Civil and Environmental Engineering (CE)

cee.engr.uconn.edu

5010. Seminar in Structures and Applied Mechanics

Zero credits.

Presentations and discussions contributed by staff, students and outside speakers. Required every semester for all full-time students in the Structures and Applied Mechanics Area of Concentration in the Civil Engineering Field of Study.

5020. Independent Graduate Study in Civil Engineering

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for a total of 12 credits.

Special problems in civil engineering as arranged by the student with a supervisory instructor of his or her choice.

5030. Seminar in Transportation and Urban Engineering

Zero credits.

Extended discussions on presentations contributed by staff, students and outside speakers. Required every semester for all full-time students in the Transportation and Urban Engineering Area of Concentration in the Civil Engineering Field of Study.

5090. Advanced Topics in Civil Engineering

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for a total of 12 credits.

Classroom or laboratory courses as announced for each semester. For independent study see CE 5020.

5122. Advanced Mechanics of Materials

Three credits.

Stress and strain, combined stress, and theories of failure. Torsion of non-circular sections. Shear center, unsymmetrical bending, curved flexural members, and beams on elastic foundations. Energy methods. Plane theory of elasticity, plate bending, and pressurized cylinders.

5125. Reliability for Engineers

Three credits. Prerequisite: Instructor consent. Recommended preparation: basic knowledge or course taken on statistics and/or random processes.

Fundamentals of reliability analysis. Load and resistance models, first order reliability methods, and probabilistic simulation techniques. Calibration of design codes. System reliability.

5128. Elastic Stability

Three credits.

Buckling of elastic and inelastic columns; lateral buckling of beams; buckling of plates, rings and tubes; stability of frames.

5130. Numerical Methods in Civil Engineering

Three credits.

Solution of linear and nonlinear systems of equations and algebraic eigenvalue problems. Interpolation, numerical integration, and regression. Ordinary and partial differential equations by finite difference method. Computer programming.

5150. Structural Vibrations

Three credits.

Vibrating systems; application to design; discrete and continuous systems, free and forced vibrations; response to periodic and non-periodic loads; analytical and numerical techniques; earthquake loading; response spectra.

5151. Experimental Structural Dynamics

Three credits.

Characteristics of random data; vibration test hardware; data acquisition and analysis; and experimental modal analysis and system identification. Laboratory experiments will be used to enhance understanding of taught concepts.

5161. Structural health monitoring and sensors

Three credits.

Concepts and applications of structural health monitoring using sensors. Data acquisition, digital signal processing, random vibration, basic control theory, modal analysis, damage detection algorithms, and decision support system. Experimental methods for structural health monitoring of civil structures.

5163. Fracture Mechanics

Three credits.

Focuses on fundamental concepts and applications of fracture mechanics. Topics include linear elastic fracture mechanics, elastic plastic fracture mechanics, computational fracture mechanics, fracture mechanisms in metals and non-metals, fracture testing, dynamic and time-dependent fracture, fatigue crack growth, interfacial fracture, fracture in advanced materials, and engineering applications.

5164. Finite Element Methods in Applied Mechanics I

(Also offered as ME 5520.) Three credits. Not open for credit to students who have passed CE 5162.

Formulation of finite elements methods for linear static analysis. Development of two and three dimensional continuum elements, axisymmetric elements, plate and shell elements, and heat transfer elements. Evaluation of basic modeling principles including convergence and element distortion. Applications using commercial finite element programs.

5166. Finite Element Methods in Applied Mechanics II

(Also offered as ME 5521.) Three credits.

Formulation of finite elements methods for modal and transient analysis. Development of implicit and explicit transient algorithms. Stability and accuracy analysis. Formulation of finite element methods for material and geometric nonlinearities. Development of nonlinear solution algorithms. Applications using commercial finite element code.

5370. Environmental Monitoring

Three credits.

