soils, soil development, distributions and management relevant to understanding plant-soil relationships in natural and human-altered landscapes.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4401

**Requisites:** Restricted to graduate students only.

**Additional Information:** Departmental Category: Physical Geography

**GEOG 5403 (3) Geographic Information Science: Space Time Analytics**

Focuses on understanding processes (human, natural, social or physical) through data driven analysis of patterns in spatio-temporal data. Covers a wide range of topics relevant to space time data, including pattern analysis, modeling and visualization as well as time geography and various contemporary issues in space time analytics. Utilizes a hands-on, flipped classroom approach with in-class development of technical skills.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4403

**Requisites:** Restricted to graduate students only.

**GEOG 5463 (3) Earth Analytics Data Science Bootcamp**

Learn key skills to automate data processing and visualization workflows that support both repeatable analysis and collaborative project approaches using scientific programming, version control and project management tools. Covers working with heterogeneous, large spatio-temporal data derived from space, airborne and ground based sensors and other sources. Gain applied experience through group projects that address real world problems.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4463

**Requisites:** Restricted to graduate students only.

**Grading Basis:** Letter Grade

**GEOG 5501 (3) Water Resources and Water Management of Western United States**

Interprets and analyzes hydroclimatic data, surface and groundwater. Critically evaluates water use, emphasizing problems associated with geographic maldistribution, appropriations, irrigation, industry, pollution and regional development.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4501

**Requisites:** Restricted to graduate students only.

**Additional Information:** Departmental Category: Environment-Society Geography

**GEOG 5503 (3) Geographic Information Science: Project Management**

Managing a geospatial project encompasses problem identification, project design, analysis and supporting team dynamics. The class mixes lectures and class exercises with student-selected projects and works through all stages of a project from articulating an initial idea to project planning and scoping, building a work plan, timeline and budget, executing the work plan and evaluating a project's progress.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4503

**Requisites:** Requires prerequisite course of GEOG 5103 (minimum grade C-).

**GEOG 5563 (3) Earth Analytics**

Introduce students to major unanswered questions in Earth science and to the analytical tools, including data management, analysis and visualization, necessary to explore 'big data' from a suite of sensors. Aligns with Earth Lab, a new initiative of the University's Grand Challenge (<http://www.colorado.edu/grandchallenges/>) to use our expertise in space-based observation to address our world's most pressing problem. Comparable programming course work may be substituted for GEOG 5463 with instructor approval.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4563

**Requisites:** Requires prerequisite course of GEOG 5463 (min grade B-) Restricted to graduate students only.

**Grading Basis:** Letter Grade

**GEOG 5603 (3) GIS in the Social and Natural Sciences**

Introduces Geographic Information Systems and their underlying principles through interactive lectures and lab exercises. Students get basic skills for working in a GIS environment and learn how to handle and manage geospatial data, create maps and conduct geospatial analysis focusing on project tasks typically encountered in the social and natural sciences.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4603

**GEOG 5622 (3) City Life**

Analyzes social, behavioral, political and demographic factors that influence development and maintenance of communities in contemporary urban environments, with primary emphasis on U.S. cities.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4622

**Requisites:** Restricted to graduate students only.

**GEOG 5632 (3) Development Geography**

Provides an overview of development policy and practice, surveying foundational works in Development Studies as well as critical interventions. Required for Graduate Certificate in Development Studies.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4632

**Requisites:** Restricted to graduate students only.

**GEOG 5642 (3) Seminar: Urban Geography**

Surveys current research topics in urban geography. Emphasizes definition of possible student thesis topics.

**Requisites:** Restricted to graduate students only.

**GEOG 5652 (3) Introduction to Social Theory**

Surveys theoretical paradigms in the social sciences. Includes canonical works from the history of the social sciences as well as contemporary theorists. Appropriate for beginning to advanced graduate students doing qualitative research.

**Requisites:** Restricted to graduate students only.

**GEOG 5662 (3) Seminar: Topics in Economic Geography**

Covers selected topics emphasizing faculty specialties. Topics vary with instructor. Check with department for semester offerings.

