ENGINEERING AND APPLIED SCIENCE

Interdisciplinary programs managed by the College (http://www.colorado.edu/engineering) are included here. The listing of courses includes interdisciplinary courses as well as those offered by the Engineering Honors Program (http://www.cuhonorsengineering.com), Engineering Leadership Program (https://www.colorado.edu/engineeringleadershipprogram) and the Herbst Program for Engineering, Ethics & Society (http://www.colorado.edu/herbst).

Minors

- Energy Engineering - Minor (catalog.colorado.edu/undergraduate/colleges-schools/engineering-applied-science/programs-study/engineering-applied-science/energy-engineering-minor)
- Global Engineering - Minor (catalog.colorado.edu/undergraduate/colleges-schools/engineering-applied-science/programs-study/engineering-applied-science/global-engineering-minor)

Certificates

- Engineering Leadership - Certificate (catalog.colorado.edu/undergraduate/colleges-schools/engineering-applied-science/programs-study/engineering-applied-science/engineering-leadership-certificate)
- Engineering, Science and Society - Certificate (catalog.colorado.edu/undergraduate/colleges-schools/engineering-applied-science/programs-study/engineering-applied-science/engineering-science-society-certificate)
- Lighting Design - Certificate (catalog.colorado.edu/undergraduate/colleges-schools/engineering-applied-science/programs-study/engineering-applied-science/lighting-design-certificate)

COEN 1350 (1) Calculus 1 Work Group
Provides problem-solving assistance to students enrolled in APPM 1350. Student groups work in collaborative learning environment. Student participation is essential.
Repeatable: Repeatable for up to 2.00 total credit hours.
Requisites: Requires enrollment in corequisite course of APPM 1350 or APPM 1345.
Grading Basis: Pass/Fail

COEN 1360 (1) Calculus 2 Work Group
Provides problem solving assistance for students enrolled in APPM 1360. Conducted in a collaborative learning environment. Student work groups solve calculus problems with assistance of facilitator.
Requisites: Requires enrollment in corequisite course of APPM 1360.
Grading Basis: Pass/Fail

COEN 1400 (3) Project Design
Teams of first-year students solve real engineering design problems. Curriculum focuses on an iterative design process, teamwork, analysis, and technical writing.
Requisites: Restricted to students with 0-75 units completed and restricted to Pre-Engineering (PREE or PREN-COS) students only.

COEN 1500 (1) Introduction to Engineering
Provides an introduction to the engineering profession, including an examination of current discipline specializations and a focus on career paths for those trained in engineering. Provides sufficient knowledge of the engineering disciplines necessary to make an informed major choice.
Requisites: Restricted to students with 0-56 (Freshmen or Sophomore) College of Engineering or Pre-Engineering Arts and Sciences majors only.

COEN 1510 (1) Self Management and Leadership Principles 1
Prepares first-year students for personal and academic success in their transition to college. Focuses on academic success strategies, time and stress management, study skills, S.M.A.R.T. goal setting and developing self-awareness. Students identify their strengths and participate in peer-to-peer interaction to foster collaboration and community. Students will also explore leadership capabilities, professional development, and insights into career interests. Speakers provide students with unique insights into academic and engineering experiences.
Requisites: Restricted to Engineering Goldshirt (PENG) students only.

COEN 1520 (1) Self Management and Leadership Principles 2
Continuation of COEN 1510. Self-management and student development is reiterated. Includes time and stress management, study skills and S.M.A.R.T. goal setting. Leadership skills are explored through group projects. Students complete professional development activities and assignments geared toward preparing students for engineering internships and research opportunities.
Requisites: Requires prerequisite course of COEN 1510 (minimum grade C). Restricted to Engineering Goldshirt (PENG) students only.

COEN 1550 (1) YOU'RE@CU: Undergraduate Career Seminar
Exposes first or second year undergraduate students to engineering research careers through a partner program (YOU'RE@CU), panel discussions with researchers in academics and industry, and exposure to research labs. Restricted to YOU'RE@CU participants. Department consent required.
Grading Basis: Pass/Fail

COEN 1830 (1) Special Topics: Engineering First-Year Symposium
Explores topics of interest in transitioning to the College of Engineering and succeeding in STEM majors.
Requisites: Restricted to freshmen College of Engineering and Pre-Engineering majors only.

COEN 2350 (1) Calculus 3 Work Group
Provides problem solving assistance to students enrolled in APPM 2350. Conducted in a collaborative learning environment. Student work groups solve calculus problems with the assistance of a facilitator.
Requisites: Requires enrollment in corequisite course of APPM 2350.
Grading Basis: Pass/Fail

COEN 2830 (1-3) Special Topics
Explores topics of interest in engineering. Content varies by instructor and semester.
Repeatable: Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
Requisites: Restricted to College of Engineering (ENGRU) undergraduates only.