Introduction to complexities and challenges associated with acquisition of information on environmental processes and characteristics of natural systems. Hands-on experience with selection of measurement strategy and sensing technology; sampling network and protocol design; and deployment, acquisition and interpretation of measurements in natural systems.

5380. Bridge Structures

Three credits.

Common types of bridges; AASHTO bridge loads; design of composite plate girders; fatigue; design of bridge substructure; design project.

5530. Advanced Soil Mechanics

Three credits. Not open for credit to students who have passed CE 4541.

Introduction of soil as a multi-phase material; stress and strain analysis in soil; soil compression and consolidation; shear strength of sand and clay; critical state soil mechanics; advanced topics in complex constitutive relationships; introduction to fracture mechanics; term paper.

5541. Advanced Soil Mechanics

Three credits.

Introduction of soil as a multi-phase material; stress and strain analysis in soil; soil compression and consolidation; shear strength of sand and clay; critical state soil mechanics; advanced topics in complex constitutive relationships; introduction to fracture mechanics; term paper.

5542. Earthquake Engineering

Three credits. Not open for credit to students who have passed CE 4542.

Global tectonics and earthquake sources, seismic wave propagation, strong ground motion analysis, seismic hazards, site effects and liquefaction, seismic load to slopes, retaining structures and foundations, structure response to dynamic loads; term paper.

5543. Advanced Foundation Design

Three credits.

Soil behavior in retaining systems, shallow foundations, deep foundations.

5549. Soil Shear Strength

Three credits.

Failure theories for particulate media, plastic equilibrium, laboratory testing and interpretation.

5570. Bituminous Materials

Three credits.

Properties, performance and design of bituminous materials for highway and airport paving; physical and chemical properties of binders; testing methods; specifications; production and construction.

5610. Advanced Reinforced Concrete Structures

Three credits.

Behavior and design of reinforced concrete for flexure, shear, torsion, bond, and axial loads; two way slabs; beam-column joints; general flexure theory; seismic considerations; review of design specifications.

5620. Advanced Steel Structures

Three credits.

Metal plasticity; plastic hinging and plastic analysis of beams; bolted and welded connections; seismic lateral load resisting systems; prequalified moment-resisting connections; blast design considerations for steel structures, term project.

5630. Wood Design

Three credits.

Physical and mechanical properties of wood. Behavior of wood beams, columns, beam columns, connectors and fasteners; introduction to plywood and glued-laminated members; analysis and design of structural diaphragms and shear walls.

5640. Prestressed Concrete Structures

Three credits.

Analysis, design, and behavior of pretensioned and post-tensioned concrete; simple and continuous span structures; time dependent behavior; review of design specifications.

5650. Structural Health Monitoring and Sensors

Three credits.

Concepts and applications of structural health monitoring using sensors. Data acquisition, digital signal processing, random vibration, basic control theory, modal analysis, damage detection algorithms, and decision support system. Experimental methods for structural health monitoring of civil structures.

5710. Case Studies in Transportation Engineering

Three credits. Prerequisite: Department consent. Not open for credit to students who have passed CE 4710.

Analysis of transportation case studies in transportation design, and transportation and land use planning. Application of transportation engineering and planning skills. Oral and written group reports, group discussions, individual papers.

5715. Sustainable Transportation

Three credits. Recommended preparation: CE 2710.

Assesses the role of the land-based transportation system in terms of how it affects the environmental, social and economic goals for a sustainable society. How the concept of sustainability can be used as a holistic framework for assessing the transportation and land use system. Strategies for reducing the environmental, social and economic footprint of the transportation/land use system and ways they can be implemented.

5720. Street and Highway Design

Three credits. Not open for credit to students who have passed CE 4720.

Urban street and highway design: vertical and horizontal alignment, cross-section elements, traffic barriers, interchanges and intersections, pedestrian and bike facilities, traffic calming, community and roadside elements.

