Civil and Environmental Engineering

Overview

The Department of Civil and Environmental Engineering (CEE) at UC Berkeley is a worldwide leader in developing engineering solutions to societal-scale challenges. The Department conducts cutting-edge research, in evolving and vital areas that address societal needs for well-designed and well-operated buildings, energy, transportation, and water systems. These critical systems must be reliable and resilient in the face of hazards such as earthquakes and flooding. Extensive efforts will be needed to adapt civil infrastructure to withstand adverse changes in weather and climate. Our research and teaching serve the needs of a growing and increasingly urban world population that requires sustainable improvements in standards of living.

CEE research establishes and advances the intellectual foundations of new fields of study. We develop theory and improve understanding, and provide tools and techniques for solving important new problems. Educational activities of the Department focus on developing future leaders in the engineering profession, in academia, and in the broader societal context. Through individual and collective efforts, the Department serves the needs of our College and University, and provides technical expertise and service to other public, private, and professional entities.

The Department is a place of intellectual vitality and diversity in which all students, faculty, and staff have the opportunity and the impetus to achieve their highest potential. Signs of this vitality and diversity are seen in innovative research conducted by students and faculty; creative, flexible, adaptable, and forward-looking curricula; outstanding classroom teaching; attentive academic mentoring; and a shared sense of a community that is inclusive and respectful of all members. We are proud of our contributions to the public mission of the University of California, as demonstrated for example by our role in providing access to higher education for students from low and middle-income families.

Libraries

The Kresge Engineering Library (http://www.lib.berkeley.edu/ENGI/), located in the nearby Stephen D. Bechtel Engineering Center, contains over more than 175,000 volumes, more than 2,000 journals and periodicals, and 680,000 technical reports.

The Water Resources Center Archives (http://library.ucr.edu/wrca/), located at UC Riverside, specializes in material related to hydraulics, hydrology, and coastal engineering, with 100,000 titles in water resources and over 15,000 reports and papers on ocean engineering and oceanography.

The Institute of Transportation Studies Harmer E. Davis Library (http://library.its.berkeley.edu/) contains one of the largest multimodal, interdisciplinary transportation reference and research collections in the world. The library holds over 125,000 volumes and receives more than 2,500 serials. The library is also a depository for government transportation publications.

The Earthquake Engineering Research Center (EERC) Library (http://nisee.berkeley.edu/elibrary/) is an affiliated library of UC Berkeley, specializing in structural engineering, geotechnical engineering, engineering dynamics, engineering seismology, and earthquake public policy. It is located at the Richmond Field Station, five miles from the main Berkeley campus and is accessible by a Berkeley-RFS shuttle.

Research Laboratories

Located on the second floor of Davis Hall within the UC Berkeley campus, the Structural and Materials Laboratory (http://www.ce.berkeley.edu/testing-facilities/structures/) houses equipment for studying the behavior of structural elements and systems on both scale models and prototypes. The laboratory is based upon the base-isolated strong floor, to which the reaction frames, actuators, and specimens are securely fastened during the tests. Testing facilities range from miniaturized precision equipment to a four-million-pound capacity testing machine.

The Environmental Fluid Mechanics Laboratory, located in O'Brien Hall, is equipped for experimental work in general fluid mechanics, granular flow, water-sediment interactions, hydraulic structures, wave hydrodynamics, and sediment transport that supports field-based studies of environmental hydrodynamics. Hydrology laboratories in Davis Hall provide equipment and instrumentation supporting terrestrial, ecological and in-channel hydrology, and field deployment staging areas. Several large-scale experimental facilities are available at the Richmond Field Station, including a wave flume, a tow tank and a large wave basin. Computational facilities are available through the Berkeley Research Computing program.

Environmental Quality laboratories are located in Davis and O'Brien Halls. The campus laboratories for research and teaching are configured for organic and inorganic chemical analysis in air, water, and soils; process analysis for aerosol dynamics, biological transformations, photochemical reactions, and mass transfer rates in porous media; and computational facilities to support environmental transport modeling. Additional facilities, including mesocosms and experimental wetlands, are utilized at the Richmond Field Station and at Lawrence Berkeley National Laboratory.

The Geotechnical Engineering Laboratories (on campus) and the Soil Mechanics and Bituminous Materials Laboratory (situated at the Richmond Field Station) provide extensive facilities for research on soil and rock properties, soil and rock mechanics, foundation engineering, and the behavior and properties of asphalts and asphaltic mixtures. State-of-the-art computer facilities are available for test control, data acquisition, data processing, and numerical analysis. Graduate students working toward master's or doctoral degrees in the Department of Civil and Environmental Engineering conduct individual research in these laboratories, usually as part of a continuing program of research conducted by faculty members.

Research Groups

The Center for Smart Infrastructure (https://web.archive.org/web/20200711222908/http://cgdm.berkeley.edu/) was formed in 2021 as a collaboration between UC Berkeley and the East Bay Municipal Utility District (EBMUD). The center, based at Richmond Field Station, applies cutting-edge technology to tackle infrastructure challenges caused by climate change, aging systems and natural hazards.

The Consortium on Green Design and Manufacturing (http://cgdm.berkeley.edu/) (CGDM) was formed to encourage multidisciplinary research and education on environmental management, design for environment, and pollution prevention issues in critical industries.

The Institute for Environmental Science and Engineering (IESE) is an interdisciplinary Organized Research Unit of UC Berkeley that has a mandate to support research that helps protect public health and the environment. The institute plays a major role in supporting the efforts of the Berkeley Water Center, an organization that coordinates campus-wide research on topics such as urban water infrastructure, water and sanitation in developing countries, and water-related climate change adaptation.

The Institute of Transportation Studies (ITS) (http://www.its.berkeley.edu/) is a multidisciplinary program that has supported transportation research at the University of California since 1948. The ITS administers several Organized Research Units, including Partners for Advanced Transit and Highways (PATH) (http://www.path.berkeley.edu/) and the Pavement Research Center (http://www.ucprc.ucdavis.edu/). The ITS is a member of the National Center of Excellence for Aviation Operations Research (http://www.nextor.org/) consortium and is the home of the University of California Transportation Center (http://www.uctc.net/).

The Pacific Earthquake Engineering Research Center (http://peer.berkeley.edu/) (PEER) is a multi-institutional research and education center with headquarters at UC Berkeley. Investigators from over 20 universities, several consulting companies, and researchers at various state and federal government agencies contribute to research programs focused on performance-based earthquake engineering. These programs aim to identify and reduce the risks from major earthquakes to life safety and to the economy by including research in a wide variety of disciplines, including structural and geotechnical engineering, geology/seismology, lifelines, transportation, architecture, economics, risk management, and public policy. The center also provides software through the Open System for Earthquake Engineering Simulation (OPENSEES) project (http://opensees.berkeley.edu/), operates the NISEE Library (http://nisee.berkeley.edu/), and houses a Strong Motions Database (http://peer.berkeley.edu/products/strong_ground_motion_db.html) of earthquake records.

The Project Production Systems Laboratory (http://p2sl.berkeley.edu/) (P2SL) at UC Berkeley is a research institute dedicated to developing and deploying knowledge and tools for project management. P2SL staff and students partner with companies worldwide, and especially those involved in the Northern California construction industry, to advance the theory and implementation of the lean construction philosophy, principles, and methods in the industry, its companies, and its projects.

Undergraduate Programs

Civil Engineering (http://guide.berkeley.edu/undergraduate/degree-programs/civil-engineering/): BS
Environmental Engineering (http://guide.berkeley.edu/undergraduate/degree-programs/environmental-engineering/): Minor
Geotechnical Engineering (http://guide.berkeley.edu/undergraduate/degree-programs/geosystems/): Minor
Structural Engineering (http://guide.berkeley.edu/undergraduate/degree-programs/structural-engineering/): Minor

Graduate Programs

Civil and Environmental Engineering (http://guide.berkeley.edu/graduate/degree-programs/civil-environmental-engineering/): MEng, MS, PhD

Civil and Environmental Engineering

Expand all course descriptions [+]Collapse all course descriptions [-]

CIV ENG 11 Engineered Systems and Sustainability 3 Units

Terms offered: Fall 2022, Spring 2022, Fall 2021
An introduction to key engineered systems (e.g., energy, water supply, buildings, transportation) and their environmental impacts. Basic principles of environmental science needed to understand natural processes as they are influenced by human activities. Overview of concepts and methods of sustainability analysis. Critical evaluation of engineering approaches to address sustainability.
Engineered Systems and Sustainability: Read More [+]
Rules & Requirements

Prerequisites: CHEM 1A and MATH 1A

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Summer: 8 weeks - 6 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Harley, Horvath, Nelson

Engineered Systems and Sustainability: Read Less [-]

CIV ENG 24 Freshman Seminars 1 Unit

Terms offered: Spring 2020, Fall 2019, Spring 2019
The Berkeley Seminar Program has been designed to provide new students with the opportunity to explore an intellectual topic with a faculty member in a small-seminar setting. Berkeley seminars are offered in all campus departments, and topics vary from department to department and semester to semester.
Freshman Seminars: Read More [+]
Rules & Requirements

Repeat rules: Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of seminar per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Undergraduate

Grading/Final exam status: The grading option will be decided by the instructor when the class is offered. Final Exam To be decided by the instructor when the class is offered.

Freshman Seminars: Read Less [-]

CIV ENG C30 Introduction to Solid Mechanics 3 Units

Terms offered: Fall 2022, Summer 2022 10 Week Session, Spring 2022
A review of equilibrium for particles and rigid bodies. Application to truss structures. The concepts of deformation, strain, and stress. Equilibrium equations for a continuum. Elements of the theory of linear elasticity. The states of plane stress and plane strain. Solution of elementary elasticity problems (beam bending, torsion of circular bars). Euler buckling in elastic beams.
Introduction to Solid Mechanics: Read More [+]

Rules & Requirements

Prerequisites: Mathematics 53 and 54 (may be taken concurrently); Physics 7A

Credit Restrictions: Students will receive no credit for Mechanical Engineering C85/Civil and Environmental Engineering C30 after completing Mechanical Engineering W85. A deficient grade in Mechanical Engineering W85 may be removed by taking Mechanical Engineering C85/Civil and Environmental Engineering C30.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Summer:
6 weeks - 7.5 hours of lecture and 2.5 hours of discussion per week
10 weeks - 4.5 hours of lecture and 1.5 hours of discussion per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Armero, Papadopoulos, Zohdi, Johnson

Also listed as: MEC ENG C85

Introduction to Solid Mechanics: Read Less [-]

CIV ENG W30 Introduction to Solid Mechanics 3 Units

Terms offered: Summer 2021 8 Week Session, Summer 2020 8 Week Session, Summer 2019 8 Week Session
A review of equilibrium for particles and rigid bodies. Application to truss structures. The concepts of deformation, strain, and stress. Equilibrium equations for a continuum. Elements of the theory of linear elasticity. The states of plane stress and plane strain. Solution of elementary elasticity problems (beam bending, torsion of circular bars). Euler buckling in elastic beams.
Introduction to Solid Mechanics: Read More [+]

Objectives & Outcomes

Course Objectives: To learn statics and mechanics of materials

Student Learning Outcomes: -
Correctly draw free-body
-
Apply the equations of equilibrium to two and three-dimensional solids
-
Understand the concepts of stress and strain
-
Ability to calculate deflections in engineered systems
-
Solve simple boundary value problems in linear elastostatics (tension, torsion, beam bending)

Rules & Requirements

Prerequisites: MATH 53 and MATH 54 (may be taken concurrently); PHYSICS 7A

Credit Restrictions: Students will receive no credit for MEC ENG W85 after completing MEC ENG C85. A deficient grade in MEC ENG W85 may be removed by taking MEC ENG C85.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of web-based lecture and 1 hour of web-based discussion per week

Summer:
6 weeks - 7.5 hours of web-based lecture and 2.5 hours of web-based discussion per week
8 weeks - 6 hours of web-based lecture and 2 hours of web-based discussion per week
10 weeks - 4.5 hours of web-based lecture and 1.5 hours of web-based discussion per week

Online: This is an online course.

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Govindjee

Also listed as: MEC ENG W85

Introduction to Solid Mechanics: Read Less [-]

CIV ENG 60 Structure and Properties of Civil Engineering Materials 3 Units

Terms offered: Fall 2022, Spring 2022, Fall 2021
Introduction to structure and properties of civil engineering materials such as asphalt, cements, concrete, geological materials (e.g. soil and rocks), steel, polymers, and wood. The properties range from elastic, plastic and fracture properties to porosity and thermal and environmental responses. Laboratory tests include evaluation of behavior of these materials under a wide range of conditions.
Structure and Properties of Civil Engineering Materials: Read More [+]

Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Monteiro, Ostertag

Structure and Properties of Civil Engineering Materials: Read Less [-]

CIV ENG 70 Engineering Geology 3 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
Principles of physical and structural geology; the influence of geological factors on engineering works and the environment. Field trip.
Engineering Geology: Read More [+]

Rules & Requirements

Prerequisites: CHEM 1A (may be taken concurrently)

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 2 hours of laboratory per week

Summer: 8 weeks - 6 hours of lecture and 4 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Glaser, Sitar

Engineering Geology: Read Less [-]

CIV ENG 88B Time Series Analysis: Sea Level Rise and Coastal Flooding 2 Units

Terms offered: Spring 2017
In this course, we will pursue analysis of long-term records of coastal water levels in the context of sea level rise. We will cover the collection, evaluation, visualization and analysis of time series data using long-term records of sea levels from coastal sites around the world. Specific topics will include extreme events and distributions, frequency-based descriptions, averaging, filtering, harmonic analysis, trend identification, extrapolations, and decision-making under uncertainty.
Time Series Analysis: Sea Level Rise and Coastal Flooding: Read More [+]

Rules & Requirements

Prerequisites: Concurrent or prior enrollment in Foundations of Data Science (COMPSCI C8 / INFO C8 / STAT C8) and MATH 1A

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of lecture and 1 hour of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Instructor: Stacey

Time Series Analysis: Sea Level Rise and Coastal Flooding: Read Less [-]

CIV ENG C88 Data Science for Smart Cities 2 Units

Terms offered: Spring 2022, Spring 2021, Spring 2020
Cities become more dependent on the data flows that connect infrastructures between themselves, and users to infrastructures. Design and operation of smart, efficient, and resilient cities nowadays require data science skills. This course provides an introduction to working with data generated within transportation systems, power grids, communication networks, as well as collected via crowd-sensing and remote sensing technologies, to build demand- and supply-side urban services based on data analytics.
Data Science for Smart Cities: Read More [+]
Objectives & Outcomes

Course Objectives: Become familiar with urban big data and sensor data collection techniques.