COEN 2850 (1-3) Independent Study
Provides opportunities for independent study at the lower-division undergraduate level. Subject and/or project agreed upon by the student and the instructor to fit the needs of the student.
Repeatable: Repeatable for up to 6.00 total credit hours.
Requisites: Restricted to College of Engineering (ENGRU) undergraduates only.
COEN 2880 (1) Fresh Start for Success
Fresh Start is a class for students in the College of Engineering who wish to have just that ¿ a Fresh Start! This class focuses on learning the skills necessary to achieve academic and personal change goals. Topics include the science of learning (metacognition) and strategies to use metacognition in everyday life; including mastery of material in engineering, successful test taking, maintaining balance throughout the semester, and the science of change and how to create sustainable change. This class is focused on the actions necessary to create change, where each student must engage in the class and commit to applying the knowledge and skills acquired during lessons and reflection to their other classes and elsewhere in their life. This course is best suited for students looking to have greater success in achieving academic goals.
Repeatable: Repeatable for up to 2.00 total credit hours.
Requisites: Restricted to Engineering Fresh Start (PEEA) students only.
Grading Basis: Letter Grade

COEN 3051 (2) Leadership Seminar 1: Launching the Leadership Experience
Practicing needs assessment, decision-making and planning skills, students take this seminar to prepare for their Leadership Experience (required for completion of the Engineering Leadership Certificate). Students work in collaboration with each other, their Engineering Leadership Program mentors and campus/community organizations and leaders to lay the foundation for and launch their individually unique Leadership Experiences.
Requisites: Requires a prerequisite course of COEN 2050 (minimum grade C). Restricted to Engineering Leadership Program (PENL) students only.
Grading Basis: Letter Grade

COEN 3052 (2) Leadership Seminar 2: Leadership Experience
Tackling a leadership experience of their own design, students undertake a key component of the Engineering Leadership Program experience and a requirement for the completion of the Engineering Leadership Certificate. Guides students through a process of planning, executing and evaluating their leadership experience and progress toward personalized leadership development goals. Coursework involves working with a mentor, collaborating with peers and conducting research.
Requisites: Requires a prerequisite course of COEN 2050 (minimum grade D). Restricted to Engineering Leadership Program (PENL) students only.
Grading Basis: Letter Grade

COEN 3053 (2) Leadership Seminar 3: ELP Synthesis and Final ePortfolio
Progressing through this course, students complete the ePortfolio that demonstrates fulfillment of the requirements of the Engineering Leadership Certificate, reflecting upon synthesizing and discerning practical applications of the leadership experiences tackled throughout their time at CU.
Requisites: Restricted to Engineering Leadership Program (PENL) students only.
Grading Basis: Letter Grade

COEN 3210 (3) Climate Change and Engineering
Explores the fundamentals of climate change science, but from an engineering perspective. After learning the fundamentals, the relationship between climate change and different engineering disciplines will be discussed. Topics covered include geoengineering, renewable energy, sustainable engineering, coastal engineering, building design, etc. Career options and entrepreneurial opportunities will also be discussed.
Requisites: Requires prerequisite courses of PHYS 1110 and APPM 1350 (minimum grade D-).
Grading Basis: Letter Grade

COEN 3930 (3-6) Engineering Internship/Co-op
Students enrolled in this course participate in a pre-approved internship or cooperative education program with an employer that allows them to explore the relationship between theory and practice and demonstrate evidence of significant learning (e.g., academic assignments and employer/sponsor evaluations). Pass/Fail only. Up to 3 credits may apply towards BS degree program's Free Electives (even if student has multiple enrollments in this course and/or COEN 4950). Students should contact the CEAS Extracurricular Programs Manager for more information. Minimum 2.75 cumulative GPA is required.
Repeatable: Repeatable for up to 24.00 total credit hours.
Requisites: Restricted to College of Engineering (ENGRU) undergraduates only.
Grading Basis: Pass/Fail

COEN 4000 (1-3) Global Intensive Studies
Provides a hands-on exploration of a particular engineering/applied science subject area in an overseas setting. Serves as a complement to an existing engineering or applied science course taught at CU. Topic areas will vary.
Equivalent - Duplicate Degree Credit Not Granted: COEN 5000
Repeatable: Repeatable for up to 6.00 total credit hours.

COEN 4830 (1-3) Special Topics
Explores topics of interest in engineering. Content varies by instructor and semester.
Repeatable: Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
Requisites: Restricted to College of Engineering (ENGRU) undergraduates only.

