

CIVIL AND ENVIRONMENTAL ENGINEERING (CEE)

<https://ceps.unh.edu/civil-environmental-engineering>

Overview

Civil and Environmental Engineering involves the sustainable planning, design, and construction of public works for the benefit of society while minimizing environmental impact. Civil Engineering concerns the design of buildings, bridges, roads, dams, water transmission systems, water treatment systems, tunnels, and more. Environmental Engineering specializes in environmental cleanup, drinking water systems, wastewater treatment systems, and solid and hazardous waste disposal systems, environmental remediation, all with consideration of the triple bottom line. Resulting infrastructure facilities must provide efficient service, be cost effective, and be compatible with the environment. Moreover, civil and environmental engineers work under a code of ethics in which their primary, overriding responsibility, is to uphold the public's trust by working to plan, design, build, and restore safe, sustainable, and environmentally responsible public works.

The Department of Civil and Environmental Engineering has two degree programs: one resulting in a Bachelor of Science in Civil Engineering (the BSCIVE) and another resulting in a Bachelor of Science in Environmental Engineering (the BSENEE). Both programs are accredited by ABET.

As civil engineering is such a broad field, it is traditionally divided into sub-disciplines. At the University of New Hampshire, multiple courses are offered in six: civil engineering materials, environmental engineering, geotechnical engineering, structural engineering, sustainable engineering, and water resources engineering.

Environmental engineering focuses on environmental pollution and public health protection; water, wastewater, reuse and stormwater technology; solid and hazardous waste engineering and remediation; engineering sustainability; environmental microbiology and chemistry; contaminant transport and fate, hydraulics, and hydrology.

Students may readily transfer between the BSCIVE and BSENEE programs within the first three semesters. Transferring between the two programs is also possible later on in the programs, but additional courses may be necessary.

Both engineering degrees provide a firm base in mathematics and engineering, and all majors are expected to develop excellent communication and computer skills. Graduates are prepared to enter the profession and to pursue advanced study. Because of the broad technical background attained, some graduates also successfully pursue further education in business, architecture, education, and law.

Mission

The mission of the Department of Civil and Environmental Engineering at the University of New Hampshire is fourfold:

- To pursue and disseminate knowledge through teaching, scholarship, and public service.
- To provide excellent undergraduate and graduate education.
- To conduct research and engagement activities, advancing the state of the art in science and engineering.

- To enhance the quality of life for people in New Hampshire and beyond.

BSCIVE Program Overview

Civil engineers work as private consultants, for large contracting firms, and for government agencies in a wide variety of indoor and outdoor settings around the world. There is a strong and constant market for civil engineers due to the demands placed on the profession to construct, maintain, and repair the infrastructure.

Educational Objectives

In accordance with its University, College, and Department missions, the faculty of the Department of Civil & Environmental Engineering has established clear educational objectives for our BSCIVE graduates, five years after obtaining the degree:

1. Professional employment, primarily in the civil and environmental engineering disciplines.
2. Commitment to continuous learning through graduate and post-graduate education, coursework, and research.
3. Resourcefulness in finding solutions, and retaining ownership and accountability for their work.
4. Positions of leadership, directing the work of others.
5. Professional licensure or certification in civil and environmental engineering disciplines and other professions.
6. Positions and active participation in community, public, and professional service.

Student Outcomes

To enable our graduates to achieve our educational objectives, the BSCIVE program is designed to provide the following student outcomes at the time of graduation:

1. To have obtained a working knowledge¹ in the civil engineering areas of materials, environmental, geotechnical, structural, sustainability, and water resources.
2. To be able to locate, assess, and compile data, to design and perform experiments to gather data, and analyze data to draw conclusions.
3. To have an ability to use and learn techniques, skills, or software necessary for engineering practice.
4. To be able to contribute as a member of multi-disciplinary teams.
5. To be able to effectively communicate and support ideas in documents and presentations to a variety of audiences.
6. To be able to apply principles of mathematics, science, and engineering to identify, formulate, and solve problems.
7. To have been prepared for the Fundamentals of Engineering examination.²
8. To have the broad education necessary to have an understanding of contemporary issues and the interaction between sustainable and ethical engineering practice and global, social, economic, political, and environmental issues.
9. To have a recognition of the need for leadership, and an ability to engage in life-long learning and to understand the importance of professional licensure.
10. Given realistic economic, environmental, social, political, and ethical constraints, to be able to critically analyze and design equipment, structures, systems, or processes to meet society's current needs without compromising the ability of future generations to meet theirs.

¹ A “working knowledge” is defined as understanding and being able to apply a sub-discipline in analysis and design as demonstrated by successful completion of two or more courses with a substantial focus in that sub-discipline.

² A specific Departmental goal is to have 85% of BSCE students take the exam before graduation with an 80% pass rate.

BSENVE Program Overview

Environmental engineers work as private consultants, in industry and for government agencies in a wide variety of indoor and outdoor settings around the world. There is a strong and constant market for environmental engineers due to the demands placed on the profession to construct, maintain, and repair the drinking water, wastewater, water reuse and stormwater, and solid and hazardous waste management infrastructure. The curriculum prepares students to plan, using triple bottom line considerations, and design systems to minimize the impact of human activity on the environment and protect human health.

Educational Objectives

In accordance with its University, College, and Department missions, the faculty of the Department of Civil & Environmental Engineering has established clear educational objectives for our BSENVE graduates, five years after obtaining the degree:

1. Professional employment, primarily in the environmental engineering discipline.
2. Commitment to continuous learning through graduate and post-graduate education, coursework, and research.
3. Being resourceful in finding solutions, and retaining ownership and accountability for their work.
4. Positions of leadership, directing the work of others.
5. Professional licensure or certification in environmental engineering discipline and other professions.
6. Positions and active participation in community, public, and professional service.

Student Outcomes

To enable our graduates to achieve our educational objectives, the BSENVE program is designed to provide the following student outcomes at the time of graduation:

1. To have obtained a working knowledge^[1] in environmental engineering areas of water and wastewater treatment, environmental health and safety, solid and hazardous waste management, sustainability, and water resources.
2. To be able to locate, assess, and compile data, to design and perform experiments to gather data, and analyze data to draw conclusions.
3. To have an ability to use and learn techniques, skills, or software necessary for engineering practice.
4. To be able to contribute as a member of multi-disciplinary teams.
5. To be able to effectively communicate and support ideas in documents and presentations to a variety of audiences.
6. To be able to apply principles of mathematics, science, and engineering to identify, formulate, and solve problems.

