

# Civil Engineering (CE)

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## Courses

### **CE 5506 Green and Sustainable Engineering: 3 semester hours.**

Study of green engineering and sustainability, topics focused on design of processes to advance sustainability, manufacturing and disposal alternatives, energy and material life-cycle assessment, and environmental law and related issues. Specific, evaluated graduate-level activities and/or performances are identified in the course syllabus. PREREQ: CHEM 1111.

### **CE 5524 Open Channel Flow: 3 semester hours.**

Application of the principles of fluid mechanics to flow in open channels - natural and manmade. Topics include uniform flow, flow resistance, gradually varied flow, flow transitions, unsteady flow, and hydraulic structures (culverts, weirs, etc.) used in open channel control. Computer applications will be used in the analysis of open channel systems. Specific, evaluated graduate-level activities and/or performances are identified in the course syllabus. PREREQ: CE 3341 or equivalent or permission of instructor.

### **CE 5525 Water Resources: 3 semester hours.**

Overview of the general field of water resources engineering. Course topics covered in other courses such as CE 3351, Engineering Hydrology, CE 4435/5535, Hydraulic Design, and CE 4424/5524, Open Channel Flow, will be limited. The course is structured to give students a background in the diverse field of water resources and help prepare them for future careers in water supply, wastewater, floodplain, stormwater and groundwater management. Specific, evaluated graduate-level activities and/or performances are identified in the course syllabus.

### **CE 5531 Advanced Mechanics of Solids: 3 semester hours.**

An introduction to elasticity, plasticity, and energy foundations, stability, plates. PREREQ: ENGR 3350 and MATH 3360.

### **CE 5534 Geotechnical Design: 3 semester hours.**

Application of soil mechanics to design of foundations, retaining wall, stable slopes, buried conduits and pavement structures. Computer methods utilized. PREREQ: ENGR 3350 and CE 3332.

### **CE 5535 Hydraulic Design: 3 semester hours.**

Hydraulic design of water control and transport structures, pipelines, and distribution systems. Computer methods utilized. PREREQ: CE 3351.

### **CE 5536 Transportation Engineering: 3 semester hours.**

Fundamentals of earthwork, route location, drainage, and pavement materials with application to geometric and pavement design of highways, streets and rural roads. COREQ: CE 3332. PREREQ: ENGR 2224 and CE 3301.

### **CE 5537 Geotechnical Engineering Laboratory: 1 semester hour.**

Field and laboratory work on site investigation, soil sampling classification and testing. Evaluation of soil properties. Design of experiment. PREREQ: CE 3332.

### **CE 5554 Basic Engineering Geology: 3 semester hours.**

Geology applied to civil engineering projects rock engineering classification systems and geotechnical parameters such as joint set orientation ground behavior and underground construction. Preparation of baseline geotechnical reports. Equivalent to GEOL 5554. COREQ: CE 3332 or GEOL 3314.

### **CE 5555 Geologic Data Methods: 3 semester hours.**

Geotechnical investigations for civil works projects. Geologic mapping for civil engineering purposes. Development of engineering geologic profiles. Core logging. Preparation of Geotechnical Data Reports for civil works projects. Equivalent to GEOL 5555. PREREQ: CE 5554 or CE 4454.

### **CE 5560 Project Management: 3 semester hours.**

Knowledge, techniques and tools for management of civil, electrical, mechanical and environmental engineering projects and firms. Topics include contract organization/interpretation; project responsibility/authority; cost estimating; scheduling; quality control; construction safety; environmental requirements and project closeout. Examples from actual construction projects used as teaching aid. Specific, evaluated graduate-level activities and/or performances are identified in the course syllabus. PREREQ: CE 3360 or CE 3361.

### **CE 5561 Project Management: 3 semester hours.**

Analysis of statically indeterminate structures. Continuation of the use of classical methods. Introduction to computer methods in structural analysis including the use of commercially available software, and lateral load effects. PREREQ: CE 3362.

### **CE 5562 Design of Steel Structures: 3 semester hours.**

Design of steel members and connections with emphasis on the AISC specifications. PREREQ: CE 3362.

### **CE 5564 Design of Concrete Structures: 3 semester hours.**

Design of reinforced concrete beams, columns, and slabs. Introduction to prestressing. PREREQ: CE 3362.

### **CE 5565 Design of Prestressed Concrete Structures: 3 semester hours.**

Basic concepts in prestressed concrete design, full versus partial prestressing, flexural design, ultimate load design, beams with constant and variable tendon eccentricity, design of reinforcement for shear and torsion. PREREQ: CE 5564 or CE 4464.