COEN 4850 (1-3) Independent Study
Provides opportunities for independent study at the upper-division undergraduate level. Subject and/or project agreed upon by the student and the instructor to fit the needs of the student.
Repeatable: Repeatable for up to 6.00 total credit hours.
Requisites: Restricted to College of Engineering (ENGRU) undergraduates only.

COEN 4950 (1-6) Global Engineering Internship
Students enrolled in this course participate in a pre-approved global internship with an employer that allows them to explore the relationship between theory and practice and demonstrate evidence of significant learning (e.g., academic assignments and employer/sponsor evaluations). Pass/Fail only. Up to 3 credits may apply towards BS degree program's Free Electives (even if student has multiple enrollments in this course and/or COEN 3930). Students may also earn COEN 4950 credit for international internship facilitated through CU-approved providers that contract with CU's Education Abroad Office. These placements must be pre-approved by the student's department/program to be eligible for credit. Students should contact the CEAS International Programs Director for more information. Minimum 2.75 cumulative GPA required.
Repeatable: Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
Requisites: Restricted to College of Engineering (ENGRU) undergraduates only.
Grading Basis: Pass/Fail

COEN 5000 (1-3) Global Intensive Studies
Provides a hands-on exploration of a particular engineering/applied science subject area in an overseas setting. Serves as a complement to an existing engineering or applied science course taught at CU. Topic areas will vary.
Equivalent - Duplicate Degree Credit Not Granted: COEN 4000
Repeatable: Repeatable for up to 6.00 total credit hours.
COEN 5550 (3) Designing for Defense
Designing for Defense/Hacking for Defense is a national service program running at leading research universities across the country. Interdisciplinary teams, chosen by competitive selection, work on real-world national security challenges, in close contact with national security agencies. Teams employ the Lean Launchpad entrepreneurship methodology to develop engineering and business concepts to solve real world challenges for special operations forces, the intelligence community, and other government agencies. Winning teams are eligible for real-world capital investment.
Equivalent - Duplicate Degree Credit Not Granted: CYBR 5550 and CSCI 5550
Grading Basis: Letter Grade

COEN 5830 (1-6) Special Topics
Explores topics of interest in engineering. Content varies by instructor and semester. May be repeated for up to 9 total credit hours.
Repeatable: Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
Requisites: Restricted to College of Engineering graduate students only.
Grading Basis: Letter Grade

EDEN 4147 (3) A Systems Approach to Global Engineering
Introduces engineering students to the global context in which engineers are asked to operate in the 21st century using system dynamics tools and other decision-making tools (network analysis, agent based modeling, etc.) necessary to analyze the uncertainty and complexity inherent in global projects.
Equivalent - Duplicate Degree Credit Not Granted: CVEN 4157, CVEN 5157 and EDEN 5147

EDEN 5001 (1-3) Special Topics in Global Engineering
At the graduate level, covers topics of interest in global engineering. Content varies by section and from semester to semester.
Repeatable: Repeatable for up to 18.00 total credit hours. Allows multiple enrollment in term.

EDEN 5147 (3) A Systems Approach to Global Engineering
Introduces engineering students to the global context in which engineers are asked to operate in the 21st century using system dynamics tools and other decision-making tools (network analysis, agent based modeling, etc.) necessary to analyze the uncertainty and complexity inherent in global projects.
Equivalent - Duplicate Degree Credit Not Granted: EDEN 4147, CVEN 4157 and CVEN 5157

EHON 1151 (3) Critical Encounters
Explores critical, literary and philosophical approaches to the following related problems: 1) how we organize knowledge and construct meaning, and 2) how we locate a sense of self as both individuals and members of various groups amidst the resources and demands of competing interpretations, traditions challenges and circumstances. Department restriction, honors standing or instructor consent required.
Requisites: Restricted to Engineering Honors Program (PEHN) students only.

EHON 1500 (1) Honors Reading Group
Faculty led reading seminars, focusing on specific test or texts chosen by the faculty. Special attention will be paid to group formation and the process of collaborative learning
Requisites: Restricted to Engineering Honors Program (PEHN) students only.
Additional Information: Engineering Honors Course

EHON 3843 (3) Special Topics
Explores different important themes relative to the Engineering Honors Program. Check with department for specific semester topics.
Repeatable: Repeatable for up to 3.00 total credit hours.
Requisites: Restricted to Engineering Honors Program (PEHN) students only.
Additional Information: Engineering Honors Course

EHON 4051 (1) Dimensions of Leadership
Explores the many dimensions of leadership that exceed technical knowledge: the ethical, societal, cultural, interpersonal, and personal. Through seminars, workshops and exposure to leaders, students will reflect upon their engineering education in light of the multifaceted demands of effective leadership and their own personal career goals. Students will take an active role in shaping the course. Department restriction, honors standing or instructor consent required.
Repeatable: Repeatable for up to 3.00 total credit hours.
Requisites: Restricted to students with 57-180 credits (Juniors or Seniors).