Develop intuition in various machine learning classification algorithms, as well as regression modelling.
Develop intuition in various machine learning classification algorithms, as well as regression modelling.
Foster critical thinking about real-world actionability from analytics.
Learn how to use data science techniques in urban decision-making and scenario generation.

Student Learning Outcomes: Develop capabilities in a range of data science techniques.

Gain the ability to solve problems in smart city research and practice.
Think critically about how to assess analytics for cities.
Use data analytics in the smart city domain.

Rules & Requirements

Prerequisites: This course is a Data Science connector course and is meant to be taken concurrent with or after Foundations of Data Science COMPSCI C8/INFO C8/STAT C8. Students may take more than one Data Science connector course if they wish, concurrently or after taking the C8 course

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Instructor: Gonzalez

Formerly known as: Civil and Environmental Engineering 88

Also listed as: CY PLAN C88

Data Science for Smart Cities: Read Less [-]

CIV ENG 92 Introduction to Civil and Environmental Engineering 1 Unit

Terms offered: Fall 2019, Fall 2018, Fall 2017
A course designed to familiarize the entering student with the nature and scope of civil and environmental engineering and its component specialty areas.
Introduction to Civil and Environmental Engineering: Read More [+]
Hours & Format

Fall and/or spring: 15 weeks - 1 hour of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

Introduction to Civil and Environmental Engineering: Read Less [-]

CIV ENG 92A Design for Future Infrastructure Systems 2 Units

Terms offered: Spring 2022, Fall 2020
Hands-on engineering design experience for creating future infrastructure systems. Intelligent infrastructure systems leverage data and computational to enhance sustainability and resilience for smart cities of the future. Student teams identify a challenge with current transportation, energy, water, waste, and/or the built infrastructure. Student teams design and prototype an innovation that solves this problem using maker resources, e.g. 3D printing, laser cutters, and open-source electronics. The project will be executing via the "Design Sprint" process, which is popular in agile development and Silicon Valley. Students present projects to guest judges from industry. Course is an introductory design experience for first-year students.
Design for Future Infrastructure Systems: Read More [+]
Hours & Format

Fall and/or spring: 15 weeks - 3 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Alternative to final exam.

Instructor: Moura

Design for Future Infrastructure Systems: Read Less [-]

CIV ENG 92B Cornerstone Structural Design 2 Units

Terms offered: Spring 2022
This course introduces students to conceptual structural design, fabrication, and testing. The course aims to provide a hands-on structural engineering design experience and to inspire creativity. Students will learn the design process as well as fundamental principles of structural analysis. Student teams will be given a design challenge with performance objectives and practical constraints that emphasize sustainable design practices. Student teams will use maker space resources (e.g. 3D printing, laser cutting, CNC router, woodshop) to fabricate their structures, which will be tested to failure in the Structural Engineering Lab in Davis Hall.
Cornerstone Structural Design: Read More [+]
Objectives & Outcomes

Student Learning Outcomes: -
Explain basic concepts of statics and equilibrium.

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Instructor: DeJong

Cornerstone Structural Design: Read Less [-]

CIV ENG 93 Engineering Data Analysis 3 Units

Terms offered: Fall 2022, Spring 2022, Fall 2021
Application of the concepts and methods of probability theory and statistical inference to CEE problems and data; graphical data analysis and sampling; elements of set theory; elements of probability theory; random variables and expectation; simulation; statistical inference. Use of computer programming languages for analysis of CEE-related data and problems. The course also introduces the student to various domains of uncertainty analysis in CEE.
Engineering Data Analysis: Read More [+]
Rules & Requirements

Prerequisites: ENGIN 7 or COMPSCI C8 / INFO C8 / STAT C8. Student should consult instructor prior to enrolling

Credit Restrictions: Students will receive no credit after taking Statistics 25.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 3 hours of laboratory per week

Summer: 6 weeks - 5 hours of lecture and 7.5 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Hansen, Rubin, Walker

Engineering Data Analysis: Read Less [-]

CIV ENG 98 Supervised Group Study and Research 1 - 3 Units

Terms offered: Fall 2022, Spring 2022, Fall 2021
Supervised group study and research by lower division students.
Supervised Group Study and Research: Read More [+]

Rules & Requirements

Prerequisites: Consent of instructor

Credit Restrictions: Enrollment is restricted; see the Introduction to Courses and Curricula section of this catalog.

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-3 hours of directed group study per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

Supervised Group Study and Research: Read Less [-]

CIV ENG 99 Supervised Independent Study and Research 1 - 4 Units

Terms offered: Fall 2022, Spring 2022, Fall 2021
Supervised independent study by lower division students.
Supervised Independent Study and Research: Read More [+]

Rules & Requirements

Prerequisites: Freshman or sophomore standing and consent of instructor. Minimum grade point average of 3.3 required

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of independent study per week

Summer: 8 weeks - 2-7.5 hours of independent study per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

Supervised Independent Study and Research: Read Less [-]

CIV ENG 100 Elementary Fluid Mechanics 4 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
Fluid statics and dynamics, including laboratory experiments with technical reports. Fundamentals: integral and differential formulations of the conservation laws are solved in special cases such as boundary layers and pipe flow. Flow visualization and computation techniques are introduced using Matlab. Empirical equations are used for turbulent flows, drag, pumps, and open channels. Principles of empirical equations are also discussed: dimensional analysis, regression, and uncertainty.
Elementary Fluid Mechanics: Read More [+]

Rules & Requirements

Prerequisites: PHYSICS 7A, MATH 53, and ENGIN 7 (may be taken concurrently); and CIV ENG C30 / MEC ENG C85 recommended

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of laboratory per week

Summer: 8 weeks - 6 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Chow, Stacey, Variano

Elementary Fluid Mechanics: Read Less [-]

CIV ENG C103N Terrestrial Hydrology 4 Units

Terms offered: Fall 2022, Spring 2021, Spring 2020
A quantitative introduction to the hydrology of the terrestrial environment including lower atmosphere, watersheds, lakes, and streams. All aspects of the hydrologic cycle, including precipitation, infiltration, evapotranspiration, overland flow, streamflow, and groundwater flow. Chemistry and dating of groundwater and surface water. Development of quantitative insights through problem solving and use of simple models. This course requires one field experiment and several group computer lab assignments.
Terrestrial Hydrology: Read More [+]
Rules & Requirements

Prerequisites: CHEM 1A, MATH 1A, MATH 1B, and PHYSICS 7A; or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Instructor: Larsen

Also listed as: ESPM C130/GEOG C136

Terrestrial Hydrology: Read Less [-]

CIV ENG 104 Planetary Boundaries and the Anthropocene 1 Unit

Terms offered: Fall 2022, Fall 2021, Spring 1998
This course aims to introduce students to the debates and discussions about the impact of increasing human resource consumption, increasing population, and increasing human prosperity on the planet's environmental systems that support human societies.
Planetary Boundaries and the Anthropocene: Read More [+]
Objectives & Outcomes

Course Objectives: Explain the major arguments on the sides of "planetary boundaries" and "cornucopia"
Understand the basic system dynamics view of planetary systems
Understand the main features of several of planetary boundaries that have scientific consensus

Rules & Requirements

Prerequisites: Upper division undergraduate standing

Credit Restrictions: Students will receive no credit for CIV ENG 104 after completing CIV ENG 104. A deficient grade in CIV ENG 104 may be removed by taking CIV ENG 104.

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of seminar per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Instructors: Chow , Gadgil

Planetary Boundaries and the Anthropocene: Read Less [-]

CIV ENG 105 Design for Global Transformation 3 Units

Terms offered: Spring 2022, Spring 2021, Spring 2020
Student teams will design strategies to address critical global challenges, such as climate change, biodiversity loss, pollution, and related issues, with the potential for transformational change. Project topics will vary. Students will explore global to local scales using principles and practices from design science, systems thinking, regenerative design, circular economy, environmental justice, science communication, data visualization, and numerical modeling, among other disciplines.
Design for Global Transformation: Read More [+]

Objectives & Outcomes

Course Objectives: Create a multi-media exhibit to clearly communicate your findings and strategy
Iteratively design a comprehensive strategy to address your team's global challenge
To gain familiarity with relevant design and engineering tools, including data visualization and simulation and modeling
Work strategically and collaboratively with fellow students in a design team

Rules & Requirements

Prerequisites: At least one of the following courses: CIV ENG C103N / ESPM C130 / GEOG C136, CIV ENG 111, CIV ENG 120, CIV ENG 155, CIV ENG 175, or CIV ENG 191; or instructor's permission

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Instructor: Chow

Design for Global Transformation: Read Less [-]

CIV ENG C106 Air Pollution 3 Units

Terms offered: Spring 2022, Spring 2021, Spring 2020
This course is an introduction to air pollution and the chemistry of earth's atmosphere. We will focus on the fundamental natural processes controlling trace gas and aerosol concentrations in the atmosphere, and how anthropogenic activity has affected those processes at the local, regional, and global scales. Specific topics include stratospheric ozone depletion, increasing concentrations of green house gasses, smog, and changes in the oxidation capacity of the troposphere.
Air Pollution: Read More [+]

Rules & Requirements

Prerequisites: CHEM 1A, CHEM 1B, and PHYSICS 8A or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Goldstein

Also listed as: EPS C180/ESPM C180

Air Pollution: Read Less [-]

CIV ENG 107 Climate Change Mitigation 3 Units

Terms offered: Spring 2021, Spring 2020, Spring 2019
Assessment of technological options for responding to climate change. Overview of climate-change science; sources, sinks, and atmospheric dynamics of greenhouse gases. Current systems for energy supply and use. Renewable energy resources, transport, storage, and transformation technologies. Technological opportunities for improving end-use energy efficiency. Recovery, sequestration, and disposal of greenhouse gases. Societal context for implementing engineered responses.
Climate Change Mitigation: Read More [+]

Rules & Requirements

Prerequisites: Upper division or graduate standing in engineering or physical science, or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Climate Change Mitigation: Read Less [-]

CIV ENG 108 Climate Change Adaptation 3 Units

Terms offered: Spring 2022, Fall 2009, Spring 2009
In this course, we will examine the local manifestation of global climate change and consider interventions and responses that anticipate long-term change in communities. The course will integrate environmental sciences, civil and environmental engineering, and the social sciences to both understand the impacts of global change and to quantitatively evaluate possible adaptation interventions. Upon completing the course, you will have a holistic perspective on the challenges associated with climate change adaptation, an understanding of the wide range of potential solutions and interventions that may be possible, and an awareness of the strengths and weaknesses of those solutions.
Climate Change Adaptation: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 11 or introductory climate science course, or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Instructor: Stacey

Climate Change Adaptation: Read Less [-]

CIV ENG 110 Water Systems of the Future 3 Units

Terms offered: Spring 2022, Spring 2020, Spring 2019
This course will familiarize students with the complex infrastructure used to meet human water demands; competing uses and demands; water and wastewater infrastructure; technologies to enable recovery of water, energy, and other resources from wastewater; supply planning; trends and forecasting; costs, pricing and financing; environmental justice; methods to assess sustainability; regulatory, policy and institutional challenges; and water's contribution to other sectors (e.g., energy, food, buildings). Innovation, both barriers and opportunities, will be highlighted. California and the U.S. will be emphasized but global challenges will be discussed. Students will study, critique, and recommend improvements for a real-world system.
Water Systems of the Future: Read More [+]
Objectives & Outcomes

Course Objectives: Consider costs and tradeoffs in water supply planning under uncertainty for real-world water systems
Critically evaluate water planning and innovation potential for real-world utilities given future uncertainties and competing priorities.
Explore the innovation ecosystem in the water sector, its opportunities and challenges, and analyze case studies
Introduce the technologies that are currently in use for treating and managing water and wastewater, as well as innovations that have the potential to dramatically change water infrastructure.
Provide overview and examples of concepts and methods for analyzing the sustainability of water systems
Provide overview of the complex infrastructure systems that supply and manage water and wastewater.

Student Learning Outcomes: Ability to apply knowledge of mathematics, science, and engineering. MODERATE
Ability to communicate effectively. EXTENSIVE
Ability to design a system, component, or process to meet desired needs. MODERATE
Ability to function on multi-disciplinary teams. EXTENSIVE
Ability to identify, formulate and solve engineering problems. MODERATE
Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice. MODERATE
Knowledge of contemporary issues. EXTENSIVE
Recognition of the need for, and an ability to engage in life-long learning. EXTENSIVE
Understand the impact of engineering solutions in a global and societal context. EXTENSIVE
Understanding of professional and ethical responsibility. EXTENSIVE

Rules & Requirements

Prerequisites: Upper division status or consent of the instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Nelson

Water Systems of the Future: Read Less [-]

CIV ENG 111 Environmental Engineering 3 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
Quantitative overview of air and water contaminants and their engineering control. Elementary environmental chemistry and transport. Reactor models. Applications of fundamentals to selected current issues in water quality engineering, air quality engineering, air quality engineering, and hazardous waste management.
Environmental Engineering: Read More [+]
Rules & Requirements

Prerequisites: Upper division standing in engineering or physical sciences, or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Alvarez-Cohen, Nelson, Sedlak

Environmental Engineering: Read Less [-]

CIV ENG 111L Water and Air Quality Laboratory 1 Unit

Terms offered: Fall 2022, Fall 2021, Fall 2019
This laboratory course is designed to accompany the lecture topics in Civil Engineering 111. Each laboratory activity will provide an opportunity to understand key concepts in water and air quality through hands-on experimentation. Laboratory topics include phase partitioning, acid/base reactions, redox reactions, biochemical oxygen demand, absorption, gas transfer, reactor hydraulics, particle destablization, disinfection, and combustion emissions.
Water and Air Quality Laboratory: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 111 (may be taken concurrently)

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Alvarez-Cohen, Nelson, Sedlak

Water and Air Quality Laboratory: Read Less [-]

CIV ENG 112 Water & Wastewater Systems Design and Operation 3 Units

Terms offered: Fall 2022, Spring 2017, Spring 2016
Water and wastewater systems serving communities are complex, large, and were built and expanded over many decades. The infrastructure includes a network of reservoirs, pipelines, pump stations, treatment plants, and other facilities that are connected to natural systems such as watersheds, rivers, groundwater basins, and bay and ocean environments. The planning, design, operation, and maintenance of urban water and wastewater systems require balancing many factors including aging infrastructure, changing regulations, climate change, costs, and community impacts.
One of the greatest challenges facing civil engineers in the 21st century is the stewardship of the infrastructure to protect public health and the environment. Existing systems r
Water & Wastewater Systems Design and Operation: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 100 and CIV ENG 111

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Instructor: Soga

Water & Wastewater Systems Design and Operation: Read Less [-]