**Repeatable:** Repeatable for up to 3.00 total credit hours.

**Requisites:** Restricted to graduate students only.

**GEOG 5663 (1-3) Earth Analytics Applications**

Develop expertise in finding, organizing, managing and processing large, heterogeneous, spatio-temporal data to address a real-world problem. Students will work collaboratively on semi-guided science project. Students gain critical skills required to understand data structures, utilize APIs, extract insight from data and understand how uncertainty propagates. Culminates with a formal presentation of project results.

**Repeatable:** Repeatable for up to 3.00 total credit hours.

**Requisites:** Requires prerequisite course of GEOG 5463 and GEOG 5563 (min grade B-) Restricted to graduate students only.

**Grading Basis:** Letter Grade

**GEOG 5712 (3) Political Geography**

Systematic study of relations between geography and politics, especially as background for better understanding of international affairs. Includes topics such as frontiers and boundaries, power analysis, geopolitics, international political economy, and strategic concepts.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4712

**Requisites:** Restricted to graduate students only.

**GEOG 5722 (3) Field Methods in Human Geography**

Examines research methods associated with field work in human geography. Prepares students for fieldwork by focusing on geographic and interdisciplinary field work techniques; interpretation of field data; discussion of the politics, ethics and gender, race, class and cross-cultural issues related to field work.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4722

**Requisites:** Restricted to graduate students only.

**GEOG 5732 (3) Population Geography**

Emphasizes spatial aspects of population characteristics including fertility, mortality, migration, distribution and composition. Includes both theoretical and empirical considerations, in addition to field work and computer simulations.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4732

**Requisites:** Restricted to graduate students only.

**GEOG 5750 (3) Climate Politics and Science-Policy**

Explores, understands and critically analyzes influences and trends in climate politics and science-policy. Course participants will gain an improved understanding of the myriad factors, pressures and processes that are involved in contemporary climate politics undergirding explicit policy proposals. Course participants will more capably identify consequential spaces of decision-making, recognize tractable places for change and fashion constructive strategies for their own research by way of best available evidence from work done in these areas. Overall, our attention to these course themes, concepts and case studies will help us to more capably understand, analyze and engage in the high-stakes 21st century arena of climate politics and science-policy. Previously offered as a special topics course.

**Equivalent - Duplicate Degree Credit Not Granted:** ENVM 5750, ENVS 5750 and SOCY 5750

**Requisites:** Restricted to graduate students only.

**Grading Basis:** Letter Grade

**GEOG 5782 (3) Sustainable Development: Critique**

Investigates historical and contemporary theories and critiques of development and their implications for geographic theory and method. Focuses on the role of representation in evaluating case studies and examining the potential for a sustainable development.

**Requisites:** Restricted to graduate students only.

**GEOG 5832 (3) Geography of Tibet**

Rigorously examines contemporary Tibetan society, culture and nature from a geographical perspective. Uses readings on contemporary Tibet as an entry point into scholarly research about nationalism, representation, diaspora, landscape and place, sustainable development, natural resource management, identity and environmentalism.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4832

**Requisites:** Restricted to graduate students only.

**Additional Information:** Departmental Category: Asia Content

**GEOG 5840 (1-3) Graduate Independent Study**

Offers independent research for master's students only. Instructor consent required.

**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**Requisites:** Restricted to graduate students only.

**GEOG 5842 (3) Global Frontiers in Southeast Asia**

Uses the theme of the global frontier to examine and compare three key moments in the modern history of Southeast Asia: the colonial encounter, the rise of the modern territorial state, and the age of contemporary globalization. Examines case studies from earlier eras to analyze emerging global frontiers at the junction of state territoriality and transnational economic expansion.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4842 and ASIA 4842

**Requisites:** Restricted to graduate students only.

**GEOG 5852 (3) Health and Medical Geography**

Examines geographical patterns of health and disease with an emphasis on global health issues. Focuses on three major approaches to medical geographic research: ecological approaches, which systematically analyze relationships between people and their environments; social approaches, including political economy and socio-behavioral approaches; and spatial approaches, which employ maps and spatial analysis to identify patterns of health and disease. Elective course for Public Health Certificate.