ENEN 4147 (3) A Systems Approach to Global Engineering
Introduces engineering students to the global context in which engineers are asked to operate in the 21st century using system dynamics tools and other decision-making tools (network analysis, agent based modeling, etc.) necessary to analyze the uncertainty and complexity inherent in global projects.
Equivalent - Duplicate Degree Credit Not Granted: CVEN 4157, CVEN 5157 and EDEN 5147

ENEN 4600 (3) Interdisciplinary Energy Engineering Projects
Prepares students to analyze energy systems from technical, economic, and policy perspectives with project topics varying by semester. Provides historical and contemporary context of the energy landscape. Emphasizes application of engineering fundamentals for the design and evaluation of real world energy systems. Projects will be completed by working in interdisciplinary teams.
Requisites: Requires prerequisite course of CHEN 3660 (minimum grade C). Restricted to Energy Engineering Minor (ENMR-MIN) students with 87-180 credits (Seniors).
Grading Basis: Letter Grade

ENEN 4321 (3) Oil and Gas Processing
Provides a foundation in the fundamentals of oil and gas processing, including discovery, extraction and refining. Due to the importance of oil and gas in the current energy infrastructure, this course provides a broad understanding of the industry to students interested in energy engineering.
Requisites: Restricted to students with 57-180 credits (Juniors or Seniors).

ENEN 4840 (1-6) Special Topics
Explores topics related to energy engineering. Content will vary by semester and instructor.
Repeatable: Repeatable for up to 6.00 total credit hours.
Requisites: Restricted to College of Engineering (ENGRU) undergraduates only.

ENEN 4600 (3) Interdisciplinary Energy Engineering Projects
Prepares students to analyze energy systems from technical, economic, and policy perspectives with project topics varying by semester. Provides historical and contemporary context of the energy landscape. Emphasizes application of engineering fundamentals for the design and evaluation of real world energy systems. Projects will be completed by working in interdisciplinary teams.
Requisites: Requires prerequisite course of CHEN 3660 (minimum grade C). Restricted to Energy Engineering Minor (ENMR-MIN) students with 87-180 credits (Seniors).
Grading Basis: Letter Grade

ENEX 5001 (1-6) Special Topics
Explores topics related to energy engineering. Content will vary by semester and instructor.
Repeatable: Repeatable for up to 6.00 total credit hours.
Requisites: Restricted to College of Engineering (ENGRU) undergraduates only.

ENEX 5840 (1-6) Special Topics
Explores topics related to energy engineering. Content will vary by semester and instructor.
Repeatable: Repeatable for up to 6.00 total credit hours.
Requisites: Restricted to College of Engineering graduate students only.
ENLP 2000 (3) Leadership, Fame and Failure
Examines the ambition, moral character, prudence and grit required for effective leadership. Common causes of leadership failure are also considered. A wide variety of ancient and modern leaders are studied in the disciplines of science and technology, politics, business and military affairs using primary source readings in history, philosophy and literature. Also explores whether leadership is a teachable art.

**Requisites:** Restricted to College of Engineering undergraduate students only.

**Grading Basis:** Letter Grade

ENLP 3000 (3) Intelligent Leadership
Investigates what it means to be a "smart" leader. In small, discussion-based classes, explores science fiction texts and social science research that generate fundamental questions about the dimensions, manifestations and value of intelligence in contexts related to leadership. Students explore social science research about how course themes are reflected in present-day, "real-life" technologies, policies and cultural phenomena.

**Requisites:** Restricted to College of Engineering undergraduate students only.

**Grading Basis:** Letter Grade

ENLP 3100 (3-4) Complex Leadership Challenges
Approaches leadership as a process of inquiry, empathy, and action, cultivating skills leaders need to understand, communicate about, and generate innovative approaches to complex issues. Each student conducts extensive, principled research about a complex social issue of their choice, investigating its multidimensionality by applying different analytic lenses. Instructor consent required for students not in Engineering Leadership. Formerly COEN 3050.

**Grading Basis:** Letter Grade

ENLP 4000 (3) The Empire of Modern Science
Examines science and technology’s rise to the status of political, cultural and economic leader of the modern world. Also considers the ambitions and limits of the modern scientific enterprise, and investigates whether scientists are adequately equipped to lead humanity’s political, spiritual and evolutionary future. Readings are drawn from primary sources in history, economics, politics, philosophy and literature.

**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**Recommended:** this course is recommended for Sophomores, Juniors, and Seniors.

**Grading Basis:** Letter Grade