CIV ENG 113 Ecological Engineering for Water Quality Improvement 3 Units

Terms offered: Spring 2021, Spring 2019, Spring 2017
Ecological engineering approaches for treating contaminated water using natural processes to improve water quality. Emphasis on combining basic science and engineering approaches to understand the fundamental processes that govern the effectiveness of complex natural treatment systems. Applications include constructed wetlands, waste stabilization ponds, stormwater bioretention, decentralized wastewater management, ecological sanitation. Laboratory sessions will consist of design and monitoring of laboratory and full-scale natural treatment systems, including a range of water quality measurements.
Ecological Engineering for Water Quality Improvement: Read More [+]
Objectives & Outcomes

Course Objectives: Become familiar with common applications of natural treatment systems through lectures, reading materials, laboratory activities, and field trips
Develop a solid understanding of the fundamental processes in ecological engineering approaches to natural treatment systems that govern the removal or transformation of contaminants in water

Learn common design approaches for waste stabilization ponds and wetlands, as well as their necessary operation and maintenance activities
Measure key water quality parameters and evaluate the performance of mesocosm ponds and wetlands based on the data collected throughout the semester
Understand and appreciate the complexity of these systems compared to mechanical treatment systems

Student Learning Outcomes: Ability to apply knowledge of mathematics, science, and engineering. EXTENSIVE
Ability to communicate effectively. MODERATE
Ability to design a system, component, or process to meet desired needs. EXTENSIVE
Ability to design and conduct experiments, as well as to analyze and interpret data. EXTENSIVE
Ability to function on multi-disciplinary teams. MODERATE
Ability to identify, formulate and solve engineering problems. EXTENSIVE
Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice. EXTENSIVE
Knowledge of contemporary issues. MODERATE
Recognition of the need for, and an ability to engage in life-long learning. MODERATE
Understand the impact of engineering solutions in a global and societal context. MODERATE
Understanding of professional and ethical responsibility. MODERATE

Rules & Requirements

Prerequisites: CIV ENG 111 or consent of instructor

Credit Restrictions: Civ Eng 113N

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Instructor: Nelson

Formerly known as: Civil and Environmental Engineering 113N

CIV ENG 114 Environmental Microbiology 3 Units

Terms offered: Spring 2016, Spring 2015, Fall 2014
The scope of modern environmental engineering requires a fundamental knowledge of microbial processes with specific application to water, wastewater and the environmental fate of pollutants. This course will cover basic microbial physiology, biochemistry, metabolism, growth energetics and kinetics, ecology, pathogenicity, and genetics for application to both engineered and natural environmental systems.
Environmental Microbiology: Read More [+]
Rules & Requirements

Prerequisites: CHEM 1A and CHEM 1B

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Alvarez-Cohen

Environmental Microbiology: Read Less [-]

CIV ENG 115 Water Chemistry 3 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
The application of principles of inorganic, physical, and dilute solution equilibrium chemistry to aquatic systems, both in the aquatic environment and in water and wastewater treatment processes.
Water Chemistry: Read More [+]
Rules & Requirements

Prerequisites: Upper division or graduate standing in engineering or physical science, or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Sedlak

Water Chemistry: Read Less [-]

CIV ENG C116 Chemistry of Soils 3 Units

Terms offered: Fall 2021, Fall 2020, Spring 2018
Chemical mechanisms of reactions controlling the fate and mobility of nutrients and pollutants in soils. Role of soil minerals and humus in geochemical pathways of nutrient biovailability and pollutant detoxification. Chemical modeling of nutrient and pollutant soil chemistry. Applications to soil acidity and salinity.
Chemistry of Soils: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 111

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Also listed as: ESPM C128

Chemistry of Soils: Read Less [-]

CIV ENG 120 Structural Engineering 3 Units

Terms offered: Spring 2022, Spring 2021, Spring 2020
Introduction to design and analysis of structural systems. Loads and load placement. Proportioning of structural members in steel, reinforced concrete, and timber. Structural analysis theory. Hand and computer analysis methods, validation of results from computer analysis. Applications, including bridges, building frames, and long-span cable structures.
Structural Engineering: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG C30 / MEC ENG C85 and CIV ENG 60 (may be taken concurrently)

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Moehle

Structural Engineering: Read Less [-]

CIV ENG 122 Design of Steel Structures 3 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
A first course in steel design focusing on basic principles. Introduction to materials and methods of steel construction; behavior and design of tension members, compression members, flexural members and beam-columns; design of welds, bolts, shear connections, and moment connections. Includes laboratory sessions to illustrate member behavior. By the end of the course students should be able to design simple steel structures subjected to static gravity and lateral loads. Design teams will conceive, determine design loads, and conduct a preliminary and final design of a structural system and its foundation. Teams will prepare a report containing project description, design criteria, structural drawings, and supporting calculations.
Design of Steel Structures: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 120

Credit Restrictions: Students will receive no credit for CIV ENG 122 after completing CIV ENG 122N, or CIV ENG 122. A deficient grade in CIV ENG 122 may be removed by taking CIV ENG 122N, or CIV ENG 122.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Becker

Design of Steel Structures: Read Less [-]

CIV ENG 123 Design of Reinforced Concrete Structures 3 Units

Terms offered: Spring 2022, Spring 2021, Fall 2015
Introduction to materials and methods of reinforced concrete design and construction; behavior and design of reinforced concrete beams and one-way slabs considering deflections, moment, shear, and reinforcement development requirements; behavior and design of columns; design of spread footings; design of earthquake-resistant structures; laboratory sessions to illustrate member behavior, to solve problem sets, and to develop and present the preliminary designs for a design project.
Design of Reinforced Concrete Structures: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 120

Credit Restrictions: Students will receive no credit for CIV ENG 123 after completing CIV ENG 123N, or CIV ENG 123. A deficient grade in CIV ENG 123 may be removed by taking CIV ENG 123N, or CIV ENG 123.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Moehle

Design of Reinforced Concrete Structures: Read Less [-]

CIV ENG 124 Structural Design in Timber 3 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
Characteristics and properties of wood as a structural material; design and detailing of structural elements and entire structures of wood. Topics include allowable stresses, design and detailing of solid sawn and glulam beams and columns, nailed and bolted connections, plywood diaphragms and shear walls. Case studies.
Structural Design in Timber: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 120

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Structural Design in Timber: Read Less [-]

CIV ENG 126 Engineering Dynamics and Vibrations 3 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
Introduction to the dynamics of particles, rigid bodies, and deformable solids in civil engineering. Newtonian and Lagrangian formulations. Vibration of particles and rigid body systems: natural frequencies and mode shapes, free and forced vibration. Vibration of continuous systems: bars, strings, beams. Modeling and numerical simulation methods..
Engineering Dynamics and Vibrations: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG C30 / MEC ENG C85 and ENGIN 7; or consent of instructor

Credit Restrictions: Students will receive no credit for CIV ENG 126 after completing MEC ENG 104. A deficient grade in CIV ENG 126 may be removed by taking MEC ENG 104, or MEC ENG 104.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Konstantinidis, DeJong

Engineering Dynamics and Vibrations: Read Less [-]

CIV ENG 132 Applied Structural Mechanics 3 Units

Terms offered: Spring 2022, Spring 2021, Spring 2020
Concepts of theory of solid mechanics: three dimensional stress, strain, and material response; elastic and inelastic boundary value problems; fracture, fatigue, and geometric instability. Problems in advanced strength of materials; thin plate and axis-symmetric shell theory.
Applied Structural Mechanics: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG C30 / MEC ENG C85, MATH 53 and MATH 54

Credit Restrictions: Students will receive no credit for CivEng 132 after CivEng 130N.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Summer: 8 weeks - 6 hours of lecture and 2 hours of discussion per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Govindjee, Li, Konstantinidis

Applied Structural Mechanics: Read Less [-]

CIV ENG C133 Engineering Analysis Using the Finite Element Method 3 Units

Terms offered: Spring 2022, Spring 2021, Spring 2020
This is an introductory course on the finite element method and is intended for seniors in engineering and applied science disciplines. The course covers the basic topics of finite element technology, including domain discretization, polynomial interpolation, application of boundary conditions, assembly of global arrays, and solution of the resulting algebraic systems. Finite element formulations for several important field equations are introduced using both direct and integral approaches. Particular emphasis is placed on computer simulation and analysis of realistic engineering problems from solid and fluid mechanics, heat transfer, and electromagnetism. The course uses FEMLAB, a multiphysics MATLAB-based finite element program that possesses a wide array of modeling capabilities and is ideally suited for instruction. Assignments will involve both paper- and computer-based exercises. Computer-based assignments will emphasize the practical aspects of finite element model construction and analysis.
Engineering Analysis Using the Finite Element Method: Read More [+]
Rules & Requirements

Prerequisites: Engineering 7 or 77 or Computer Science 61A; Mathematics 53 and 54; senior status in engineering or applied science

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 2 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Also listed as: MEC ENG C180

Engineering Analysis Using the Finite Element Method: Read Less [-]

CIV ENG C138 Flight Vehicle Structures and Aeroelasticity 3 Units

Terms offered: Not yet offered
This course introduces engineering students to the analysis and design of load-bearing components of flight structures, ranging from subsonic aircraft to rockets. Emphasis is placed on the quasi-static and dynamic analysis of structural components which are prevalent in aerospace engineering. Attention is also devoted to a comprehensive design roadmap of flight vehicle structures from the full system- to the individual component-level
Flight Vehicle Structures and Aeroelasticity: Read More [+]
Objectives & Outcomes

Course Objectives: 1. Familiarize students with the different load-bearing components and loads encountered in flight vehicles.

2. Sharpen the students' skills in the statics and dynamics of thin-walled structures.

3. Enhance the students' aerospace engineering design skills by leveraging the use of the finite element method as a tool for both global and local analysis.

Student Learning Outcomes: Ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

(g) A knowledge of contemporary issues.

Ability to apply knowledge of mathematics, science, and engineering.

Ability to design and conduct experiments, as well as to analyze and interpret data
Ability to identify, formulate, and solve engineering problems.

Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.

Understanding of professional and ethical responsibility.

Rules & Requirements

Prerequisites: CIV ENG C30 / MEC ENG C85, and MEC ENG 104 or CIV ENG 126

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Papadopoulos

Formerly known as: Mechanical Engineering 184

Also listed as: AERO ENG C184/MEC ENG C184

Flight Vehicle Structures and Aeroelasticity: Read Less [-]

CIV ENG 140 Failure Mechanisms in Civil Engineering Materials 3 Units

Terms offered: Spring 2013, Spring 2010, Spring 2009
The failure mechanisms in civil engineering materials (cement-based materials, metallic- and polymer-based materials) are associated with processing, microstructure, stress states, and environmental changes. Fracture mechanics of brittle, quasi-brittle, and ductile materials; cracking processes in monolithic, particulate, and fiber reinforced materials; examples of ductile/brittle failure transitions in civil engineering structures; retrofitting of existing structures; non-destructive techniques for damage detection.
Failure Mechanisms in Civil Engineering Materials: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 60

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Ostertag

Failure Mechanisms in Civil Engineering Materials: Read Less [-]

CIV ENG 153 Transportation Facility Design 3 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
A capstone class with the objective to design transportation facilities based on operational capacity, site constraints, and environmental design considerations. Emphasis on airports, including landside and airside elements, and environmental assessment and mitigation techniques.
Transportation Facility Design: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 155

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Hansen

Transportation Facility Design: Read Less [-]

CIV ENG 155 Transportation Systems Engineering 3 Units

Terms offered: Fall 2022, Fall 2021, Spring 2021
Operation, management, control, design, and evaluation of passenger and freight transportation systems. Their economic role. Demand analysis. Overall logistical structure. Performance models and modeling techniques: time-space diagrams, queuing theory, network analysis, and simulation. Design of control strategies for simple systems. Feedback effects. Paradoxes. Transportation impact modeling; noise; air pollution. Multi-criteria evaluation and decision making. Financing and politics.
Transportation Systems Engineering: Read More [+]
Rules & Requirements

Prerequisites: Sophomore standing in engineering or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Cassidy, Daganzo, Hansen, Kanafani, Madanat

Transportation Systems Engineering: Read Less [-]

CIV ENG 160D Data Science in Aviation 3 Units

Terms offered: Not yet offered
The course will be centered around analyses of a set of aviation data sets and will enable the students to become familiar with data science applications to aviation. Aviation topics to be covered include fundamentals of air traffic control, models of aviation operations, aircraft trajectory prediction and optimization, data sources in aviation, overview of data science methods, role of data science in solving problems in aviation operations such as conflict detection and resolution, traffic flow management, arrivals management and surface operations, airline operations, fuel efficiency, global aviation.
Data Science in Aviation: Read More [+]
Rules & Requirements

Prerequisites: DATA C8 and CIV ENG 93

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 2 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Data Science in Aviation: Read Less [-]

CIV ENG 165 Concrete Materials, Construction, and Sustainability 3 Units

Terms offered: Spring 2021, Spring 2020, Spring 2019
Concrete materials: cements, supplementary cementitious materials, water, and admixtures. Sustainability analysis of concrete materials and mixtures. Development of special concretes: self-leveling concrete, high-performance concrete, and mass concrete. Consideration of sustainability of concrete construction methods used for buildings, highways, airfields, bridges, dams and other hydraulic structures. Non-destructive methods. Discussion of long-term durability. Comprehensive group projects.
Concrete Materials, Construction, and Sustainability: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 60

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Monteiro

Concrete Materials, Construction, and Sustainability: Read Less [-]

CIV ENG 166 Construction Engineering 3 Units

Terms offered: Fall 2021, Spring 2021, Fall 2018
Introduction to construction engineering and field operations. The construction industry, construction methods and practice, productivity improvement, equipment selection, site layout formwork, erection of steel and concrete structures. Labs demonstrate the concepts covered. Field trips to local construction projects.
Construction Engineering: Read More [+]
Rules & Requirements

Prerequisites: Upper division standing; CIV ENG 167 recommended

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Horvath

Construction Engineering: Read Less [-]

CIV ENG 167 Engineering Project Management 3 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
Principles of economics, decision making, and law applied to company and project management. Business ownership, liability and insurance, cash flow analysis, and financial management. Project life-cycle, design-construction interface, contracts, estimating, scheduling, cost control.
Engineering Project Management: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 93 (can be taken concurrently)

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Ibbs, Tommelein

Engineering Project Management: Read Less [-]

CIV ENG 170A Infrastructure Sensing and Modeling 3 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
Introduction to sensing and modeling of infrastructure system; Imagery analysis (point clouds, lidar, structure for motion, satellite); Geophysics (Synthetic-aperture radar analysis, time histories analyses); Sensor systems (distributed fiber optics, wireless sensor network, MEMS, conventional); Structural health monitoring and analysis; Infrastructure network analysis (graph theory, GIS, simulations); entrepreneurship in infrastructure and smart cities industry.
Infrastructure Sensing and Modeling: Read More [+]
Rules & Requirements