7. To have been prepared for the Fundamentals of Engineering examination.

8. To have the broad education necessary to have an understanding of contemporary issues and the interaction between sustainable and ethical engineering practice and global, social, economic, political, and environmental issues.

9. To have a recognition of the need for leadership, and an ability to engage in life-long learning and to understand the importance of professional licensure.

10. Given realistic economic, environmental, social, political, and ethical constraints, to be able to critically analyze and design systems or processes to meet society's current needs without compromising the ability of future generations to meet theirs.

[1] Approved by the CEE Department Faculty on 12 December 2016.

[2] Approved by the EnvE Faculty on 2 March 2018 and by the CEE Department Faculty on 20 March 2018.

[3] Approved by the EnvE Faculty on 2 March 2018 and by the CEE Department Faculty on 20 March 2018.

[4] A “working knowledge” is defined as understanding and being able to apply a sub-discipline in analysis and design as demonstrated by successful completion of two or more courses with a substantial focus in that sub-discipline.

Programs

- Civil Engineering Major (B.S) (<http://catalog.unh.edu/undergraduate/engineering-physical-sciences/programs-study/civil-environmental-engineering/civil-engineering-major-bs>)
- Environmental Engineering Major (B.S.) (<http://catalog.unh.edu/undergraduate/engineering-physical-sciences/programs-study/civil-environmental-engineering/environmental-engineering-major-bs>)
- Environmental Engineering Minor (<http://catalog.unh.edu/undergraduate/engineering-physical-sciences/programs-study/civil-environmental-engineering/environmental-engineering-minor>)

Courses

CEE 400 - Introduction to Civil Engineering

Credits: 4

Introduction to the civil engineering profession: structural, geotechnical, water resources, materials, and environmental. Overviews the civil project process including the creative design process, teamwork, bidding and construction. The relationship between civil engineering works and society including ethics, earthquakes, failures, successful signature structures, current events, and professional licensure. The production of professional engineering documents including writing tasks and calculations sets. Campus resources, the University system, and relationship between required curriculum, student objectives, and the civil engineering profession. Introduction to spreadsheet software, data analysis, and probability and statistics.

Attributes: Environment, TechSociety(Disc); Inquiry (Discovery)

CEE 404 - Surveying and Mapping**Credits: 4**

Principles of land measurements by ground, photogrammetric and satellite methods to model the environment. Application of theory of measurements to perform and adjust engineering survey. Conformal mapping and its application to state plane coordinates. Digital mapping and Geographic Information Systems. Construction and cadastral surveying. Pre- or Coreq: MATH 425 or permission. Lab. Writing intensive.

Attributes: Writing Intensive Course

CEE 420 - Environmental Engineering Lectures I**Credits: 3**

Introduces the profession, the environmental engineer as planner, designer, problem solver, and interdisciplinary team player; and the goals of the environmental engineering curriculum. Lectures by faculty and practitioners. Introduction to computer skills required for environmental engineering. Engineering ethics.

CEE 444 - Housing - Everyone Needs a Place to Live**Credits: 4**

A discussion of residential housing, whether from the larger societal view or from the viewpoint of an individual, involves more than just the concepts associated with engineering. In order for the discussion to be complete, one needs to include legislative issues, economic issues, land issue, energy issues and environmental issues along with a variety of engineering issues (construction, transportation, water, materials, environmental controls, etc.). Thus a major focus of the course will be to provide a student with an appreciation of breadth and complexity of the issues associated with providing housing.

Attributes: Environment,TechSociety(Disc); Inquiry (Discovery)

CEE 500 - Statics for Civil Engineers**Credits: 3**

Introduction to statics with emphasis on civil engineering topics; two and three dimensional force systems; static equilibrium; friction; analysis of trusses and beams; centroids; and moment and shear diagrams for flexural members. Prereq: PHYS 407. Pre- or Coreq: MATH 426.

CEE 501 - Strength of Materials**Credits: 3**

Strength of materials with emphasis on civil engineering applications. Virtual work; work and energy relationships; analysis of members subjected to flexure, torsion, and axial loads; stresses and strains; and stability of columns. Prereq: CEE 500 or ME 525.

CEE 502 - Project Engineering**Credits: 3**

Techniques for financial analysis, and operation and management of engineering systems, engineering economics, material take-offs, estimating, scheduling, modeling physical systems, and decision-making. CEE major or permission.

CEE 520 - Environmental Pollution and Protection: A Global Context**Credits: 4**

Introduces environmental science and engineering and the anthropogenic causes of environmental change. Emphasizes the causes, effects, and controls of air, water, and land pollution. The political, ecological, economic, ethical, and engineering aspects of environmental pollution and control are discussed. Field trips. Writing intensive.

Attributes: Environment,TechSociety(Disc); Writing Intensive Course

CEE 620 - Fundamental Aspects of Environmental Engineering**Credits: 4**

Application of fundamental concepts of mass balance in treatment processes. Physical, chemical, and biological aspects of pollution control, and design concepts for operations and processes used in environmental engineering are discussed. Concepts of engineering ethics are presented. Students participate in a design project that involves an oral presentation and written report. Prereq: CHEM 404, CEE 650, CEE 520; or permission. Writing intensive.

Attributes: Writing Intensive Course

CEE 626 - Field Experience**Credits: 1**

Based on appropriate career-oriented work experience in environmental engineering. Student can get one credit for field experience. A written final report is required as well as permission of student's adviser.

CEE 627 - Internship**Credits: 2**

Off-campus work in the environmental engineering field for on-the-job skill development. Needs to be supervised by an environmental engineering faculty member; and a proposal for the internship must be submitted and have permission of the ENE faculty prior to the start of the internship. Prereq: permission. IA (continuous grading).

CEE 635 - Engineering Materials**Credits: 4**

Structural properties and applications of the various materials used in civil engineering projects, including steel, cement, mineral aggregates, concrete, timber, and bituminous materials. Microstructure and properties of common metals, plastics, and ceramics. Prereq: CEE major or permission, CEE 501 or ME 526. Lab. Writing intensive.

Attributes: Writing Intensive Course

CEE 650 - Fluid Mechanics**Credits: 4**

Properties of fluids, fluid statics, continuity, momentum and energy equations, resistance to flow, boundary layer theory, flow in open channels and piping systems, dimensional analysis, similitude, drag, and lift. Laboratory exercises on measurement of fluid properties, energy principles, flow resistance, discharge measurements, momentum, hydropower, groundwater flow, and settling of spheres. Prereq: PHYS 407, CEE Hydrology major; or permission. Lab. Writing intensive.