**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4852

**Requisites:** Restricted to graduate students only.

**GEOG 5930 (3) Advanced Internship**

Provides an academically supervised opportunity for graduate-level geography majors to work in public and private organizations on advanced projects related to geographic theory and their career goals. Instructor consent required.

**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**Requisites:** Restricted to graduate students only.

**GEOG 5961 (3) Theories of Climate and Climate Variability**

Critically reviews current theories of climatic variability based on analysis of the different physical processes affecting climate.

**Requisites:** Restricted to graduate students only.

**Additional Information:** Departmental Category: Physical Geography

**GEOG 6180 (1-3) Seminar: Geographic Problems**

Applies research methods to selected problems. Topics vary with instructor.

**Repeatable:** Repeatable for up to 7.00 total credit hours.

**Requisites:** Restricted to graduate students only.

**GEOG 6211 (1-3) Readings in Climatology**

Discusses selected topics in current climatological literature. Specific themes vary.

**Repeatable:** Repeatable for up to 7.00 total credit hours.

**Requisites:** Restricted to graduate students only.

**Additional Information:** Departmental Category: Physical Geography

**GEOG 6402 (3) Seminar: Political Ecology**

Critically examines the politics of human-environment relationships across cultures and societies. Focuses on environmental degradation, change and management from the perspectives including political economy, cultural politics, STS and post structural theory.

**Repeatable:** Repeatable for up to 6.00 total credit hours.

**Requisites:** Restricted to graduate students only.

**GEOG 6712 (3) Seminar: Political Geography**

Considers in detail history and methodology of the field, including an analysis of selected systematic topics such as frontiers and boundaries, international rivers, conflicting claims to territory, and electoral geography.

**Repeatable:** Repeatable for up to 7.00 total credit hours.

**Requisites:** Restricted to graduate students only.

**GEOG 6732 (3) Formal Population Geography: Analysis and Forecasting**

In-depth introduction to formal demography. In addition to learning the basic demographic tools used nowadays in fertility, marriage, mortality, migration and forecasting/projections, it also looks at some potential links between formal and statistical demographic work that would enable the student to apply some of the methods learnt in an econometric or multivariate setting.

**Requisites:** Restricted to graduate students only.

**Recommended:** Prerequisite GEOG 5023.

**GEOG 6742 (3) Seminar: Cultural Geography**

Explores various geographic topics emphasizing the concept of culture. Emergence of several points of view in the development of cultural geography.

**Repeatable:** Repeatable for up to 7.00 total credit hours.

**Requisites:** Restricted to graduate students only.

**GEOG 6940 (1) Master's Candidate for Degree**

Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.

**Requisites:** Restricted to graduate students only.



**GEOG 6950 (1-6) Master's Thesis**

Instructor consent required.

**Repeatable:** Repeatable for up to 6.00 total credit hours.

**Requisites:** Restricted to graduate students only.

**GEOG 7118 (3) Foundations of Environmental Justice**

Examines environmental justice movements, policies, institutions, objectives, and scholarship. Identifies factors that contribute to environmental inequality, and efforts to reduce it. Formerly offered as a special topics course.

**Equivalent - Duplicate Degree Credit Not Granted:** COMM 7118, ENVS 7118 and PSCI 7118

**Requisites:** Restricted to graduate students only.

**GEOG 7840 (1-3) Graduate Independent Study**

Offers independent research for doctoral students only. Instructor consent required.

**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**Requisites:** Restricted to graduate students only.

**GEOG 8990 (1-10) Doctoral Dissertation**

All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section. Instructor consent required.

**Repeatable:** Repeatable for up to 30.00 total credit hours.

**Requisites:** Restricted to graduate students only.