Prerequisites: ENGIN 7, CIV ENG C30, and CIV ENG 93 or equivalents

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Instructors: Soga , Zekkos, Kayen

Infrastructure Sensing and Modeling: Read Less [-]

CIV ENG 171 Rock Mechanics 3 Units

Terms offered: Spring 2022, Spring 2020, Spring 2019
Geological and geophysical exploration for structures in rock; properties and behavior of rock masses; rock slope stability; geological engineering of underground openings; evaluation of rock foundations, including dams.
Rock Mechanics: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 70 or an introductory course in physical geology; and upper division standing in engineering

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Glaser

Rock Mechanics: Read Less [-]

CIV ENG C172 Remote Sensing of the Environment 4 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
The course will introduce junior/senior undergraduate students to the basic physical concepts of remote sensing as they relate to different earth surface processes. It will introduce students to a variety of recently developed ground, airborne, and satellite instruments and their applications to monitor and analyze environmental processes. These include active (e.g., Lidar), and passive (radiometers) sensors, optical (e.g., Landsat, MODIS), microwave (e.g., SMAP), and gravitational (e.g., GRACE) satellites.
Remote Sensing of the Environment: Read More [+]
Rules & Requirements

Credit Restrictions: Students will receive no credit for ESPM C172 after completing CIV ENG 172, or ESPM 172. A deficient grade in ESPM C172 may be removed by taking CIV ENG 172, or ESPM 172.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Girotto

Also listed as: ESPM C172

Remote Sensing of the Environment: Read Less [-]

CIV ENG 173 Groundwater and Seepage 3 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
Introduction to principles of groundwater flow, including steady and transient flow through porous media, numerical analysis, pumping tests, groundwater geology, contaminant transport, and design of waste containment systems.
Groundwater and Seepage: Read More [+]
Rules & Requirements

Prerequisites: Senior standing in engineering or science; CIV ENG 100 recommended

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Rubin, Sitar

Groundwater and Seepage: Read Less [-]

CIV ENG 174 Engineering Geomatics 3 Units

Terms offered: Summer 2015 First 6 Week Session, Summer 2014 10 Week Session, Summer 2014 First 6 Week Session
Engineering Geomatics is a field that integrates collections, processing, and analysis of digital geospatial data. This new field is anchored in the established field of geodetics that describes the complex shape of the Earth, elements and usage of topographic data and maps. Basic and advanced GPS satellite mapping. Digital globe technology. Advanced laser-LIDAR mapping. Quantitative terrain modeling, change detection, and analysis. Hydrogeomatics-seafloor mapping.
Engineering Geomatics: Read More [+]
Hours & Format

Summer: 6 weeks - 6 hours of lecture and 5 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Engineering Geomatics: Read Less [-]

CIV ENG 175 Geotechnical and Geoenvironmental Engineering 3 Units

Terms offered: Spring 2022, Spring 2021, Spring 2020
Soil formation and identification. Engineering properties of soils. Fundamental aspects of soil characterization and response, including soil mineralogy, soil-water movement, effective stress, consolidation, soil strength, and soil compaction. Use of soils and geosynsynthetics in geotechnical and geoenvironmental applications. Introduction to site investigation techniques. Laboratory testing and evaluation of soil composition and properties.
Geotechnical and Geoenvironmental Engineering: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG C30 / MEC ENG C85 (may be taken concurrently); CIV ENG 100 recommended

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 2 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Bray, Sitar, Soga

Geotechnical and Geoenvironmental Engineering: Read Less [-]

CIV ENG 176 Environmental Geotechnics 3 Units

Terms offered: Spring 2021, Spring 2016, Spring 2015
Principles of environmental geotechnics applied to waste encapsulation and remediation of contaminated sites. Characterization of soils and wastes, engineering properties of soils and geosynthetics and their use in typical applications. Fate and transport of contaminants. Fundamental principles and practices in groundwater remediation. Application of environmental geotechnics in the design and construction of waste containment systems. Discussion of soil remediation and emerging technologies.
Environmental Geotechnics: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 175 or consent of instructor; CIV ENG 111 and CIV ENG 173 recommended

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Sitar

Environmental Geotechnics: Read Less [-]

CIV ENG 177 Foundation Engineering Design 3 Units

Terms offered: Spring 2017, Spring 2016, Fall 2014
Principles of foundation engineering. Shear strength of soil and theories related to the analysis and design of shallow and deep foundations, and retaining structures. Structural design of foundation elements; piles, pile caps, and retaining structures. The course has a group project that incorporates both geotechnical and structural components of different foundation elements.
Foundation Engineering Design: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 175; CIV ENG 120 recommended

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Bray

Foundation Engineering Design: Read Less [-]

CIV ENG C178 Applied Geophysics 3 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020, Fall 2019
The theory and practice of geophysical methods for determining the subsurface distribution of physical rock and soil properties. Measurements of gravity and magnetic fields, electrical and electromagnetic fields, and seismic velocity are interpreted to map the subsurface distribution of density, magnetic susceptibility, electrical conductivity, and mechanical properties.
Applied Geophysics: Read More [+]
Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Rector

Also listed as: EPS C178

Applied Geophysics: Read Less [-]

CIV ENG 179 Geosystems Engineering Design 3 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
Geosystem engineering design principles and concepts. Fundamental aspects of the geomechanical and geoenvironmental responses of soil are applied to analyze and design civil systems, such as earth dams and levees, earth retention systems, building and bridge foundations, solid-waste fills, and tailings dams. Students form teams to design geotechnical aspects of a civil project and prepare/present a design document. Field trip to a project site.
Geosystems Engineering Design: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 175

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Bray, Sitar, Soga

Geosystems Engineering Design: Read Less [-]

CIV ENG 180 Life-Cycle Design and Construction 4 Units

Terms offered: Spring 2022, Spring 2021, Spring 2020
Course encompasses two design aspects of a civil and environmental engineering system: 1) Design of whole system, component, or life-cycle phase, subject to engineering standards and constraints, and 2) production system design (e.g., cost estimation and control, scheduling, commercial and legal terms, site layout design). Students form teams to address real-life projects and prepare project documentation and a final presentation.
Life-Cycle Design and Construction: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 167

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam not required.

Life-Cycle Design and Construction: Read Less [-]

CIV ENG 186 Design of Internet-of-Things for Smart Cities 3 Units

Terms offered: Spring 2022, Fall 2019, Fall 2018
Hands-on engineering design experience for creating cyber-physical systems, or more colloquially, "internet-of-things (IoT) systems" for smart cities. Projects overlay a software layer onto physical infrastructure to produce one integrated system. Student teams will identify a challenge with current urban systems, e.g. mobility, energy & environment, water, waste, health, security, and the built environment. Student teams design and prototype an innovation that addresses this challenge using maker resources, e.g. 3D printing, laser cutters, and open-source electronics. The project will be executing via the "Design Sprint" process, which is popular in agile development and Silicon Valley. Students present projects to industry judges.
Design of Internet-of-Things for Smart Cities: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 191

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 2 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Alternate method of final assessment during regularly scheduled final exam group (e.g., presentation, final project, etc.).

Instructors: Moura, Sengupta

Design of Internet-of-Things for Smart Cities: Read Less [-]

CIV ENG 190 Special Topics in Civil and Environmental Engineering 1 - 4 Units

Terms offered: Fall 2022, Spring 2022, Fall 2021
This course covers current topics of interest in civil and environmental engineering. The course content may vary from semester to semester depending upon the instructor
Special Topics in Civil and Environmental Engineering: Read More [+]
Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction. Students may enroll in multiple sections of this course within the same semester.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Instructor: Variano

Special Topics in Civil and Environmental Engineering: Read Less [-]

CIV ENG 191 Civil and Environmental Engineering Systems Analysis 3 Units

Terms offered: Spring 2022, Spring 2021, Spring 2020
This course is organized around five real-world large-scale CEE systems problems. The problems provide the motivation for the study of quantitative tools that are used for planning or managing these systems. The problems include design of a public transportation system for an urban area, resource allocation for the maintenance of a water supply system, development of repair and replacement policies for reinforced concrete bridge decks, traffic signal control for an arterial street, scheduling in a large-scale construction project.
Civil and Environmental Engineering Systems Analysis: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 93 and ENGIN 7

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Bayen, Madanat, Sengupta

Formerly known as: 152

Civil and Environmental Engineering Systems Analysis: Read Less [-]

CIV ENG 192 The Art and Science of Civil and Environmental Engineering Practice 1 Unit

Terms offered: Fall 2017, Fall 2016, Fall 2015
A series of lectures by distinguished professionals designed to provide an appreciation of the role of science, technology, and the needs of society in conceiving projects, balancing the interplay of conflicting demands, and utilizing a variety of disciplines to produce unified and efficient systems.
The Art and Science of Civil and Environmental Engineering Practice: Read More [+]
Rules & Requirements

Prerequisites: Senior standing in Civil Engineering

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam not required.

The Art and Science of Civil and Environmental Engineering Practice: Read Less [-]

CIV ENG 193 Engineering Risk Analysis 3 Units

Terms offered: Fall 2021, Fall 2020, Fall 2019
Applications of probability theory and statistics in planning, analysis, and design of civil engineering systems. Development of probabilistic models for risk and reliability evaluation. Occurrence models; extreme value distributions. Analysis of uncertainties. Introduction to Bayesian statistical decision theory and its application in engineering decision-making.
Engineering Risk Analysis: Read More [+]
Rules & Requirements

Prerequisites: Upper division standing

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Li

Engineering Risk Analysis: Read Less [-]

CIV ENG H194 Honors Undergraduate Research 3 - 4 Units

Terms offered: Fall 2022, Spring 2022, Fall 2021
Supervised research. Students who have completed 3 or more upper division courses may pursue original research under the direction of one of the members of the staff. A final report or presentation is required. A maximum of 4 units of H194 may be used to fulfill the technical elective requirement.
Honors Undergraduate Research: Read More [+]
Rules & Requirements

Prerequisites: Upper division technical GPA 3.3, consent of instructor and faculty advsior

Repeat rules: Course may be repeated for credit up to a total of 8 units.

Hours & Format

Fall and/or spring: 15 weeks - 3-4 hours of independent study per week

Summer:
6 weeks - 7.5-10 hours of independent study per week
8 weeks - 6-7.5 hours of independent study per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Honors Undergraduate Research: Read Less [-]

CIV ENG 197 Field Studies in Civil Engineering 1 - 4 Units

Terms offered: Fall 2022, Summer 2022 10 Week Session, Spring 2022
Supervised experience in off-campus companies or tutoring/mentoring relevant to specific aspects and applications of civil engineering on or off campus. Written report required at the end of the semester.
Field Studies in Civil Engineering: Read More [+]
Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of fieldwork per week

Summer:
6 weeks - 2.5-10 hours of fieldwork per week
8 weeks - 1.5-7.5 hours of fieldwork per week
10 weeks - 1.5-6 hours of fieldwork per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

Field Studies in Civil Engineering: Read Less [-]

CIV ENG 198 Directed Group Study for Advanced Undergraduates 1 - 4 Units

Terms offered: Fall 2022, Spring 2022, Fall 2021
Group study of a selected topic or topics in civil engineering.
Directed Group Study for Advanced Undergraduates: Read More [+]
Rules & Requirements

Prerequisites: Senior standing in engineering

Credit Restrictions: Enrollment is restricted; see the Introduction to Courses and Curricula section of this catalog.

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of directed group study per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

Directed Group Study for Advanced Undergraduates: Read Less [-]

CIV ENG 199 Supervised Independent Study 1 - 4 Units

Terms offered: Fall 2022, Summer 2022 10 Week Session, Spring 2022
Supervised independent study.
Supervised Independent Study: Read More [+]

Rules & Requirements

Prerequisites: Consent of instructor and major adviser. Enrollment is restricted; see the Course Number Guide for details

Credit Restrictions: Course may be repeated for a maximum of four units per semester.

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of independent study per week

Summer:
6 weeks - 1-5 hours of independent study per week
8 weeks - 1-4 hours of independent study per week
10 weeks - 1-4 hours of independent study per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

Supervised Independent Study: Read Less [-]

CIV ENG 200A Environmental Fluid Mechanics I 3 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
Fundamental fluid mechanics with application to the environment. Analytical solutions and numerical modeling of advection-diffusion and Navier-Stokes equations, with a focus on understanding both the numerical techniques needed to predict environmental flow and transport and the underlying physical processes described by the mathematical equations. Fluid kinematics, scalar transport, numerical error and stability analysis, scaling analysis, channel flows, Stokes flows, and introduction to turbulence.
Environmental Fluid Mechanics I: Read More [+]

Rules & Requirements

Prerequisites: Undergraduate fluid mechanics, basic computer programming or permission of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructors: Chow, Stacey

Environmental Fluid Mechanics I: Read Less [-]

CIV ENG 200B Environmental Fluid Mechanics II 3 Units

Terms offered: Spring 2022, Spring 2021, Spring 2020
Fundamental fluid mechanics with application to the environment, including turbulent channel flows and boundary layers, surface waves, and sediment transport. Turbulence modeling and development of analytical and numerical solutions for the equations governing flow and transport in the environment. Scaling analysis and numerical techniques applied to examples from surface water and atmospheric flows.
Environmental Fluid Mechanics II: Read More [+]

Rules & Requirements

Prerequisites: Civ Eng 200A or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructors: Chow, Stacey

Environmental Fluid Mechanics II: Read Less [-]

CIV ENG 200C Transport and Mixing in the Environment 3 Units

Terms offered: Spring 2017, Spring 2016, Spring 2014
Application of fluid mechanics to transport and mixing in the environment. Fundamentals of turbulence, turbulent diffusion, and shear dispersion in steady and oscillatory flows and the effects of stratification. Application to rivers, wetlands, lakes, estuaries, the coastal ocean, and the lower atmosphere.
Transport and Mixing in the Environment: Read More [+]

Rules & Requirements

Prerequisites: 100, Math 53 and 54, or equivalent

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Stacey

Formerly known as: 209A

Transport and Mixing in the Environment: Read Less [-]

CIV ENG 202A Vadose Zone Hydrology 3 Units

Terms offered: Spring 2021, Spring 2019, Spring 2018
Course addresses fundamental and practical issues in flow and transport phenomena in the vadose zone, which is the geologic media between the land surface and the regional water table. A theoretical framework for modeling these phenomena will be presented, followed by applications in the areas of ecology, drainage and irrigation, and contaminant transport. Hands-on applications using numerical modeling and analysis of real-life problems and field experiments will be emphasized.
Vadose Zone Hydrology: Read More [+]
Rules & Requirements

Prerequisites: 173 or equivalent

Credit Restrictions: Students will receive no credit for 202A after taking 202 before fall 1998.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Rubin

Formerly known as: 202

Vadose Zone Hydrology: Read Less [-]

CIV ENG 203N Surface Water Hydrology 3 Units

Terms offered: Spring 2022, Spring 2021, Spring 2018
Course addresses topics of surface water hydrology, such as processes of water in the atmosphere, over land surface, and within soil; advanced representation and models for infiltration and evapotranspiration processes; partition of water and energy budgets at the land surface; snow and snowmelt processes; applications of remote sensing; flood and drought, and issues related to advanced hydrological modeling. Students will address practical problems and will learn how to use the current operational hydrologic forecasting model, and build hydrological models.
Surface Water Hydrology: Read More [+]
Rules & Requirements

Prerequisites: 103 or equivalent, or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Formerly known as: 203

Surface Water Hydrology: Read Less [-]

CIV ENG 204 Planetary Boundaries and the Anthropocene 1 Unit

Terms offered: Fall 2022, Fall 2021, Spring 1999
This course aims to introduce students to the debates and discussions about the impact of increasing human resource consumption, increasing population, and increasing human prosperity on the planet's environmental systems that support human societies.
Planetary Boundaries and the Anthropocene: Read More [+]
Objectives & Outcomes

Course Objectives: Explain the major arguments on the sides of "planetary boundaries" and "cornucopia"
Understand the basic system dynamics view of planetary systems
Understand the main features of several of planetary boundaries that have scientific consensus

Rules & Requirements

Prerequisites: Graduate Standing

Credit Restrictions: Students will receive no credit for CIV ENG 204 after completing CIV ENG 204. A deficient grade in CIV ENG 204 may be removed by taking CIV ENG 204.