Attributes: Writing Intensive Course

CEE 665 - Soil Mechanics**Credits: 4**

Soil classification and physical properties. Permeability, compressibility, consolidation, and shearing resistance are related to the behavior of soils subjected to various loading conditions. Prereq: CEE 635, CEE 650, CEE major; or permission. Lab.

CEE 680 - Classical Structural Analysis**Credits: 3**

Analytical stress and deflection analysis of determinate and indeterminate structures under static and moving loads by classical methods. Prereq: CEE 501, CEE major; or permission.

CEE 700 - Building Information Modeling**Credits: 3**

Building Information Modeling (BIM) is the process of generating and managing project data during its life cycle by integrating 3D multidisciplinary drawings with dynamic scheduling and visualization. BIM provides a digital representation of project data to facilitate the exchange of information beyond the standard two dimensional plan set. This course introduces students to the fundamentals of model creation, scheduling, material take-offs, visualizations, and animations that improve the communication of information to potential clients. Pre- or Coreq: TECH 564. Open to CEE and EnvEngr.MunicipalProc majors only.

CEE 702 - Issues in Engineering Practice and Management**Credits: 3**

Non-technical professional engineering topics including: participation in multidisciplinary teams, interpersonal and human resources skills, verbal and written communication skills, project management, marketing, ethics, professional licensure, professional liability, and contract administration. Prereq: seniors only; juniors with permission.

CEE 703 - Residential Construction**Credits: 3**

Introduces innovations in residential design. Investigates heat loss, electrical usage, green energy alternatives, and construction procedures. Addresses private and subdivision construction and mortgage financing for residential properties. Considers planning, zoning and soil usage codes applicable to residential zoned areas. Each student prepares a set of construction drawings for a private home, and a subdivision layout.

CEE 704 - Transportation Eng & Planning**Credits: 3**

Fundamental relationships of traffic speed, density, and flow applied to public and private modes of transport. Principles of demand forecasting and urban systems planning. Prereq: permission.

CEE 705 - Introduction to Sustainable Engineering**Credits: 3**

This course begins with exploration of the precept that we live in, and must design engineering works for, a world with a finite supply of natural resources and with limited life support capacity. Tools for sustainability engineering are the focus of the course, which includes life cycle analysis and life cycle impact analysis, the metrics and mass and energy flow analyses used in the field of industrial ecology, and environmental management systems.

CEE 706 - Environmental Life Cycle Assessment**Credits: 3**

This course teaches knowledge and hands-on-skills in conducting environmental life cycle assessment (LCA), which is a widely used technique by industries, academics, and governments. Students will learn to use popular LCA software (e.g. SimaPro), apply proper LCA techniques, critically analyze LCA results, and provide client-oriented suggestions during this course. Class time is primarily devoted to a combination of lectures and computer labs.

CEE 719 - Green Building Design**Credits: 3**

This course gives an overview of green designs and sustainable practices in building construction. We will cover technical topics and requirements of a nationally recognized rating system (LEED), with a specific focus on Green Building Design and Construction. Students are introduced to basic building designs and systems related to sustainability. Additionally, they learn about green design topics such as site plans, water and energy efficiency, material and resources usage, environmental quality and renewable energy source. As an outcome of the course, students are able to assess and incorporate green technologies and designs into building projects.

CEE 720 - Solid and Hazardous Waste Engineering**Credits: 3**

A thorough examination of the problems that exist in hazardous and solid waste management are presented in terms of the current regulations and engineering approaches used to develop solutions. Topics include risk-based decision making, transport and fate of contaminants, and the fundamental physical, chemical, and biological concepts, which make up the basis for technological solutions to these waste management problems. Case studies are used throughout the course to highlight key concepts and provide real-world examples.

CEE 721 - Environmental Sampling and Analysis**Credits: 4**

Theory of analytical and sampling techniques used in environmental engineering. Topics include potentiometry, spectroscopy, chromatography, automated analysis, quality control, sampling design, and collection methods. Methods discussed in lecture are demonstrated in labs. Prereq: CHEM 404 and CEE 620 or permission. Lab.

CEE 722 - Introduction to Marine Pollution and Control**Credits: 4**

Introduces the sources, effects, and control of pollutants in the marine environment. Dynamic and kinetic modeling; ocean disposal of on-shore wastes, shipboard wastes, solid wastes, dredge spoils, and radioactive wastes; and oil spills. Prereq: CEE 620 or permission.

CEE 723 - Environmental Water Chemistry**Credits: 4**

Emphasizes the use of chemical equilibrium principles and theory, calculations, and applications of ionic equilibrium stresses. Topics include thermodynamics, kinetics, acid/base, complexation, precipitation/dissolution, and redox equilibria. Computer equilibrium modeling is presented. Prereq: CHEM 404 or CHEM 405.

CEE 724 - Environmental Engineering Microbiology**Credits: 4**

Concepts of environmental engineering microbiology. Topics include taxonomy of species important in environmental engineering processes; microbial metabolism, interaction, and growth kinetics in environmental treatment processes; biogeochemical cycling in water; and effects of environmental parameters on environmental engineering microbial processes. Laboratories focus on microbiological methods and laboratory-scale biological treatment experiments. Prereq: CEE 520 and CEE 650 or permission. Lab. Writing intensive.

Attributes: Writing Intensive Course

CEE 730 - Public Health Engineering for Rural and Developing Communities**Credits:** 3

The application of environmental health engineering and sanitation principles in disease prevention and control are discussed. Special emphasis is given to areas of the world where communicable and related diseases have not yet been brought under control and to what can happen in more advanced countries when basic sanitary safeguards are relaxed. The following topics are covered: water-related diseases to include their transmission and control; safe water development, treatment, distribution and storage; and on-site wastewater treatment and disposal system.

CEE 731 - Advanced Water Treatment Processes**Credits:** 4

The primary objective of this course is to provide the environmental engineer with an overview of physical-chemical and biological unit water treatment processes. Major emphasis is placed on the analysis and design of both conventional and advanced water treatment unit processes/operations.