### **CE 5566 Design of Wood Structures: 3 semester hours.**

Design of solid and laminated wood members and connections. Includes the design of wooden diaphragms for resisting lateral loads. PREREQ: CE 3362.

### **CE 5567 Structural Engineering Laboratory: 1 semester hour.**

Measurement of stresses and load distribution through concrete, steel and wood components and structures. Design of experiment. PREREQ: CE 3362.

### **CE 5568 Behavior of Composite Materials: 3 semester hours.**

Macro and micromechanical behavior of laminae and laminates bending, buckling and vibration of laminated beams and plates. Equivalent to ME 5568. PREREQ: ENGR 3350 and MATH 2240.

### **CE 5575 Essentials of Geomechanics: 3 semester hours.**

Essentials of rock fracture relevant to geological engineering including stress and strain, properties and classification of rock masses, rock fracture mechanisms. Equivalent to GEOL 5575. PREREQ: GEOL 4421 or ENGR 3350.

### **CE 5576 Engineering Geology Project: 1 semester hour.**

Team projects studying actual problems in engineering geology. Equivalent to GEOL 5576. PREREQ: GEOL 5554, GEOL 4454, CE 5554, or CE 4454.

### **CE 5580 Earthquake Engineering: 3 semester hours.**

Topics include: mechanism and characterization of earthquakes; seismic risk analysis; site and structural response; applications from points of view of engineer and geologist. Equivalent to GEOL 5583. PREREQ: GEOL 3313 or CE 3332, or permission of instructor.

### **CE 5599 Experimental Course: 1-6 semester hours.**

The content of this course is not described in the catalog. Title and number of credits are announced in the Class Schedule. Experimental courses may be offered no more than three times with the same title and content. May be repeated.

***CE 6626 Introduction to Computational Fluid Dynamics: 3 semester hours.***

Introduction to the governing equations of fluid flow, their application to solve fluid flow problems and the traditional numerical methods used to solve the equations. Numerical methods will cover basic techniques in the solutions of parabolic, hyperbolic and elliptical type equations. In addition, students will be introduced to an industry Computational Fluid Dynamics (CFD) code. Application of the code and its limitations will be covered. PREREQ: CE/ME 3341 or equivalent.

***CE 6628 Hydraulics of Pipelines: 3 semester hours.***

A study and application of the principles and procedures involved in the design and operation of pipeline systems. Topics include a feasibility assessment, economic analysis, design of pipe size/pressure class, cavitation, hydraulic transients and the selection of pumps and valves. Comprehensive design problems are used to demonstrate pipeline design and operational problems. PREREQ: CE/ME 3341 or equivalent.

***CE 6650 Thesis: 1-6 semester hours.***

Thesis research must be approved by the student's advisory committee. Total of six credits are required to satisfy the research requirements for the degree. May be repeated. Graded S/U.

***CE 6652 Advanced Topics: 3 semester hours.***

Advanced topics in Civil Engineering and related fields, depending upon the interest of students and faculty. May be repeated for credit when topics vary. PREREQ: Permission of instructor.

***CE 6660 Special Project: 1-3 semester hours.***

A significant project, involving engineering applications, toward the completion of M.S. program with non-thesis option. Includes a report and oral examination. Total of three credits may be used to satisfy the degree requirement. May be repeated. Graded S/U.

***CE 6664 Dynamics of Structures: 3 semester hours.***

Evaluation of response of structures subjected to dynamic forces including earthquake-induced forces and deformations. Applications include single- and multi-degree of freedom systems, and continuous systems. PREREQ: ME 4440 or ME 5540 or permission of instructor.

***CE 6665 Finite Element Methods: 3 semester hours.***

Introduction to finite element methods applied to linear one- and two-dimensional problems. Application of the concept to specific problems in various fields of engineering and applied sciences. Equivalent to ME 6665. PREREQ: ENGR/CE/ME 3350 and MATH 3360.

***CE 6667 Structures and Mechanics Laboratory: 3 semester hours.***

Strain gauge installation and circuitry. Strain measurements and analysis of variety of structural and mechanical systems. Dynamic measurements of various structures. PREREQ: CE 5531 or CE 4431 or permission of instructor.

***CE 6699 Experimental Course: 1-6 semester hours.***

The content of this course is not described in the catalog. Title and number of credits are announced in the Class Schedule. Experimental courses may be offered no more than three times with the same title and content. May be repeated.

***CE 8850 Doctoral Dissertation: 1-24 semester hours.***

Research toward completion of the dissertation for Ph.D. in Engineering and Applied Science. Variable credits. May be repeated. Graded S/U.