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of seminar per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructors: Chow, Gadgil

Planetary Boundaries and the Anthropocene: Read Less [-]

CIV ENG 205B Margins of Quality for Engineered Systems 3 Units

Terms offered: Fall 2009, Fall 2007, Fall 2000
Processes and procedures to define and determine the demands and capacities of the structures and hardware elements of engineered systems during their life-cycles: margins of quality. The objective of this course is to provide students with the knowledge and skills to define and evaluate system demands, capacities, and reliabiltity targets to be used in design, requalification, construction, operation, maintenance, and decommissioning of engineered systems.
Margins of Quality for Engineered Systems: Read More [+]
Rules & Requirements

Prerequisites: 125, 193 or equivalents and senior design experience

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Bea

Margins of Quality for Engineered Systems: Read Less [-]

CIV ENG 206 Water Resources Management 3 Units

Terms offered: Spring 2022, Spring 2021, Spring 2020
The course provides a framework to address contemporary water-resources problems, and to achieve water security for local areas and broader regions. Students will become aware of critical water-resources issues at local, national and global scales, and learn to formulate solutions for water-resources problems using engineering, natural-science and social-science tools. The main focus is on California and the Western United States, with comparative analysis for other regions.
Water Resources Management: Read More [+]
Rules & Requirements

Prerequisites: Graduate standing or senior undergrad with consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Bales

Water Resources Management: Read Less [-]

CIV ENG 209 Design for Sustainable Communities 3 Units

Terms offered: Spring 2022, Spring 2021, Spring 2016
This course provides conceptual and hands-on experience in design and implementation of innovative products or processes for improving the sustainability of resource-constrained communities (mostly poor ones in the developing countries). Teams of students will take on practical projects, with guidance from subject experts.
Design for Sustainable Communities: Read More [+]
Rules & Requirements

Prerequisites: Graduate standing or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Gadgill

Design for Sustainable Communities: Read Less [-]

CIV ENG 210 Control of Water-Related Pathogens 3 Units

Terms offered: Spring 2022, Fall 2018, Spring 2018
Comprehensive strategies for the assessment and control of water-related human pathogens (disease-causing microorganisms). Transmission routes and life cycles of common and emerging organisms, conventional and new detection methods (based on molecular techniques), human and animal sources, fate and transport in the environment, treatment and disinfection, appropriate technology, regulatory approaches, water reuse.
Control of Water-Related Pathogens: Read More [+]
Rules & Requirements

Prerequisites: Basic course in microbiology recommended; graduate standing or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Nelson

Formerly known as: Civil and Environmental Engineering 210A

Control of Water-Related Pathogens: Read Less [-]

CIV ENG 211A Environmental Physical-Chemical Processes 3 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
Fundamental concepts of physical-chemical processes that affect water quality in natural and engineered environmental systems. Focus is on developing a qualitative understanding of mechanisms as well as quantitative tools to describe, predict, and control the behavior of physical-chemical processes. Topics include reactor hydraulics and reaction kinetics, gas transfer, adsorption, particle characteristics, flocculation, gravitational separations, filtration, membranes, and disinfection.
Environmental Physical-Chemical Processes: Read More [+]
Rules & Requirements

Prerequisites: Civil and Environmental Engineering 111 or equivalent and course work in aquatic chemistry, or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Nelson

Environmental Physical-Chemical Processes: Read Less [-]

CIV ENG 211B Environmental Biological Processes 3 Units

Terms offered: Spring 2022, Fall 2020, Fall 2019
Fundamental concepts of biological processes that are important in natural and engineered environmental systems, especially those affecting water quality. Incorporates basic fundamentals of microbiology into a quantifiable engineering context to describe, predict, and control behavior of environmental biological systems. Topics include the stoichiometry, energetics and kinetics of microbial reactions, suspended and biofilm processes, carbon and nutrient cycling, and bioremediation applications.
Environmental Biological Processes: Read More [+]
Rules & Requirements

Prerequisites: Civil and Environmental Engineering 111 or equivalent and course work in microbiology, or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Alvarez-Cohen

Environmental Biological Processes: Read Less [-]

CIV ENG 213 Watersheds and Water Quality 3 Units

Terms offered: Fall 1996
Overview of approaches used by engineers to preserve or improve water quality at the watershed scale. Characterization and modeling of nutrients, metals, and organic contaminants in watersheds. Application of ecosystem modification and pollutant trading to enhance water quality. The course emphasizes recent case studies and interdisciplinary approaches for solving water quality problems.
Watersheds and Water Quality: Read More [+]
Rules & Requirements

Prerequisites: Graduate standing or consent of instructor

Credit Restrictions: Students will receive no credit for 213 after taking 290C.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Sedlak

Watersheds and Water Quality: Read Less [-]

CIV ENG 215 Emerging Technologies for Water Sustainability 3 Units

Terms offered: Spring 2022, Spring 2021, Fall 2005
Overview of technological development to address global challenges on water-energy nexus and water scarcity. Introduction to emerging technologies, such as membrane filtration, thermal processes, and nanotechnology. Their applications in water purification, wastewater reuse, desalination, and renewable energy production. Quantitative understanding of energy efficiency, transport mechanisms, and interfacial phenomena involved in the above engineered systems. Group projects on selected topic.
Emerging Technologies for Water Sustainability: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 111 or equivalent

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Mi

Emerging Technologies for Water Sustainability: Read Less [-]

CIV ENG 217 Environmental Chemical Kinetics 3 Units

Terms offered: Spring 2022, Spring 2020, Spring 2017
Kinetic aspects of chemical fate and transport in aquatic systems. Quantitative descriptions of the kinetics of intermedia transport and pollutant transformation by abiotic, photochemical, and biological reactions. Techniques for the estimation of environmental reaction rates. Development of models of pollutant behavior in complex natural systems.
Environmental Chemical Kinetics: Read More [+]
Rules & Requirements

Prerequisites: Graduate standing or consent of instructor; 115 or 214 or equivalent

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Sedlak

Environmental Chemical Kinetics: Read Less [-]

CIV ENG 218A Air Quality Engineering 3 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
Quantitative overview of the characterization and control of air pollution problems. Summary of fundamental chemical and physical processes governing pollutant behavior. Analysis of key elements of the air pollution system: sources and control techniques, atmospheric transformation, atmospheric transport, modeling, and air quality management.
Air Quality Engineering: Read More [+]
Rules & Requirements

Prerequisites: Graduate standing in engineering or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Harley

Air Quality Engineering: Read Less [-]

CIV ENG 218B Atmospheric Aerosols 3 Units

Terms offered: Spring 2013, Fall 2008, Spring 2006
Nature, behavior and signifance of airborne particulate matter. Size distributions. Transport phenomena and deposition processes. Light scattering, visibility impairment, and climate consequences. Aerosol thermodynamics and kinetics of phase-change processes, including nucleation. Phase partitioning of semivolatile species. Coagulation. Atmospheric sources including primary and secondary particle formation. Loss mechanisms including wet and dry deposition. Technological controls.
Atmospheric Aerosols: Read More [+]
Rules & Requirements

Prerequisites: Graduate standing or consent of instructor, Civil and Environmental Engineering 218A recommended

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of lecture and 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Atmospheric Aerosols: Read Less [-]

CIV ENG 218C Air Pollution Modeling 3 Units

Terms offered: Spring 2022, Spring 2010, Spring 2008
Theory and practice of mathematical air quality modeling. Modeling atmospheric chemical transformation processes. Effects of uncertainty in model parameters on predictions. Review of atmospheric diffusion theory and boundary layer meteorology. Dispersion modeling. Combining chemistry and transport.
Air Pollution Modeling: Read More [+]
Rules & Requirements

Prerequisites: 218A

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Harley

Air Pollution Modeling: Read Less [-]

CIV ENG 219 Fluid Flow in Environmental Processes 3 Units

Terms offered: Spring 2021, Spring 2020, Spring 2019
Transport and mixing of solutes in water. Focus on rivers, lakes, estuaries, and wetlands, with some discussion of groundwater and the atmosphere. Basic equations of fluid motion will be used to contextualize and/or derive applied empirical equations for use in specific cases of applied environmental engineering practice. Example applications include outfalls, total maximum daily loads, residence time, and longitudinal dispersion.
Fluid Flow in Environmental Processes: Read More [+]
Rules & Requirements

Prerequisites: Graduate standing or senior undergrad with consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructors: Variano, Stacey

Fluid Flow in Environmental Processes: Read Less [-]

CIV ENG 220 Structural Analysis Theory and Applications 3 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
Theory and applications of modern structural analysis. Direct stiffness method. Matrix formulations. Virtual work principles. Numerical solution methods. Modeling and practical analysis of large frame structures. Elastoplastic analysis of frames. P-delta effects.
Structural Analysis Theory and Applications: Read More [+]
Rules & Requirements

Prerequisites: 121 or equivalent

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Filippou

Structural Analysis Theory and Applications: Read Less [-]

CIV ENG 220N Nonlinear Structural Analysis 3 Units

Terms offered: Spring 2019, Spring 2018, Spring 2017
Theory, modeling, and computation for analysis of structures with material and geometric nonlinearities. Sources of nonlinearity. Solution strategies for static and dynamic loads. Modeling of inelastic materials and members. P-# analysis and large deformation theory. Elastic stability. Nonlinear dynamic analysis. Time integration methods. Practical applications.
Nonlinear Structural Analysis: Read More [+]
Rules & Requirements

Prerequisites: Civ Eng 121 or equivalent

Credit Restrictions: Students who have previously taken Civ Eng 221 will not receive credit for this course

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Filippou

Nonlinear Structural Analysis: Read Less [-]

CIV ENG 221 Nonlinear Structural Analysis 3 Units

Terms offered: Spring 2022, Spring 2021, Spring 2020
Theory, modeling, and computation for analysis of structures with material and geometric nonlinearities. Sources of nonlinearity. Solution strategies for static and dynamic loads. Modeling of inelastic materials and members. P-delta and large deformation theory. Analysis of stability. Practical applications.
Nonlinear Structural Analysis: Read More [+]
Rules & Requirements

Prerequisites: 220

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Filippou

Nonlinear Structural Analysis: Read Less [-]

CIV ENG 222 Finite Element Methods 3 Units

Terms offered: Spring 2022, Spring 2021, Spring 2020
Approximation theory for analysis of deformation and stress in solids. Finite element formulations for frame, plane stress/strain, axisymmetric, torsion, and three-dimensional elastic problems. The isoparametric formulation and implementation. Plate and shell elements. Finite element modeling of structural systems.
Finite Element Methods: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 220; and CIV ENG 132 or CIV ENG C231

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructors: Filippou, Govindjee

Finite Element Methods: Read Less [-]

CIV ENG 223 Earthquake Protective Systems 3 Units

Terms offered: Spring 2022, Spring 2021, Spring 2020
Conceptual basis for earthquake protective systems including seismic isolation and energy absorbing techniques. Design rules for seismic isolation, energy absorbing and self-centering systems. Characteristics of isolation bearings, frictional, metallic and energy absorbing devices, code provision for earthquake protective systems. Applications to new and existing structures.
Earthquake Protective Systems: Read More [+]
Rules & Requirements

Prerequisites: 220, 225, or consent of instructor

Credit Restrictions: Students will receive no credit for 223 after taking 290D.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Konstantinidis

Formerly known as: 290D

Earthquake Protective Systems: Read Less [-]

CIV ENG 225 Dynamics of Structures 3 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
Evaluation of deformations and forces in structures, idealized as single-degree of freedom or discrete-parameter multi-degree of freedom systems, due to dynamic forces. Evaluation of earthquake-induced deformations and forces in structures by linear response history analysis; estimation of maximum response by response spectrum analysis; effects of inelastic behavior. Laboratory demonstrations.
Dynamics of Structures: Read More [+]
Rules & Requirements

Prerequisites: 220 (may be taken concurrently) or equivalent

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: DeJong

Dynamics of Structures: Read Less [-]

CIV ENG 226 Stochastic Structural Dynamics 3 Units

Terms offered: Spring 2016, Spring 2014, Spring 2012
Introduction to the theory of probability and random processes. Correlation and power spectral density functions. Stochastic dynamic analysis of single- and multi-degree-of-freedom structures subjected to stationary and non-stationary random excitations. Time- and frequency-domain analyses; modal cross-correlations. Response to multi-support excitations. Level crossings, envelope process, first-excursion probability, and distributions of peaks and extremes. Introduction to nonlinear stochastic dynamic analysis. Applications in earthquake, wind, and ocean engineering.
Stochastic Structural Dynamics: Read More [+]
Rules & Requirements

Prerequisites: 225

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Stochastic Structural Dynamics: Read Less [-]

CIV ENG 227 Earthquake-Resistant Design 3 Units

Terms offered: Spring 2022, Spring 2021, Spring 2020
Design of structures to resist earthquakes and other dynamic excitations. Characterization of earthquakes for design. Development of design criteria for elastic and inelastic structural response. Seismic performance of various structural systems. Prediction of nonlinear seismic behavior. Basis for code design procedures. Preliminary design of steel and reinforced concrete structures. Evaluation of earthquake vulnerability of existing structures and rehabilitation of seismic deficiencies.
Earthquake-Resistant Design: Read More [+]