CEE 732 - Solid and Hazardous Waste Design**Credits:** 4

Selection, design, and evaluation of unit processes employed in the treatment of solid wastes and hazardous wastes will be studied. Topics include design of materials recovery facilities, landfills, waste-to-energy facilities and hazardous waste site remedial technologies. A group term project taken from a real-world project will be required. An oral presentation by the group and preparation of a final written engineering report including alternative evaluation, permits, scheduling and economic analysis will be required from each group. Prereq: CEE 720 or permission. Writing intensive.

Attributes: Writing Intensive Course**CEE 733 - Public Infrastructure Asset Management****Credits:** 4

The course provides a thorough examination of the growing engineering field of Public Infrastructure Asset Management (IAM). The course enables the student to design an IAM system. It touches upon all types of public infrastructure with a particular focus on water infrastructure for the semester design project. Students build upon their engineering economics and project engineering skills and use simple IAM software along with GIS applications. Practice leaders from the industry provide guest lectures throughout the semester. A focus on triple bottom line or the Societal, Environmental and Economic aspects of IAM are included. The format is a modified team base design learning experience providing practice in processing of technical lecture material, personal performance evaluation (frequent quizzes) and team based performance evaluation. Student groups will present their design to the class and provide a written engineering report. Pre- or Coreq: CEE 502 and CEE 620.

CEE 734 - Bioenvironmental Engineering Design**Credits:** 4

Selection, design, and evaluation of unit processes employed in biological treatment of waters, wastewaters, and hazardous wastes. Preparation of engineering reports, including developing design alternatives and economic analysis, is required. Prereq: CEE 620 and CEE 724 or permission. Writing intensive.

Attributes: Writing Intensive Course**CEE 735 - Properties and Production of Concrete****Credits:** 3

Basic properties of hydraulic cements and mineral aggregates, and their interactions in the properties of plastic and hardened concrete; modifications through admixtures; production handling and placement problems; specifications; quality control and acceptance testing; lightweight, heavyweight, and other special concretes. Prereq: CEE 635 or permission.

CEE 736 - Asphalt Mixtures and Construction**Credits:** 3

Specification of asphalt cements, aggregates and proportioning of mixture constituents for paving applications. Asphalt mixture design methods, production, construction, and quality control are discussed. Current new material production and construction technologies are introduced. Prereq: CEE 635.

CEE 748 - Pavement Design Project**Credits:** 1

Semester long design project accompanying CEE 749 Pavement Design Analysis. The design project will require weekly meetings (either online or in person) for the duration of the semester. Meeting times will be arranged based on student schedules. This course, in combination with the 3-credit CEE 749 Pavement Design Analysis, will satisfy a senior level materials principal design elective in the CEE department.

Co-requisite: CEE 749**CEE 749 - Pavement Design and Analysis****Credits:** 3

Introduction to flexible and rigid pavement design and analysis for highways and airports. Examines design inputs, materials, analysis methods, design tools, and maintenance treatments. This course satisfies a senior level materials design elective in the CEE department. This course, in combination with the 1-credit CEE 748 Pavement Design Project, will satisfy a senior level materials principal design elective in the CEE department. Prereq: CEE 635 and CEE 665.

CEE 750 - Ecohydrology**Credits:** 3

Introduction to ecohydrological concepts in terrestrial and riverine systems. Topics include the historical practices, resource management impacts, hydrologic variability, and the relationships among water and ecology, vegetation, biology, geomorphology, and water quality. Prereq: CEE 754 or ESCI 705 or permission.

CEE 751 - Open Channel Flow**Credits:** 3

Energy and momentum principles in open channel flow; flow resistance; channel controls and transitions; unsteady flow concepts and dam failure studies. Modeling with HEC programs. Prereq: CEE 650 or permission.

CEE 754 - Engineering Hydrology**Credits:** 3

Hydrologic cycle, probability theory related to hydrology and the design of water resources structures, water law, flood discharge prediction, hydrograph development, hydraulic and hydrologic river routing, reservoir routing, theory of storage, reservoir operations, hydropower development, modeling of watershed hydrology with program HEC-1, HEC-HMS, multipurpose projects.

CEE 755 - Design of Pressurized Water Transmission Systems**Credits: 4**

Theory developed for individual components to large complex systems. Analysis and designs of components and systems. Topics include: steady and unsteady closed conduit flow, valves and meters, pump requirements, pump selection, system planning and layout, water hammer, and system operation and maintenance. Pressure system modeling with program EPANET. Prereq: CEE 650 or permission.

CEE 757 - Coastal Engineering and Processes**Credits: 3**

Introduction to small amplitude and finite amplitude wave theories. Wave forecasting by significant wave and wave spectrum method. Coastal processes and shoreline protection. Wave forces and wave-structure interaction. Design of coastal structures. Introduction to mathematical and physical modeling. Prereq: CEE 650 or permission.

CEE 758 - Stormwater Management Designs**Credits: 3**

Historic review of stormwater management leading up to the current regulatory framework. Overview of stormwater management strategies, strategy selection, and the targeting of specific contaminants, contaminant removal efficiencies, construction and site selection, and system maintenance. Hydrologic concepts including watershed and storm characteristics, design hydrology (peak flows, storm and treatment volumes), hydrograph routing, and critical review of hydrology and drainage reports. Design and sizing of treatment systems including: conventional, BMPs, low impact development, and manufactured devices. Rainfall runoff calculations with US SCS TR55 model. Prereq: CEE 650 or permission.

CEE 759 - Stream Restoration**Credits: 4**

The assessment, planning, design, engineering, and monitoring of stream and watershed practices intended to protect and restore the quality and quantity of flowing surface waters and stream corridors. Lecture material covers hydrology, geomorphology, and ecosystems, with the intent of understanding the variables associated with stream systems and their interplay. Students measure field variables and then are challenged with actual designs. Examples of stream restoration issues include: in-stream flow, dam removal, induced recharge, improvements to fish habitat, and channel stabilization. Prereq: CEE 650.

CEE 765 - Engineering Behavior of Soils**Credits: 4**

Review of stress and strain in soil. Introduction to continuum mechanics. Development of engineering soil properties. Application of soil mechanics to shear strength and stress-strain behaviors of soils. Failure states and residual strength. Application of stress paths in engineering problems. Unstaturated soil mechanics. Laboratory exercises using direct shear test, triaxial test, and soil-water retention measurements.

CEE 766 - Introduction to Geotechnical Earthquake Engineering**Credits: 3**

Overviews earthquake source mechanisms; magnitude and intensity; seismicity of the United States. Dynamics of simple structures; response spectra. Selection of design parameters; source, magnitude, input records. Measurement of dynamic characteristics of soils; site response, liquefaction, and ground deformation. Prereq: CEE 778 or permission.