5725. Transportation Safety

Three credits. Prerequisite: Instructor consent. Recommended preparation: CE 2211 and 2251 or equivalent courses in engineering, economics, and statistics.

Human factors in traffic safety, economic costs of crashes, crash data collection and database management, elements of statistics and crash count distributions, exploratory analysis of crash count data, regression analysis of crash count data, before-after studies, network screening and diagnosis, roadway and roadside design, crash modification factors.

5730. Transportation Planning

Three credits. Not open for credit to students who have passed CE 4730.

Transportation economics, urban transportation planning process, local area traffic management, evaluation of transportation improvements, land use and transportation interaction.

5735. Public Transportation Systems

Three credits.

Characteristics of public transportation systems, public transport network planning, station spacing and design, public transportation and land use development, public transportation network design problems, and introduction to transit assignment.

5740. Traffic Engineering Characteristics

Three credits. Not open for credit to students who have passed CE 4740.

Relationships among traffic flow characteristics; microscopic and macroscopic representations of traffic flow; capacity of highways; traffic stream models; shock wave analysis; queueing analysis; traffic simulation.

5750. Pavement Design

Three credits. Not open for credit to students who have passed CE 4750.

Analysis and design of flexible and rigid pavements; testing and characterization of paving materials.

5812. Ecohydrology

(Also offered as ENVE 5812.) Three credits.

Focuses on the interactions between ecological processes and the water cycle, emphasizing the hydrological mechanisms underlying various terrestrial ecological patterns and the ecological properties controlling the hydrologic and climatic regimes. Topics include conceptual understanding of hydrological cycle over vegetated land, quantifying and modeling flux exchanges in the soil-vegetation-atmosphere continuum, case studies on the hydrological impact of land use land cover changes, ecosystem response to environmental changes, and vegetation-climate feedback at the regional and global scales.

5820. Unsaturated Flow and Transport

(Also offered as ENVE 5820.) Three credits.

Modern approaches to water flow and solute transport in partially-saturated porous media including media characterization (review); unsaturated flow in porous media (governing equations, hydraulic functions, numerical and analytical solution methods); solute transport in unsaturated media (convection dispersion, transfer functions, solutions); modeling and observational scales; coupled water flow and solute transport (model applications); special topics (preferential flow, effects of spatial variability, stochastic aspects of flow and transport, gas exchange and transport measurement methods).

6725. Statistical and Econometric Methods for Transportation Data Analysis

Three credits. Prerequisite: Instructor consent. Recommended preparation: completion of an introductory graduate-level statistics course or equivalent, and completion of a graduate-level transportation core course.

Application of various statistical methods for analysis of transportation data, including linear regression, count data models, logistic regression, discrete outcome models, ordered probability models, random parameter models, and duration models among others.

6730. Travel Demand Forecasting

Three credits.

Alternative formulations and calibration of trip generation, trip distribution and travel mode choice prediction models. Traffic network equilibrium and assignment.

6735. Transportation Network Analysis

Three credits. Prerequisite: CE 5730. Recommended preparation: CE 4210.

Network modeling and graph theoretical applications to transportation systems. Algorithmic approaches to common network problems. System optimal and user equilibrium traffic assignment modeling and solution techniques.

6740. Traffic Engineering Operations

Three credits.

Driver, pedestrian and vehicle operating characteristics. Traffic data collection. Accident and safety analysis. Highway capacity analysis. Traffic signs and markings. Traffic signal timing and operation. Traffic management.

6830. The Flood Problem

Three credits.

Flood hazards. Preventing or alleviating damages. Flood frequency analysis. Effect of land-use/land-cover and soil moisture on flooding. Remote sensing in flood prediction. Flood and dam-break modeling. Multiple purpose projects.

6920. Doctoral Teaching Practicum

(Also offered as ENVE 6920.) Variable (0-3) credits.

Offered by special arrangement. Practical experience in classroom teaching with mentoring from a member of the graduate faculty.