Rules & Requirements

Prerequisites: 220 and 225

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructors: Moehle, Becker

Earthquake-Resistant Design: Read Less [-]

CIV ENG 228 Advanced Earthquake Analysis 3 Units

Terms offered: Fall 2021, Spring 2015, Spring 2013
Advanced topics in time-domain dynamic analysis of structures. Frequency-domain analysis of dynamic response; discrete Fourier transform methods. Earthquake analysis of structures including structural-foundation-soil interaction, and of structures interacting with fluids.
Advanced Earthquake Analysis: Read More [+]

Rules & Requirements

Prerequisites: 225

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Advanced Earthquake Analysis: Read Less [-]

CIV ENG 229 Structural System Reliability 3 Units

Terms offered: Spring 2022, Spring 2020, Spring 2015
Review of probability theory. Multivariate distribution models. Review of classical methods for characterization of systems and assessment of system reliability. Formulation of structural reliability for components and systems. Exact solutions for special cases. Computational reliability methods, including first- and second-order reliability methods (FORM and SORM), response surface, Monte Carlo simulation, and importance sampling. Bounds on system reliability. Reliability sensitivity and importance measures. Bayesian updating and reliability analysis under statistical and model uncertainties. Introductions to reliability-based optimal design, time- and space-variant reliability analysis, and finite-element reliability methods.
Structural System Reliability: Read More [+]

Rules & Requirements

Prerequisites: Graduate standing

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Structural System Reliability: Read Less [-]

CIV ENG C231 Mechanics of Solids 3 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
Mechanical response of materials: Simple tension in elastic, plastic and viscoelastic members. Continuum mechanics: The stress and strain tensors, equilibrium, compatibility. Three-dimensional elastic, plastic and viscoelastic problems. Thermal, transformation, and dealloying stresses. Applications: Plane problems, stress concentrations at defects, metal forming problems.
Mechanics of Solids: Read More [+]

Rules & Requirements

Prerequisites: Graduate standing or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Govindjee

Also listed as: MAT SCI C211

Mechanics of Solids: Read Less [-]

CIV ENG 232 Structural Mechanics 3 Units

Terms offered: Spring 2022, Spring 2020, Spring 2018
The goal of this course is to study the theories of structural mechanics within the framework of nonlinear continuum mechanics of solids. Finite elasticity; invariance. Energy principles: principles of virtual and complementary virtual work; primary and mixed variational principles. Theory of stability: Euler method; stability under follower loads. Classical theories of beams: planar, torsional, and lateral buckling. Plate theories. Invariant theories of structural mechanics: directed continua; Cosserat theories of rods.
Structural Mechanics: Read More [+]

Rules & Requirements

Prerequisites: 231 or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Armero

Structural Mechanics: Read Less [-]

CIV ENG 233 Computational Mechanics 3 Units

Terms offered: Fall 2022, Spring 2021, Fall 2018
Computational methods for solution of problems in structural mechanics. Finite-element methods for displacement and mixed variational solutions of problems in elasticity and inelasticity. Treatment of constraints arising from near incompressibility in solids, transverse shear effects in beams, plates, and shells, and/or contact between structures. Programming methods for finite-element implementations.
Computational Mechanics: Read More [+]

Rules & Requirements

Prerequisites: 222, or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Armero

Computational Mechanics: Read Less [-]

CIV ENG 234 Computational Inelasticity 3 Units

Terms offered: Spring 2011, Fall 2007, Fall 2005
Computational methods applied to inelastic deformations of solids; 1, 2, and 3-D large and small-deformation continuum plasticity and viscoelasticity models and their algorithmic approximations; viscoplastic regularizations and softening; thermodynamics and its relationship to algorithmic stability; return mappings, closest-point projections and operator splits; application to metals, soils, concrete, and polymers and incorporation into finite element codes.
Computational Inelasticity: Read More [+]

Rules & Requirements

Prerequisites: 231 or Materials Science and Engineering 211 or Mechanical Engineering 185

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructors: Armero, Govindjee

Computational Inelasticity: Read Less [-]

CIV ENG C235 Introduction to Statistical Mechanics for Engineers 3 Units

Terms offered: Spring 2020, Spring 2017, Fall 2013
Introduction to statistical mechanics for engineers. Basics of ensembles, phase spaces, partitions functions, and free energies. Analysis of expectation values and fluctuations in system properties. Applications to the study of elementary gases, phonons in solids, polymer chains and networks, harmonic and quasi-harmonic crystalline solids; limitations of classical methods and quantum mechanical influences; molecular dynamics simulations for solids.
Introduction to Statistical Mechanics for Engineers: Read More [+]
Objectives & Outcomes

Course Objectives: To provide a modern introduction to the application of statistical mechanics for engineering with a particular emphasis on mechanical response.

Rules & Requirements

Prerequisites: CE C231 or MSE C211 or ME 185 or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructors: Govindjee, Papadopoulos

Also listed as: MEC ENG C279

Introduction to Statistical Mechanics for Engineers: Read Less [-]

CIV ENG C236 Micromechanics 3 Units

Terms offered: Spring 2022, Spring 2018, Spring 2016
Basic theories, analytical techniques, and mathematical foundations of micromechanics. It includes 1. physical micromechanics, such as mathematical theory of dislocation, and cohesive fracture models; 2. micro-elasticity that includes Eshelby's eigenstrain theory, comparison variational principles, and micro-crack/micro-cavity based damage theory; 3. theoretical composite material that includes the main methodologies in evaluating overall material properties; 4. meso-plasticity that includes meso-damage theory, and the crystal plasticity; 5. homogenization theory for materials with periodic structures.
Micromechanics: Read More [+]
Rules & Requirements

Prerequisites: Consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructors: Govindjee, Li

Also listed as: MAT SCI C214

Micromechanics: Read Less [-]

CIV ENG 237 Computational Nano-mechanics 3 Units

Terms offered: Prior to 2007
Basic statistical thermodynamics foundations, physical models, computational formulations, algorithms, and software that are used in nanoscale simulations and modellings. They include (1) Molecular dynamics; (2) Monte Carlo methods; (3) Coarse-grained molecular dynamics, and (4) Multiscale methods including coupling between molecular dynamics and finite element methods.
Computational Nano-mechanics: Read More [+]
Rules & Requirements

Prerequisites: Undergraduate level thermodynamics and calculus-based physics, e.g., MECENG 40 and PHYSICS 7A/B or equivalents

Credit Restrictions: Students will receive no credit for CIV ENG C237 after completing CIV ENG 237. A deficient grade in CIV ENG C237 may be removed by taking CIV ENG 237.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Li

Formerly known as: Civil and Environmental Engineering C237/ Nanoscale Science and Engineering C237

Computational Nano-mechanics: Read Less [-]

CIV ENG 240 Civil Engineering Materials 3 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
Microstructures of concrete, wood, and steel. Differences and similarities in response to loading and environmental effects on these materials, with emphasis on strength, elastic properties, creep, shrinkage, thermal stresses, and failure mechanisms.
Civil Engineering Materials: Read More [+]
Rules & Requirements

Prerequisites: An undergraduate course in civil engineering materials

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructors: Monteiro, Ostertag

Civil Engineering Materials: Read Less [-]

CIV ENG 241 Concrete Technology 3 Units

Terms offered: Spring 2019, Spring 2015, Spring 2013
Properties of fresh and hardened concrete; strength, elastic behavior, creep, shrinkage, and durability to chemical and physical attacks. New concrete-making materials. Recent advancements in concrete technology: high-strength, high-workability, and high-performance concrete; fiber-reinforced concrete, and roller-compacted concrete.
Concrete Technology: Read More [+]
Rules & Requirements

Prerequisites: 165 or equivalent

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Monteiro

Concrete Technology: Read Less [-]

CIV ENG 244 Reinforced Concrete Structures 3 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
Analysis and design of reinforced concrete elements and systems that are common in building and bridge structures, with an emphasis on seismic response and design; structural design methods; reinforced concrete materials; confined concrete; line elements under axial, flexural, and shear loadings; bond, anchorage, and development; seismic design principles; earthquake-resistant building frames, walls, diaphragms, and foundations; earthquake-resistant bridges.
Reinforced Concrete Structures: Read More [+]
Rules & Requirements

Prerequisites: Civil and Environmental Engineering 123

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Moehle

Reinforced Concrete Structures: Read Less [-]

CIV ENG 245 Behavior of Reinforced Concrete 3 Units

Terms offered: Spring 2015, Spring 2013, Spring 2011
Advanced topics in reinforced concrete construction, including inelastic flexural behavior; applications of plastic analysis to reinforced concrete frames; behavior in shear and torsion; yield-line analysis of slabs; behavior under cyclic and reversed loading; seismic rehabilitation.
Behavior of Reinforced Concrete: Read More [+]
Rules & Requirements

Prerequisites: 123 and 220

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Moehle

Behavior of Reinforced Concrete: Read Less [-]

CIV ENG 246 Prestressed Concrete Structures 3 Units

Terms offered: Spring 2022, Spring 2021, Spring 2020
Behavior and design of statically determinate prestressed concrete structures under bending moment, shear, torsion and axial load effects. Design of continous prestressed concrete beams, frames, slabs, and shells. Time-dependent effects and deflections of prestressed concrete structures. Applications to the design and construction of bridges and buildings.
Prestressed Concrete Structures: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 123N or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructors: Filippou, Moehle

Prestressed Concrete Structures: Read Less [-]

CIV ENG 247 Design of Steel and Composite Structures 3 Units

Terms offered: Spring 2022, Spring 2021, Spring 2020
Behavior and design of steel plate girders and shear walls. Design of bracings for stability. Design of members subjected to torsion. Design of composite beams, columns, and beam-columns. Behavior and design of shear, semi-rigid and moment connections. Concepts used in design of gusset plates and base plates. Selection and design of steel and composite systems.
Design of Steel and Composite Structures: Read More [+]
Rules & Requirements

Prerequisites: 122 or equivalent

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructors: Astaneh, Mahin

Design of Steel and Composite Structures: Read Less [-]

CIV ENG 248 Behavior and Plastic Design of Steel Structures 3 Units

Terms offered: Fall 2015, Fall 2012, Fall 2010
Topics related to inelastic behavior and plastic design of steel members and structures. Behavior of plastic hinge in members subjected to bending moment, axial force, shear, and their combinations. Collapse mechanisms of steel members and structures such as moment frames and braced systems. Inelastic cyclic behavior of steel components. Introduction to fracture and fatigue of steel components.
Behavior and Plastic Design of Steel Structures: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 122

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Behavior and Plastic Design of Steel Structures: Read Less [-]

CIV ENG 249 Experimental Methods in Structural Engineering 3 Units

Terms offered: Fall 2022, Fall 2019, Fall 2017
This course covers the following topics: similitude laws, design of structural models, instrumentation and measurement techniques; use of computers to acquire data and control tests; pseudo-dynamic testing method; standard proof-testing for capacity assessment; non-destructive testing for condition assessment, and virtual experimentation. Upon completing this course, the students will be able to use experimental methods to investigate the behavior of a structure and to evaluate its condition.
Experimental Methods in Structural Engineering: Read More [+]
Rules & Requirements

Prerequisites: Graduate standing or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Mosalam

Experimental Methods in Structural Engineering: Read Less [-]

CIV ENG C250N Transportation Policy and Planning 3 Units

Terms offered: Spring 2022, Spring 2021, Spring 2020
Policy issues in urban transportation planning; measuring the performance of transportation systems; the transportation policy formulation process; transportation finance, pricing, and subsidy issues; energy and air quality in transportation; specialized transportation for elderly and disabled people; innovations in transportation policy.
Transportation Policy and Planning: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 213

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Also listed as: CY PLAN C217

Transportation Policy and Planning: Read Less [-]

CIV ENG 251 Operation of Transportation Facilities 3 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
The management of vehicle flows and fleets. Traffic stream properties and their measurement. Theories of traffic flow. Capacity analysis and queueing. Flow control and fleet scheduling.
Operation of Transportation Facilities: Read More [+]
Rules & Requirements

Prerequisites: Graduate standing or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructors: Cassidy, Daganzo

Operation of Transportation Facilities: Read Less [-]

CIV ENG 252 Systems Analysis in Transportation 3 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
The systems approach and its application to transportation planning and engineering. Prediction of flows and level of service. Production functions and cost minimization. Utility theory and demand modeling. Transportation network analysis and equilibrium assignment. Decision analysis and evaluation of transportation projects.
Systems Analysis in Transportation: Read More [+]
Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Hansen

Systems Analysis in Transportation: Read Less [-]

CIV ENG 253 Intelligent Transportation Systems 3 Units

Terms offered: Spring 2021, Spring 2019, Spring 2017
The use of advanced surveillance, navigation, communication, and computer technology to monitor, analyze, and improve the performance of transportation systems. Enabling technologies. Application to monitoring, analysis, evaluation, and prediction of transportation system performance and behavior. Intervention strategies. Feasibility studies. Human factors and institutional issues. Case studies. In the laboratory, students carry out a term project under the supervision of an ITS researcher.
Intelligent Transportation Systems: Read More [+]
Rules & Requirements

Prerequisites: Consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructors: Sengupta, Skabardonis

Intelligent Transportation Systems: Read Less [-]

CIV ENG 254 Transportation Economics 3 Units

Terms offered: Spring 2019, Spring 2010, Spring 2009
Application of micro- and macro-economic concepts to transportation systems. Urban and interregional travel demand analysis. Freight demand. Project and program evaluation. Social welfare theory. Analysis of social cost. Investment analysis and pricing theory. Economic impact analysis. Role of economic analysis in decision making.
Transportation Economics: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 252 or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructors: Hansen, Kanafani

Transportation Economics: Read Less [-]

CIV ENG 254G Global Metropolitan Studies: Introduction to Theories, Histories & Methods 3 Units

Terms offered: Fall 2021
Implications of increasing urbanization are widespread: from environmental challenges, to segregation, to new political and social movements. This course provides an overview of different disciplinary approaches to understanding urban systems, drawing on engineering, the social sciences, urban planning, and the natural sciences. Students will learn from other disciplines to enrich the study of cities within their own field and be better prepared for interdisciplinary collaborations.
Global Metropolitan Studies: Introduction to Theories, Histories & Methods: Read More [+]
Rules & Requirements

Prerequisites: PhD standing (any discipline)

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructors: Walker, Soga

Global Metropolitan Studies: Introduction to Theories, Histories & Methods: Read Less [-]