CEE 767 - Geological Engineering**Credits: 3**

Functional classification of rocks and rock masses, stereographic projection, engineering properties of rocks, and rock mechanics. The influence of geology in the design of underground excavations, tunneling, foundations, and rock slope engineering. Prereq: ESCI 401 or permission.

CEE 768 - Geo-Environmental Engineering**Credits: 3**

Soil composition and structure; hydrogeology; attenuation and contaminant transport; containment design including landfills, geo-synthetics for liners and covers, leachate collection systems, vertical cutoff walls and stability analyses; geo-environmental site characterization and investigation using geotechnical and geophysical methods; ground water, soil and gas monitoring and sampling; remediation including in situ and ex situ techniques and treatment methods. Prereq: CEE 665 or permission.

CEE 778 - Foundation Design I**Credits: 4**

Foundation design based on subsurface investigation and characterization using current methods of laboratory and in situ testing. Use of consolidation theory and bearing capacity theory for the design of shallow foundations including footings and rafts. Basic design of pile foundations. Earth pressure theory applied to design of retaining walls. Slope stability theory and applications. Prereq: CEE 665 or permission.

CEE 779 - Foundation Design II**Credits: 3**

Advanced pile and pier design under vertical and lateral loads. Slope stability by circular and noncircular arc methods. Design of flexible bulkhead walls and mechanically stabilized walls. Excavation and dewatering. Soil and site improvement. Prereq: CEE 778 or permission.

CEE 780 - Matrix Structural Analysis and Modeling**Credits: 3**

Modeling and analysis of determinate and indeterminate structures by matrix computer methods. Creation of matrix elements using compatibility, equilibrium, and constitutive relationships. Plane trusses, beams, frames, and space trusses. Prereq: CEE 680 or permission.

CEE 781 - Dynamics of Structures**Credits: 3**

Dynamics of single- and multi-story buildings. Response due to earthquakes, blasting, traffic, and mechanical equipment. Analysis in the time domain and through the Fourier Transform. Fundamentals of structural vibration measurement. Prereq: CEE 780, permission.

CEE 789 - Timber Design**Credits: 3**

Introduces the design of timber structures. Structural properties of wood, determination of horizontal and vertical loads, horizontal and vertical load-resisting systems, and design of horizontal diaphragms, shear walls, beams, and columns. Bolted, screwed, and nailed connections. Prereq: CEE 680 or permission.

CEE 790 - Structural Design in Masonry**Credits: 3**

Introduces the design of reinforced masonry structural members by the stress and strength method and considering deflection and other serviceability performance criteria. Includes development of wind and seismic load, curtain wall, shear wall, lintels and columns. Prereq: CEE 635, CEE 680; or permission.

CEE 791 - Reinforced Concrete Design**Credits: 4**

Introduces the design of reinforced concrete structural members by the strength method and considering deflection performance. Includes loads, approximate analyses, slabs, beams, and columns. Prereq: CEE 635, CEE 680; or permission.

CEE 792 - Pre-stressed Concrete**Credits: 3**

Analysis and design of prestressed and post-tensioned concrete sections in flexure and shear. Strength, deflection, and losses in flexural members. Optimization of section and prestressing force selection. Prereq: CEE 791 or permission.

CEE 793 - Structural Design in Steel**Credits: 4**

Introduction to steel member design, including horizontal and vertical members for design and analysis of buildings. Examines design inputs, material choice, analysis methods and design and construction methodologies. Prereq: CEE 635 and CEE 680.

CEE 794 - Bridge Design**Credits: 3**

Analysis of two-span, continuous, slab and beam bridges using the AASHTO LRFD Bridge Design Specifications. Use of influence lines, load distribution, load factoring, deck design, analysis and design of composite beams and plate girders. Bridge aesthetics. Prereq: CEE 791. Pre- or Coreq: CEE 793.

CEE 795 - Independent Study**Credits: 1-4**

Seniors in good standing may pursue independent studies under faculty guidance. A written culminating report is required. Prereq: permission.

CEE 796 - Special Topics**Credits: 1-4**

Advanced or specialized topics not normally covered in regular course offerings. May be repeated, but not in duplicate areas. Prereq: permission. Special Fee.

CEE 797 - Introduction to Project Planning and Design**Credits: 1**

Part one of a two-part sequence. Student groups develop a project statement to address a large-scale civil engineering system design. Each team prepares a project plan to be executed in CEE 798, part two of this sequence. Cr/F.

CEE 798 - Project Planning and Design**Credits: 3**

Student groups are formed into design teams to prepare a design plan for a large-scale civil engineering system including consideration of budgetary constraints, building code criteria, and environmental impacts. Each team prepares a final written report and gives a formal presentation. Prereq: CEE 797; Civil Engineering and EnvEngr. Civil Engr majors only. Writing intensive.

Attributes: Writing Intensive Course

CEE 799H - Senior Honors Thesis**Credits: 4**

Students in the honors program in civil engineering complete a project under the direction of a faculty sponsor resulting in a written thesis which must be accepted by the sponsor by the end of the second semester, senior year. Four credits total during senior year; 3 of which may be used to fulfill a CEE non-design elective.

CEE 800 - Building Information Modeling**Credits: 3**

Building Information Modeling (BIM) is the process of generating and managing project data during its life cycle by integrating 3D multidisciplinary drawings with dynamic scheduling and visualization. BIM provides a digital representation of project data to facilitate the exchange of information beyond the standard two dimensional plan set. This course introduces students to the fundamentals of model creation, scheduling, material take-offs, visualizations, and animations that improve the communication of information to potential clients. Prereq: AUTOCAD Experience or by permission.

CEE 804 - Transportation Engineering and Planning**Credits: 3**

Fundamental relationships of traffic speed, density, and flow applied to public and private modes of transport. Principles of demand forecasting and urban systems planning. Prereq: permission.

CEE 805 - Introduction to Sustainable Engineering**Credits: 3**

Course begins with exploration of the precept that we live in, and must design engineering works for, a world with a finite supply of natural resources and with limited life support capacity. Tools for sustainability engineering are the major focus of the course, which include life cycle, analysis and life cycle impact analysis, the metrics and mass and energy flow analyses used in the field of industrial ecology, and environmental management systems.