CIV ENG 255 Highway Traffic Operations 3 Units

Terms offered: Fall 2022, Fall 2021, Spring 2020
Operational planning and management of the highway transportation system. The highway system is presented as a set of operating environments with each having its unique analytical framework. Major topics to be covered include policy and institutional issues, selection of strategies and tactics, evaluation of objectives and measures of effectiveness.
Highway Traffic Operations: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 251 or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Cassidy

Highway Traffic Operations: Read Less [-]

CIV ENG 256 Transportation Sustainability 3 Units

Terms offered: Spring 2022, Spring 2021, Spring 2020
This multi-disciplinary course is intended to introduce students to the fundamentals of sustainable transportation, with an emphasis on: 1) current trends, climate and energy science, and the policy context; 2) methodological and analysis techniques; 3) vehicle technology, fuels, and intelligent transportation systems (ITS) solutions (supply side); and 4) land use, public transportation, and demand management.
Transportation Sustainability: Read More [+]
Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Horvath

Transportation Sustainability: Read Less [-]

CIV ENG 257 Sustainable Aviation and Infrastructure 3 Units

Terms offered: Spring 2022, Spring 2021, Spring 2020
Principles of “green” and “sustainable” aviation, and analysis methods for evaluating aviation sustainability metrics and measurements. Aircraft operations and airport systems in the context of global warming, aviation noise, local and global emissions, third-party risk, environmental economics and resilience. Models of carbon reduction, and technology and operations alternatives are studied. Future concepts, such as urban and regional air mobility using electric aircraft and vertiports.
Sustainable Aviation and Infrastructure: Read More [+]
Rules & Requirements

Prerequisites: Graduate standing or consent of instructor

Credit Restrictions: Students will receive no credit for CIV ENG 257 after completing CIV ENG 257, or CIV ENG 257. A deficient grade in CIV ENG 257 may be removed by taking CIV ENG 257, or CIV ENG 257.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Rakas

Sustainable Aviation and Infrastructure: Read Less [-]

CIV ENG 258 Logistics 3 Units

Terms offered: Fall 2013, Fall 2011, Fall 2010
Vehicle routing. Transportation-inventory-production interrelationships, physical distribution networks, many-to-many networks (airlines, postal, etc.), the role of transshipments and terminals in logistic systems for the transportation of goods and passengers, public and private transportation system design. Relevant methodologies.
Logistics: Read More [+]
Rules & Requirements

Prerequisites: Consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Daganzo

Logistics: Read Less [-]

CIV ENG C258 Supply Chain and Logistics Management 3 Units

Terms offered: Spring 2022, Spring 2021, Fall 2020, Spring 2020
Supply chain analysis is the study of quantitative models that characterize various economic trade-offs in the supply chain. The field has made significant strides on both theoretical and practical fronts. On the theoretical front, supply chain analysis inspires new research ventures that blend operations research, game theory, and microeconomics. These ventures result in an unprecedented amalgamation of prescriptive, descriptive, and predictive models characteristic of each subfield. On the practical front, supply chain analysis offers solid foundations for strategic positioning, policy setting, and decision making.
Supply Chain and Logistics Management: Read More [+]
Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Shen

Also listed as: IND ENG C253

Supply Chain and Logistics Management: Read Less [-]

CIV ENG 259 Public Transportation Systems 3 Units

Terms offered: Spring 2022, Spring 2021, Spring 2020
Analysis of mass transit systems, their operation, and management. Technology of transit vehicles and structures. Public policy and financing.
Public Transportation Systems: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 251, CIV ENG 252, and CIV ENG 262

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructors: Cassidy, Daganzo

Public Transportation Systems: Read Less [-]

CIV ENG 260 Air Transportation 3 Units

Terms offered: Spring 2022, Spring 2021, Spring 2020
Nature of civil aviation; structure of the airline industry; aircraft characteristics and performance; aircraft noise; navigation and air traffic control; airport planning and design; airline operations; aviation system planning.
Air Transportation: Read More [+]
Rules & Requirements

Prerequisites: Graduate standing or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructors: Hansen, Kanafani

Air Transportation: Read Less [-]

CIV ENG 260D Data Science in Aviation 3 Units

Terms offered: Not yet offered
The course will be centered around analyses of a set of aviation data sets and will enable the students to become familiar with data science applications to aviation. Aviation topics to be covered include fundamentals of air traffic control, models of aviation operations, aircraft trajectory prediction and optimization, data sources in aviation, overview of data science methods, role of data science in solving problems in aviation operations such as conflict detection and resolution, traffic flow management, arrivals management and surface operations, airline operations, fuel efficiency, global aviation.
Data Science in Aviation: Read More [+]
Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 2 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Data Science in Aviation: Read Less [-]

CIV ENG 261 Infrastructure Systems Management 3 Units

Terms offered: Spring 2014, Spring 2013, Spring 2011
Integrated treatment of quantitative and analytical methods for the management of infrastructure facilities over their life. The focus of the course is on statistical modeling and numerical optimization methods and their application to managing systems of civil infrastructure, with an emphasis on transportation facilities.
Infrastructure Systems Management: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 252 and CIV ENG 262

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Infrastructure Systems Management: Read Less [-]

CIV ENG 262 Analysis of Transportation Data 3 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
Probabilistic models in transportation. The use of field data. Data gathering techniques, sources of errors, considerations of sample size. Experiment design for demand forecasting and transportation operations analysis. Analysis techniques.
Analysis of Transportation Data: Read More [+]
Rules & Requirements

Prerequisites: College calculus or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructors: Daganzo, Hansen

Analysis of Transportation Data: Read Less [-]

CIV ENG 263N Scalable Spatial Analytics 3 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
Introduction to modern methods of data analysis, spatial data handling and visualization technologies for engineers and data scientists. Theoretical coverage includes a selection of methods from spatial statistics, exploratory data analysis, spatial data mining, discriminative and generative approaches of machine learning. Projects and assignment tasks are targeted at real-world scalable implementation of systems and services based on data analytics in environmental remote sensing, transportation, energy, location-based services and the domain of “smart cities” in general
Scalable Spatial Analytics: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 290I or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Scalable Spatial Analytics: Read Less [-]

CIV ENG 264 Behavioral Modeling for Engineering, Planning, and Policy Analysis 3 Units

Terms offered: Spring 2022, Spring 2021, Spring 2020
Many aspects of engineering, planning, and policy involve a human element, be it consumers, businesses, governments, or other organizations. Effective design and management requires understanding this human response. This course focuses on behavioral theories and the use of quantitative methods to analyze human response. A mix of theory and practical tools are covered, with applications drawn from infrastructure investment and use, urban growth and design, health, and sustainability.
Behavioral Modeling for Engineering, Planning, and Policy Analysis: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 262 or CY PLAN 204

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Walker

Behavioral Modeling for Engineering, Planning, and Policy Analysis: Read Less [-]

CIV ENG C265 Traffic Safety and Injury Control 3 Units

Terms offered: Spring 2022, Spring 2021, Spring 2020
This course applies principles of engineering, behavioral science, and vision science to preventing traffic collisions and subsequent injury. A systematic approach to traffic safety will be presented in the course, and will include (1) human behavior, vehicle design, and roadway design as interacting approaches to preventing traffic crashes and (2) vehicle and roadway designs as approaches to preventing injury once a collision has occured. Implications of intelligent transportation system concepts for traffic safety will be discussed throughout the course.
Traffic Safety and Injury Control: Read More [+]
Rules & Requirements

Prerequisites: Graduate standing or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Ragland

Also listed as: PB HLTH C285

Traffic Safety and Injury Control: Read Less [-]

CIV ENG 268A Lean Construction Concepts and Methods 3 Units

Terms offered: Fall 2021, Fall 2020, Fall 2019
Inspired by the "lean" resolution in manufacturing, production management concepts and methods are woven into a lean project delivery system. Key concepts include flow, value, variability, and waste. Key methods include proecution system design, target costing, value stream mapping, and work flow control. Student teams apply concepts and methods in field studies of real project management processes and construction operations. The course includes a tour of the NUMMI Auto Plant in Fremont.
Lean Construction Concepts and Methods: Read More [+]
Rules & Requirements

Prerequisites: Graduate standing in Civil and Environmental Engineering

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Tommelein

Formerly known as: 290M

Lean Construction Concepts and Methods: Read Less [-]

CIV ENG 268B Lean Construction and Supply Chain Management 3 Units

Terms offered: Spring 2022, Spring 2021, Spring 2020
Principles and practices of "lean" production are applied to project delivery in the AEC industry. Case studies illustrate the concepts. Project delivery is viewed holistically with a focus on work structuring and supply chain management. Topics include systems dynamics, uncertainty, and variation; materials management; logistics; e-commerce; building information modeling (BIM); and integrated product and process design. Students use process simulation to assess performance of different system configurations and develop a case study applying concepts on a real project.
Lean Construction and Supply Chain Management: Read More [+]
Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Tommelein

Formerly known as: 290N

Lean Construction and Supply Chain Management: Read Less [-]

CIV ENG 268D Law for Engineers 3 Units

Terms offered: Spring 2022, Spring 2021, Spring 2020
Engineering involves many parties with diverse interests. Legal principles form the framework for their interaction. Contracts for engineering services establish both risk allocation and reciprocal liabilities. Issues of contract formation, performance, breach, and remedy are covered in detail. Standard of care and professional negligence are emphasized during the discussion of tort law. Other topics include regulation, legal relationships, litigation, and alternative dispute resolution.
Law for Engineers: Read More [+]
Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Formerly known as: 290L

Law for Engineers: Read Less [-]

CIV ENG 268E Environmental Life-Cycle Assessment 3 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
Methods and tools of environmental life-cycle assessment (LCA, an international standard), especially as applied to infrastructure, but also applicable to other products, processes, services, and systems. Focus on design, management, and supply chains of the entire life cycle: manufacturing, construction, transportation, operation and maintenance, and end of life. Economic life-cycle cost analysis. Models and tools for life-cycle environmental inventory, impact, and improvement analysis.
Environmental Life-Cycle Assessment: Read More [+]
Objectives & Outcomes

Student Learning Outcomes: After taking this course, students will be able to analyze the life-cycle environmental and economic implications of products, processes, and services using state-of-the-art methods, make decisions with confidence, document their analysis in a structured and transparent way, and be cognizant of the policy dimensions of decisions needing LCA.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Horvath

Environmental Life-Cycle Assessment: Read Less [-]

CIV ENG 268H Advanced Project Planning and Control 3 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
Cost and time estimating and controlling techniques for projects. Evaluation of labor, material, equipment, and subcontract resources, scheduling techniques, earned value concepts. Measuring project percent complete. Contractual risk allocation. Project investment analysis techniques.
Advanced Project Planning and Control: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 167

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Ibbs

Advanced Project Planning and Control: Read Less [-]

CIV ENG 268I Business Fundamentals for Engineers 3 Units

Terms offered: Spring 2019, Spring 2017, Spring 2016
This course will provide a broad survey of management practices critical to starting and managing a business in the engineering and construction industries. Topics that are covered include the entrepreneurial process; organizing and staffing; establishing and applying production control systems; means of protecting products and services from competitive threat; and financial management.
Business Fundamentals for Engineers: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 167

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Ibbs

Business Fundamentals for Engineers: Read Less [-]

CIV ENG 268K Human and Organizational Factors: Quality and Reliability of Engineered Systems 3 Units

Terms offered: Spring 2011, Spring 2010, Fall 2009
This course addresses human and organizational factors in development of desirable quality and reliabiltiy in engineered systems during their life-cyles (concept development through decommissioning). Applications tested and verified proactive, reactive, and interactive approaches are developed and illustrated.
Human and Organizational Factors: Quality and Reliability of Engineered Systems: Read More [+]
Rules & Requirements

Prerequisites: Graduate standing

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Formerly known as: 290A

Human and Organizational Factors: Quality and Reliability of Engineered Systems: Read Less [-]

CIV ENG 268S Buildings and Sustainability 3 Units

Terms offered: Spring 2018
Overview of what makes buildings and their systems “green” and “sustainable," and analysis throughout their life cycle (design, materials, construction, operation, maintenance, renovation, end of life) and in interaction with infrastructure systems (energy, transportation, water, waste management), the economy, natural environment, society. Innovative approaches, expectations for future developments. Cost-benefit analysis. Life-cycle management. Net-zero buildings. Case studies.
Buildings and Sustainability: Read More [+]
Objectives & Outcomes

Course Objectives: 1.
Provide overview of the importance of buildings to resource management, particularly focused on energy, transportation systems, water, waste, and land use
2.
Introduce the major design considerations, practices, and outcomes associated with green buildings
3.
Develop students’ ability to think critically about the role of buildings in society.
4.
Critically evaluate tradeoffs in building systems design subject to time, cost, material, social, and environmental constraints, and ethical considerations.
5.
Consider the future of the green building industry in the context of real-world developments and practice, equity, and justice.
6.
Evaluate the interplay between buildings and policy, including use of local case studies.