CEE 806 - Environmental Life Cycle Assessment**Credits: 3**

This course teaches knowledge and hands-on skills in conducting environmental life cycle assessment (LCA), which is a widely used technique by industries, academics, and governments. Students will learn to use popular LCA software (e.g., SimaPro), apply proper LCA techniques, critically analyze LCA results, and provide client-oriented suggestions during this course. Class time is primarily devoted to a combination of lectures and computer labs.

CEE 819 - Green Building Design**Credits: 3**

This course gives an overview of green designs and sustainable practices in building construction. We cover technical topics and requirements of a nationally recognized rating system (LEED), with a specific focus on Green Building Design and Construction. Students are introduced to basic building designs and systems related to sustainability. Additionally, they learn about green design topics such as site plans, water and energy efficiency, material and resources usage, environmental quality and renewable energy source. As an outcome of the course, students are able to assess and incorporate green technologies and designs into building projects. They are prepared to contribute in building projects that target LEED certifications. Students are also capable to engage in green practices within their existing built environments.

CEE 820 - Solid and Hazardous Waste Engineering**Credits: 3**

A thorough examination of the problems which exist in hazardous and solid waste management will be presented in terms of the current regulations and engineering approaches used to develop solutions. Topics will include risk-based decision making, transport and fate of contaminants, and the fundamental physical, chemical and biological concepts which make up the basis for technological solutions to these waste management problems. Case studies will be used throughout the course to highlight key concepts and provide real-world examples.

CEE 822 - Introduction to Marine Pollution and Control**Credits:** 4

Introduction to the sources, effects, and control of pollutants in the marine environment. Dynamic and kinetic modeling; ocean disposal of on-shore wastes, shipboard wastes, solid wastes, dredge spoils, and radioactive wastes; and oil spills. Prereq: CEE 620 or permission.

CEE 823 - Environmental Water Chemistry**Credits:** 4

Emphasizes the use of chemical equilibrium principles and theory, calculations, and applications of ionic equilibrium stresses. Topics include thermodynamics, kinetics, acid/base, complexation, precipitation/dissolution, and redox equilibria. Computer equilibrium modeling is presented. Prereq: general chemistry or equivalent.

CEE 824 - Environmental Engineering Microbiology**Credits:** 4

Concepts of environmental engineering microbiology including microbial metabolism, growth kinetics, bioremediation applications, mass transfer kinetics and effects of environmental parameters. Coursework includes reading and discussion of the microbial literature. Laboratories cover microbiological monitoring and biological treatment experiments. Prereq: CEE 620 or permission. Lab.

CEE 830 - Public Health Engineering for Rural and Developing Communities**Credits:** 3

The design principles are to impart to the student specific information that can be used to design public health control facilities such as small water treatment systems and on-site wastewater disposal systems. The engineering control methods taught are particularly applicable to rural areas and developing countries. Prereq: permission..

CEE 832 - Solid and Hazardous Waste Design**Credits:** 4

Selection, design, and evaluation of unit processes employed in the treatment of solid wastes and hazardous wastes will be studied. Topics include design of materials recovery facilities, landfills, waste-to-energy facilities and hazardous waste site remedial technologies. A group term project taken from a real-world project will be required. An oral presentation by the group and preparation of a final written engineering report including alternative evaluation, permits, scheduling and economic analysis will be required from each group. Prereq: CEE 720. permission.

CEE 833 - Public Infrastructure Asset Management**Credits:** 4

The course provides a thorough examination of the growing engineering field of Public Infrastructure Asset Management (IAM). The course enables the student to design an IAM system. It touches upon all types of public infrastructure with a particular focus on water infrastructure for the semester design project. Students build upon their engineering economics and project engineering skills and use simple IAM software along with GIS applications. Practice leaders from the industry provide guest lectures throughout the semester. A focus on triple bottom line or the Societal, Environmental and Economic aspects of IAM are included. The format is a modified team based design learning experience providing practice in processing of technical lecture material, personal performance evaluation (frequent quizzes) and team based performance evaluation. Student groups will present their design to the class and provide a written engineering report. Pre- or Coreq: CEE 502 and CEE 620.

CEE 835 - Properties and Production of Concrete**Credits:** 3

Basic properties of hydraulic cements and mineral aggregates and their interactions in the properties of plastic and hardened concrete; modifications through admixtures; production handling and placement problems; specifications; quality control and acceptance testing; lightweight, heavyweight, and other special concretes. Prereq: CEE 635 or permission.

CEE 836 - Asphalt Mixtures and Construction**Credits:** 3

Specification of asphalt cements, aggregates and proportioning of mixture constituents for paving applications. Asphalt mixture design methods, production, construction, and quality control are discussed. Current and new material production and construction technologies are introduced. Prereq: CEE 635 or permission.

CEE 848 - Pavement Design Project**Credits:** 1

Semester long design project accompanying CEE 849 Pavement Design Analysis. The design project will require weekly meetings (either online or in person) for the duration of the semester. Meeting times will be arranged based on student schedules.

Co-requisite: CEE 849**CEE 849 - Pavement Design Analysis****Credits:** 3

Introduction to flexible and rigid pavement design and analysis for highways and airports. Examines design inputs, materials, analysis methods, design tools, and maintenance treatments. Prereq: CEE 635 and CEE 665.

CEE 850 - Ecohydrology**Credits:** 3

Introduction to ecohydrological concepts in terrestrial and riverine systems. Topics include the historical practices, resources management impacts, hydrologic variability and the relationships among water and ecology, vegetation, biology, geomorphology, and water quality. Prereq: CEE 854 or ESCI 805; or permission.

CEE 851 - Open Channel Flow**Credits:** 3

Energy and momentum principles in open channel flow; flow resistance; channel controls and transitions; unsteady flow concepts and dam failure studies. Modeling with HEC programs. Prereq: CEE 650 or permission.

CEE 854 - Engineering Hydrology**Credits:** 3

Hydrologic cycle, probability theory related to hydrology and the design of water resources structures, water flow, flood discharge prediction, hydrograph development, hydraulic and hydrologic river routing, reservoir routing, theory of storage, reservoir operations, hydropower development, modeling of watershed hydrology with program HEC-1, HEC-HMS, multipurpose projects.

CEE 855 - Design of Pressurized Water Transmission Systems**Credits:** 4

Theory developed for individual components to large complex systems. Analysis and designs of components and systems. Topics include steady and unsteady closed conduit flow, valves and meters, pump requirements, pump selection, system planning and layout, water hammer, and system operation and maintenance. Pressure system modeling with program EPANET. Prereq: Fluid mechanics, or permission.