Rules & Requirements

Prerequisites: Graduate or senior undergraduate standing with consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Horvath

Buildings and Sustainability: Read Less [-]

CIV ENG 270 Advanced Geomechanics 3 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
Advanced treatment of topics in soil mechanics, including state of stress, consolidation and settlement analysis, shear strength of cohesionless and cohesive soils, and slope stability analysis.
Advanced Geomechanics: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 175

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructors: Bray, Soga

Formerly known as: 270A

Advanced Geomechanics: Read Less [-]

CIV ENG 271 Sensors and Signal Interpretation 3 Units

Terms offered: Fall 2019, Fall 2018, Fall 2017
An introduction to the fundamentals of sensor usage and signal processing, and their application to civil systems. In particular, the course focuses on how basic classes of sensors work, and how to go about choosing the best of the new MEMS-based devices for an application. The interpretation of the data focuses on analysis of transient signals, an area typically ignored in traditional signal processing courses. Goals include development of a critical understanding of the assumptions used in common sensing and analysis methods and their implications, strengths, and limitations.
Sensors and Signal Interpretation: Read More [+]
Rules & Requirements

Prerequisites: Graduate standing or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Glaser

Sensors and Signal Interpretation: Read Less [-]

CIV ENG 272 Numerical Modelling in Geomechanics 3 Units

Terms offered: Spring 2022, Spring 2021, Spring 2020
Constitutive laws for geotechnical materials including inelastic hyperbolic and elasto-plastic Cam-clay; soil behavior and critical-state soil mechanics; application of the finite element method to static analysis of earth structures; the Discontinuous Deformation Analysis method.
Numerical Modelling in Geomechanics: Read More [+]
Rules & Requirements

Prerequisites: Graduate standing or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructors: Bray, Soga

Numerical Modelling in Geomechanics: Read Less [-]

CIV ENG 273 Advanced GeoEngineering Testing and Design 3 Units

Terms offered: Spring 2022, Spring 2021, Spring 2020
Field and laboratory testing of soils to support analysis and design of earth structures. In situ field testing, including SPT, CPT, and vane shear, undisturbed sampling of soil, and laboratory testing of soil, including advanced equipment, instrumentation, data acquisition, and measurement techniques. Consolidation and static and cyclic triaxial and simple shear testing under stress- and strain-control with pore pressure measurements. Preparation of an engineering report.
Advanced GeoEngineering Testing and Design: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 270 or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 1.5 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Bray

Formerly known as: 270L

Advanced GeoEngineering Testing and Design: Read Less [-]

CIV ENG 275 Geotechnical Earthquake Engineering 3 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
Seismicity, influence of soil conditions on site response, seismic site response analysis, evaluation and modelling of dynamic soil properties, analysis of seismic soil-structure interaction, evaluation and mitigation of soil liquefaction and its consequences, seismic code provisions and practice, seismic earth pressures, seismic slope stability and deformation analysis, seismic safety of dams and embankments, seismic performance of pile foundations, and additional current topics.
Geotechnical Earthquake Engineering: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 175 or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Bray

Geotechnical Earthquake Engineering: Read Less [-]

CIV ENG C276 Seismic Hazard Analysis and Design Ground Motions 3 Units

Terms offered: Spring 2021, Spring 2019, Spring 2018
Deterministic and probabilistic approaches for seismic hazard analysis. Separation of uncertainty into aleatory variability and epistemic uncertainty. Discussion of seismic source and ground motion characterization and hazard computation. Development of time histories for dynamic analyses of structures and seismic risk computation, including selection of ground motion parameters for estimating structural response, development of fragility curves, and methods for risk calculations.
Seismic Hazard Analysis and Design Ground Motions: Read More [+]
Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Abrahamson

Also listed as: EPS C276

Seismic Hazard Analysis and Design Ground Motions: Read Less [-]

CIV ENG 277 Advanced Foundation Engineering 3 Units

Terms offered: Spring 2022, Spring 2021, Spring 2020
Advanced treatment of topics in foundation engineering, including earth pressure theories, design of earth retaining structures, bearing capacity, ground improvement for foundation support, analysis and design of shallow and deep foundations.
Advanced Foundation Engineering: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 270 or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Bray

Formerly known as: 270B

Advanced Foundation Engineering: Read Less [-]

CIV ENG 281 Engineering Geology 3 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
Influence of geologic origin and history on the engineering characteristics of soils and rocks. Application of geology in exploration, design, and construction of engineering works.
Engineering Geology: Read More [+]
Rules & Requirements

Prerequisites: A course in physical geology

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Sitar

Engineering Geology: Read Less [-]

CIV ENG 285C Seismic Methods in Applied Geophysics 3 Units

Terms offered: Spring 2011, Spring 2006, Spring 2002
This course gives an overview of seismic methods used to image the subsurface. Acquisition, processing, and interpretation of seismic data are discussed, with application to petroleum production, environmental site characterization, earthquake engineering, and groundwater.
Seismic Methods in Applied Geophysics: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG C178 (introductory course in applied geophysics); amd ENGIN 7 (introductory course in computer programming)

Credit Restrictions: Students will receive no credit for 285C after taking Mineral Engineering 236 before Fall 2001.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Rector

Formerly known as: Mineral Engineering 236

Seismic Methods in Applied Geophysics: Read Less [-]

CIV ENG 286 Digital Data Processing 3 Units

Terms offered: Spring 2021, Spring 2019, Spring 2017
Considerations for digital signal processing and data analysis. Fourier Transforms, convolution and correlation. Discrete linear systems, Z tranforms. Digital processing of seismic reflection data, deconvolution and migration. Introduction to 3-D seismic data.
Digital Data Processing: Read More [+]
Rules & Requirements

Prerequisites: Consent of instructor

Credit Restrictions: Students will receive no credit for 286 after taking Mineral Engineering 240 taken before Fall 2001.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Rector

Formerly known as: Mineral Engineering 240

Digital Data Processing: Read Less [-]

CIV ENG C289 Embedded System Design: Modeling, Analysis, and Synthesis 4 Units

Terms offered: Spring 2022, Spring 2021, Spring 2020, Spring 2019, Spring 2016
Principles of embedded system design. Focus on design methodologies and foundations. Platform-based design and communication-based design and their relationship with design time, re-use, and performance. Models of computation and their use in design capture, manipulation, verification, and synthesis. Mapping into architecture and systems platforms. Performance estimation. Scheduling and real-time requirements. Synchronous languages and time-triggered protocols to simplify the design process.
Embedded System Design: Modeling, Analysis, and Synthesis: Read More [+]
Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture, 1 hour of discussion, and 2 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Sangiovanni-Vincentelli

Formerly known as: Electrical Engineering C249/Civil and Environmental Engineering C289

Also listed as: EL ENG C249B

Embedded System Design: Modeling, Analysis, and Synthesis: Read Less [-]

CIV ENG 290 Advanced Special Topics in Civil and Environmental Engineering 1 - 3 Units

Terms offered: Fall 2022, Spring 2022, Fall 2021
This course covers current topics of interest in civil and environmental engineering. The course content may vary from semester to semester depending upon instructor.
Advanced Special Topics in Civil and Environmental Engineering: Read More [+]
Rules & Requirements

Prerequisites: Consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Advanced Special Topics in Civil and Environmental Engineering: Read Less [-]

CIV ENG 290F Advanced Topics in Seismology 3 Units

Terms offered: Spring 2022, Spring 2018, Spring 2016
Active areas of research in applied seismology. Subjects include: anisotropic and viscoelastic wave propagation, borehole seismology, crosswell seismology, including crosswell seismic tomography, vertical seismic profiling, reservoir monitoring including passive seismic methods.
Advanced Topics in Seismology: Read More [+]
Rules & Requirements

Prerequisites: Introductory course in seismology; 286 or Mineral Engineering 240

Repeat rules: Course may be repeated for credit with instructor consent.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Rector

Formerly known as: Mineral Engineering 290C

Advanced Topics in Seismology: Read Less [-]

CIV ENG 290I Civil Systems: Control and Information Management 3 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
Mathematical methods and information technologies for controlling CEE systems. Emphasizes designing component organizations that interact with the world in real-time to control a large system. Methods applied to transportation operations, supply chains, and structures. Management of design complexity by hierarchical specification, systematic use of simulation and verification tools, semantics, polymorphism,information management services, and compilation from high-level design languages.
Civil Systems: Control and Information Management: Read More [+]
Rules & Requirements

Prerequisites: Graduate standing or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Sengupta

Civil Systems: Control and Information Management: Read Less [-]

CIV ENG 290J Advanced Topics in Geotechnical Engineering 3 Units

Terms offered: Spring 2014, Spring 2009, Spring 2007
Advanced treatment of developing areas of geomechanics and geotechnical earthquake engineering, including the development of generalized nonlinear soil constitutive models, new developments in soil dynamics and geotechnical earthquake engineering, soil improvement, geosynthetics and earth structures, and case studies of geotechnical problems.
Advanced Topics in Geotechnical Engineering: Read More [+]
Rules & Requirements

Prerequisites: Advanced graduate standing in Geoengineering

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of seminar per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Bray

Advanced Topics in Geotechnical Engineering: Read Less [-]

CIV ENG 290T Advanced Topics in Transportation Theory 1 Unit

Terms offered: Fall 2008, Spring 2008, Fall 2007
Selected topics in the mathematical analysis of transportation systems. Topics will vary from year to year.
Advanced Topics in Transportation Theory: Read More [+]
Rules & Requirements

Prerequisites: Consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructors: Cassidy, Daganzo

Advanced Topics in Transportation Theory: Read Less [-]

CIV ENG C290U Transportation and Land Use Planning 3 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
Examination of the interactions between transportation and land use systems; historical perspectives on transportation; characteristics of travel and demand estimation; evaluation of system performance; location theory; models of transportation and urban structure; empirical evidence of transportation-land use impacts; case study examinations.
Transportation and Land Use Planning: Read More [+]
Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Chatman

Also listed as: CY PLAN C213

Transportation and Land Use Planning: Read Less [-]

CIV ENG 291G Advanced Estimation, Control, and Optimization of Partial Differential Equations 3 Units

Terms offered: Prior to 2007
This course will cover advanced methods in estimation, control, and optimization of distributed parameter systems (partial differential equations in particular). The course builds on 291 and covers discrete methods relying on finite differencing such as quadratic programming for optimal control and variational data assimilation, (ensemble, extended) Kalman filtering. The course covers distributed transfer function analysis and frequency responses of PDEs, and characteristics-based stability analysis.
Advanced Estimation, Control, and Optimization of Partial Differential Equations: Read More [+]
Rules & Requirements

Prerequisites: Civil and Environmental Engineering C291F/Electrical Engineering C291/Mechanical Engineering C236 or equivalent, or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Bayen

Advanced Estimation, Control, and Optimization of Partial Differential Equations: Read Less [-]

CIV ENG C291F Control and Optimization of Distributed Parameters Systems 3 Units

Terms offered: Fall 2017, Spring 2016, Spring 2015, Spring 2014
Distributed systems and PDE models of physical phenomena (propagation of waves, network traffic, water distribution, fluid mechanics, electromagnetism, blood vessels, beams, road pavement, structures, etc.). Fundamental solution methods for PDEs: separation of variables, self-similar solutions, characteristics, numerical methods, spectral methods. Stability analysis. Adjoint-based optimization. Lyapunov stabilization. Differential flatness. Viability control. Hamilton-Jacobi-based control.
Control and Optimization of Distributed Parameters Systems: Read More [+]

Rules & Requirements

Prerequisites: ENGIN 7 and MATH 54; or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Also listed as: EL ENG C291/MEC ENG C236

Control and Optimization of Distributed Parameters Systems: Read Less [-]

CIV ENG 292A Technologies for Sustainable Societies 1 Unit

Terms offered: Fall 2018, Fall 2017, Fall 2016
Exploration of selected important technologies that serve major societal needs, such as shelter, water, food, energy, and transportation, and waste management. How specific technologies or technological systems do or do not contribute to a move toward sustainability. Specific topics vary from year to year according to student and faculty interests.
Technologies for Sustainable Societies: Read More [+]

Rules & Requirements

Prerequisites: Graduate standing or consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1.5 hours of seminar per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructors: Horvath, Nazaroff

Technologies for Sustainable Societies: Read Less [-]

CIV ENG 295 Data Science for Energy 3 Units

Terms offered: Fall 2021, Spring 2021, Spring 2020
This course introduces students to the fundamentals of data science methods for the design and operation of energy systems. The course is oriented towards students pursuing a technical career in cleantech, or a PhD in the energy sciences and engineering. Course contents include: mathematical modeling & analysis, state estimation, optimization, machine learning, and optimal control. Homework assignments are designed around case studies, including lithium-ion batteries, oil & gas systems, renewable power systems, smart buildings, and electrified transportation. Student teams also execute a self-defined project.
Data Science for Energy: Read More [+]

Objectives & Outcomes

Course Objectives: This course provides an introduction to emerging smart energy systems and the associated fundamental concepts in control systems theory

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Letter grade.

Instructor: Moura

Data Science for Energy: Read Less [-]

CIV ENG 297 Field Studies in Civil and Environmental Engineering 1 - 12 Units

Terms offered: Fall 2022, Summer 2022 3 Week Session, Summer 2022 First 6 Week Session
Supervised experience in off-campus companies relevant to specific aspects and applications of civil and environmental engineering. Written report required at the end of the semester. Course does not satisfy unit or residence requirements for a master's or doctoral degree.
Field Studies in Civil and Environmental Engineering: Read More [+]

Rules & Requirements

Prerequisites: Graduate standing

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-12 hours of fieldwork per week

Summer:
6 weeks - 2.5-30 hours of fieldwork per week
8 weeks - 1.5-22.5 hours of fieldwork per week
10 weeks - 1.5-18 hours of fieldwork per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Field Studies in Civil and Environmental Engineering: Read Less [-]

CIV ENG 298 Group Studies, Seminars, or Group Research 1 - 6 Units

Terms offered: Fall 2022, Spring 2022, Fall 2021
Advanced studies in various subjects through special seminars on annually selected topics, informal group studies of special problems, group participation in comprehensive design problems, or group research on complete problems for analysis and experimentation.
Group Studies, Seminars, or Group Research: Read More [+]

Rules & Requirements

Prerequisites: Graduate standing

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-2 hours of seminar per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Group Studies, Seminars, or Group Research: Read Less [-]

CIV ENG 299 Individual Research 1 - 12 Units

Terms offered: Fall 2022, Summer 2022 8 Week Session, Summer 2022 First 6 Week Session
Research or investigation in selected advanced subjects.
Individual Research: Read More [+]

Rules & Requirements

Prerequisites: Graduate standing

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 3-36 hours of independent study per week

Summer: 8 weeks - 6-68 hours of independent study per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Individual Research: Read Less [-]

CIV ENG 375 Workshop for Future Civil and Environmental Engineering Teachers 2 Units

Terms offered: Fall 2022, Spring 2022
The course will include supervised teaching of laboratory sections of civil engineering courses, group analysis of videotapes, reciprocal classroom visitations, and an individual project.
Workshop for Future Civil and Environmental Engineering Teachers: Read More [+]

Rules & Requirements

Prerequisites: Teaching assistant or graduate student status

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Professional course for teachers or prospective teachers

Grading: Offered for satisfactory/unsatisfactory grade only.

Formerly known as: Civil and Environmental Engineering 301

Workshop for Future Civil and Environmental Engineering Teachers: Read Less [-]

CIV ENG 601 Individual Study for Master's Students 1 - 6 Units

Terms offered: Fall 2022, Summer 2022 10 Week Session, Spring 2022
Individual study for the comprehensive or language requirements in consultation with the major field adviser. Units may not be used to meet either unit or residence requirements.
Individual Study for Master's Students: Read More [+]

Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 0 hours of independent study per week

Summer:
6 weeks - 1-5 hours of independent study per week
8 weeks - 1-4 hours of independent study per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate examination preparation

Grading: Offered for satisfactory/unsatisfactory grade only.

Individual Study for Master's Students: Read Less [-]

CIV ENG 602 Individual Study for Doctoral Students 1 - 6 Units

Terms offered: Fall 2022, Spring 2022, Fall 2021
Individual study in consultation with the major field adviser, intended to provide an opportunity for qualified students to prepare for the various examinations required of candidates for doctoral degrees. May not be used for unit or residence requirements.
Individual Study for Doctoral Students: Read More [+]

Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 0 hours of independent study per week

Summer:
6 weeks - 1-5 hours of independent study per week
8 weeks - 1-4 hours of independent study per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/Graduate examination preparation

Grading: Offered for satisfactory/unsatisfactory grade only.

Individual Study for Doctoral Students: Read Less [-]