CEE 857 - Coastal Engineering and Processes**Credits: 3**

Introduction to small amplitude and finite amplitude wave theories. Wave forecasting by significant wave and wave spectrum method. Coastal processes and shoreline protection. Wave forces and wave-structure interaction. Design of coastal structures. Introduction to mathematical and physical modeling. Prereq: CEE 650 or permission. (Also offered as ME 857 and OE 857.)

CEE 858 - Stormwater Management Designs**Credits: 3**

Historic review of stormwater management leading up to the current regulatory framework. Overview of stormwater management strategies, strategy selection and the targeting of specific contaminants, contaminant removal efficiencies, construction and site selection, and system maintenance. Hydrologic concepts including watershed and storm characteristics, design hydrology (peak flows, storm and treatment volumes), hydrograph routing, and critical review of hydrology and drainage reports. Design and sizing of treatment systems including conventional BMPs, low impact development, and manufactured devices. Rainfall runoff calculations with US SCS TR55 model. Prereq: Fluid mechanics or permission.

CEE 859 - Stream Restoration**Credits: 4**

Explores the assessment, planning, design, engineering, and monitoring of stream and watershed practices intended to protect and restore the quality and quantity of flowing and surface waters and stream corridors. Lecture material covers hydrology, geomorphology, and ecosystems, with the intent of understanding the variables associated with stream systems and their interplay. Students measure field variables and then are challenged with actual designs. Examples of stream restoration issues include in-stream flow, dam removal, induced recharge, improvements to fish habitat, and channel stabilization. Prereq: CEE 650.

CEE 865 - Engineering Behavior of Soils**Credits: 4**

Review of stress and strain in soil. Introduction to continuum mechanics. Development of engineering soil properties. Application of soil mechanics to shear strength and stress-strain behavior of soils. Failure states and residual strength. Application of stress paths in engineering problems. Unsaturated soil mechanics. Laboratory exercises using the direct shear test, triaxial test, and soil-water retention measurements. Prereq: Foundation design or equivalent or permission.

CEE 866 - Introduction to Geotechnical Earthquake Engineering**Credits: 3**

Overview of earthquake source mechanisms; magnitude and intensity; seismicity of the U.S.A. Dynamics of simple structures; response spectra. Selection of design parameters; source, magnitude, input records. Measurement of dynamic characteristics of soils; site response, liquefaction, and ground deformation. Prereq: CEE 878 or permission.

CEE 867 - Geological Engineering**Credits: 3**

Functional classification of rocks and rock masses. Stereographic projection. Engineering properties of rocks. Rock mechanics. The influence of geology in the design of underground excavations, tunneling, foundations, and rock slope engineering. Prereq: ESCI 401 or permission.

CEE 868 - Geo-Environmental Engineering**Credits: 3**

Soil composition and structure; hydrogeology; attenuation and contaminant transport; containment design including landfills, geosynthetics for liners and covers, leachate collection systems, vertical cutoff walls, and stability analyses; geo-environmental site characterization and investigation using geotechnical and geophysical methods; ground water, soil and gas monitoring, and sampling; remediation including in-situ and ex-situ techniques and treatment methods. Prereq: CEE 665 or permission.

CEE 878 - Foundation Design I**Credits: 4**

Foundation design based on subsurface investigation and characterization using current methods of laboratory and in situ testing. Use of consolidation theory and bearing capacity theory for the design of shallow foundations, including footings and rafts. Basic design of pile foundations. Earth pressure theory applied to design of retaining walls. Slope stability theory and applications. Prereq: CEE 665 or permission.

CEE 879 - Foundation Design II**Credits: 3**

Advanced pile and pier design under vertical and lateral loads. Slope stability by circular and noncircular arc methods. Design of flexible bulkhead walls and mechanically stabilized walls. Excavation and dewatering. Soil and site improvement. Prereq: CEE 878 or permission.

CEE 880 - Matrix Structural Analysis and Modeling**Credits: 3**

Modeling and analysis of determinate and indeterminate structures by matrix computer methods. Creation of matrix elements using compatibility, equilibrium, and consecutive relationships. Plane trusses, beams, frames, and space trusses. Prereq: CEE 680 or permission.

CEE 881 - Dynamics of Structures**Credits: 3**

Dynamics of single- and multi-story buildings. Response due to earthquakes, blasting, traffic, and mechanical equipment. Analysis in the time domain and through the Fourier Transform. Fundamentals of structural vibration measurement. Prereq: CEE 880, permission.

CEE 889 - Timber Design**Credits: 3**

Introduction to the design of timber structures. Structural properties of wood. Determination of horizontal and vertical loads. Horizontal and vertical load-resisting systems. Design of horizontal diaphragms, shear walls, beams, and columns. Bolted, screwed, and nailed connections. Prereq: CEE 680 or permission.

CEE 890 - Structural Design in Masonry**Credits: 3**

Introduces the design of reinforced masonry structural members by the stress and strength method and considering deflection and other serviceability performance criteria. Includes development of wind and seismic load, curtain wall, shear wall, lintels and columns. Prereq: CIE 635, 680; or permission.

CEE 891 - Reinforced Concrete Design**Credits: 4**

Introduction to the design of reinforced concrete structural members by the strength method and considering deflection performance. Includes loads, approximate analysis, slabs, beams, and columns. Prereq: CEE 635, 680; or permission.

CEE 892 - Pre-stressed Concrete**Credits: 3**

Analysis and design of pre-stressed and post-tensioned concrete sections in flexure and shear. Strength, deflection, and losses in flexural members. Optimization of section and pre-stressing force selection. Prereq: CEE 891 or permission.

CEE 893 - Structural Design in Steel**Credits: 4**

Introduction to steel member design, including horizontal and vertical members for design and analysis of buildings. Examines design inputs, material choice, analysis methods and design and construction methodologies. Prereq: CEE 635 and CEE 680.

CEE 894 - LRFD Bridge Design**Credits: 3**

AASHTO LRFD Bridge Design Specifications using SI units. Design objectives, loads, load case analysis and selection, load distributions, static analysis, and design for axial loads, flexure, and shear. Design of slender columns, composite beams, and plate girders. Prereq: senior-level structural design course or permission.

CEE 895 - Independent Study**Credits: 1-4**

A limited number of qualified graduate students will be permitted to pursue independent studies under faculty guidance. May be repeated.

CEE 896 - Special Topics**Credits: 1-4**

Advanced or specialized topics not normally covered in regular course offerings. May be repeated, but not in duplicate areas. Prereq: permission. Special Fee.

CEE 897 - Masters Student Seminar**Credits: 1**

Topics of interest to graduate students and staff; reports of research ideas, progress, and results; lectures by outside speakers. Continuing course: instructor may assign IA grade (continuous grading) at the end of one semester. Course held simultaneously with CEE 997.

CEE 898 - Master's Project Paper**Credits: 3**

Concluding project paper required of Master's level students who utilize the non-thesis option. Prereq: permission. CEE majors only.

CEE 899 - Master's Thesis**Credits: 1-6**

May be repeated up to maximum of 6 credits. Cr/F.

CEE 931 - Advanced Physicochemical Treatment Design**Credits: 4**

Selection, design, and evaluation of advanced unit processes employed in physicochemical treatment of waters, wastewaters, and hazardous wastes. Discussion on preparation of alternative designs and economic analysis. Emphasis on treatment schemes based on experimental laboratory or pilot studies. Prereq: undergraduate-level course in water and waste water engineering or water chemistry, or permission. Lab.

CEE 934 - Advanced Bioenvironmental Engineering Design**Credits: 4**

Theoretical and experimental examination of the fundamental parameters used in selection, design, and operation of biological treatment processes for waters, wastewaters, and hazardous wastes. Topics include design and evaluation of aerobic and anaerobic processes, suspended and fixed-film processes, and advanced biological water and wastewater treatment processes. Prereq: environmental engineering microbiology course, or permission.

CEE 936 - Advanced Asphalt Materials**Credits: 3**

Examination of chemical composition of asphalt cements, current technologies for modification, and inclusion of recycled materials to meet desired physical properties. Advanced characterization of asphalt materials, modelling, advanced mixture design tools. Prereq: CEE 836 or permission.

CEE 949 - Advanced Pavement Design and Analysis**Credits: 3**

Advanced flexible pavement design and analysis including rehabilitation/overlay design. Includes development of mechanistic-empirical methods, advanced pavement structural analysis, and advanced material characterization. Prereq: CEE 849 or permission.

CEE 951 - Statistical Hydrology**Credits: 3**

Course examines statistical methods used to address water resources planning and management problems involving uncertainty objectives and hydrologic inputs. Application of statistics and probability to uncertainty in the description, measurement, and analysis of hydrologic variables and processes, including extreme events, error models, simulation, and sampling. Prereq: A hydrology course, basic statistics, or permission.

CEE 954 - Advanced Groundwater Topics**Credits: 3**

Review of Darcy's Law for confined and unconfined aquifers, linearization techniques, draw down computations under varying boundary conditions, solutions to the inverse problem, drainage theory, recharge theory, two-phase flow, succession of steady states modeling, and borehole geophysics. Prereq: ESCI 810.

CEE 955 - Advanced Surface Water Hydrology**Credits: 3**

Occurrence and distribution of water by natural processes including atmospheric thermodynamics, precipitation, runoff, infiltration, water losses, flood routing and catchment characteristics, analysis, and methods of runoff prediction. This course builds from a foundation of fluid mechanics in the environment to address essentials of modern hydrology. An emphasis is placed on fundamental concepts, first principles, and the scientific basis of approximations. Prereq: Calculus and Fluid Mechanics.

CEE 959 - Advanced Stream Restoration Topics**Credits: 3**

Course focuses on: stream crossing analysis and design, dam removal, and designs for aquatic species passage. Pre- or Coreq: CEE 759 or equivalent.

CEE 965 - Advanced Soil Mechanics**Credits: 4**

Numerical and physical modeling of the mechanical behavior of soils. Cam-clay and other predictive models. Laboratory studies of mechanical behavior and measurement of input parameters to soil models. Prediction of soil behavior based on laboratory results. Applications to numerical modeling of soil masses. Prereq: soil mechanics, and foundation design, or permission.

CEE 966 - Laboratory Geotechnical Testing**Credits: 4**

Introduction to geotechnical modeling, soil constitutive modeling, introduction to numerical modeling and applications, physical modeling, centrifuge modeling, and theoretical modeling. Prereq: CEE 665, CEE 778, or equivalent, or permission.

CEE 967 - In Situ Geotechnical Testing**Credits:** 3

In situ geotechnical testing methods for site characterization; theory and practice. Geotechnical testing methods include the piezocone, the pressuremeter, the flat plate dilatometer, the field vane, and the standard penetration test. Includes sampling techniques, geophysical exploration, and recent innovations in site and soil characterization. Prereq: CEE 965 or equivalent.

CEE 968 - Soil-Structure-Interaction**Credits:** 3

Introduction to soil-structure-interaction, elastic and plastic analyses, serviceability calculations, relative foundation stiffness, Pile-soil-interaction, flexible retaining walls, tunnel lining, bridge abutments, dynamic soil-structure-interaction, case studies, and modeling techniques. Prereq: CEE 665 and 778; or permission.

CEE 980 - Nonlinear Structural Analysis**Credits:** 3

This course deals with the theory, implementation, and application of methods of geometric and material nonlinear analysis. Geometric nonlinear analysis entails solving for equilibrium on the deformed configuration on the structure. Material nonlinear analysis involves inelastic behavior of materials. Practical design implications include problems of structural stability and inelastic static/dynamic analysis. Emphasis is on methods applied to frame structures comprised of line-type elements; however, the basic concepts also apply to general finite element methods. Prereq: CEE 780/CEE 880 or equivalent.

CEE 993 - Advanced Structural Steel Design**Credits:** 3

Advanced design of structural steel elements according to the AISC Load and Resistance Factor Method as applied to advanced topics in steel design. Emphasis will be placed on theory involved in the development of the design code requirements. Course design project will expand on these topics and include experimental work as appropriate. Prereq: CEE 793/CEE 893 or permission.

CEE 995 - Problems**Credits:** 2-4

The study and investigation of problems selected to meet the needs of the students.

CEE 997 - Doctoral Student Seminar**Credits:** 1

Topics of interest to graduate students, faculty, and staff; requires two presentations from doctoral students on their research ideas, progress, and results; lectures by outside speakers. Continuing course: instructor may assign IA grade (continuous grading) at the end of one semester. Course held simultaneously with CEE 897.

CEE 999 - Doctoral Research**Credits:** 0

Cr/F.

Faculty

<https://ceps.unh.edu/cee/faculty-staff-directory>