

# Civil Engineering (CE)

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## Courses

### **CE 1100 Engineering Fundamentals: 3 semester hours.**

Fundamental tools are covered for success in civil engineering and other majors, especially engineering and science majors. Includes basic skills and study strategies to succeed in college courses including: test taking, math essentials, good note taking, time scheduling, unit conversions, email protocol, faculty/student interactions, cultural issues and problem-solving strategies. F, S

### **CE 1105 Engineering Graphics: 2 semester hours.**

Engineering drawing emphasizing projections, sketching and 3-D visualization. Introduction to CAD with civil, electrical and mechanical engineering applications. PREREQ: MATH 1147 or equivalent. F, S

### **CE 1120 Introduction to Engineering: 2 semester hours.**

Introduction to engineering problem solving, engineering design, analysis of contemporary societal issues and methods of presenting engineering information. Design projects and/or presentations of current engineering challenges. F, S

### **CE 1140 Environmental Sustainability and Climate: 3 semester hours.**

This course presents a broad overview of the science of climate change including its possible causes (both natural and anthropogenic), sustainable energy as well as societal and environmental impacts. It examines future climate projections, renewable energy, societal decisions that may influence future greenhouse gas emissions, possible mitigation strategies, and our ability to adapt to climate change. It presents ways to identify disinformation versus legitimate applications of the scientific method. Partially satisfies Objective 5 of the General Education Requirements. F, S

### **CE 1150 Engineering Marvels and Civilizations: 3 semester hours.**

Introduces engineering and scientific discoveries from different cultures and countries and their contributions to society. It identifies historical milestones in the advancement of engineering and its connections to societal and cultural developments. It presents the problematization and conceptualization of engineering as a societal and cultural phenomenon. Satisfies Objective 9 of the General Education Requirements. F, S

### **CE 1199 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 2200 Civil Engineering Tools: 1 semester hour.**

Civil engineering problem solving using spreadsheets as a modern data analysis, reporting and database tool; word processing, reading plans/drawings and specifications. PREREQ: MATH 1170 and CS 1181 or INFO 1181. F

### **CE 2210 Engineering Statics: 3 semester hours.**

Concepts of force vectors and equilibrium with emphasis on free body diagrams. Trusses, beams, frames, centroids, fluid statics, and friction. Equivalent to ME 2210. PREREQ or COREQ: CE 1105 or ME 1105; PHYS 2211; and MATH 1175. F, S

### **CE 2220 Engineering Dynamics: 3 semester hours.**

Principles of kinetics. Angular and linear displacement, velocity, and acceleration analysis. Rigid bodies in motion and types of motion. Application of principles of force-mass acceleration, work-kinetic energy, and impulse-momentum to solution of problems of force systems acting on moving particles and rigid bodies. Equivalent to ME 2220. PREREQ: CE 2210 or ME 2210, PHYS 2211, CE 1105 or ME 1105; and MATH 1175. F, S

### **CE 2299 Experimental Course: 1-6 semester hours.**

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### **CE 3301 Surveying: 3 semester hours.**

Fundamental principles of surveying. Electronic and conventional angle and distance measurement, leveling traversing, stadia, solar observation, surveying computations, mapping. Application to engineering, geology and architecture. PREREQ: CE 2210 or ME 2210. F, D

### **CE 3332 Basic Geotechnics: 3 semester hours.**

Classification, analysis and evaluation of soils as engineering material. Water movement through soils. Soil mechanics applied to analysis of foundations, earth slopes and other structures. PREREQ: CE 2210 or ME 2210, PHYS 2211, CE 1105 or ME 1105; and MATH 1175. S

### **CE 3337 Geotechnical Engineering Laboratory: 1 semester hour.**

Field and laboratory work on site investigation, soil sampling, classification and testing. Evaluation of soil properties. Design of experiments. PREREQ: ENGL 1102. PRE-or-COREQ: CE 3332. S

### **CE 3341 Fluid Mechanics: 3 semester hours.**

Fluid statics, incompressible fluid flow, open channel flow, compressible fluid flow, pipe flow, flow measurements, pumps, valves, other devices. Equivalent to ME 3341. PREREQ: ME 2220 and MATH 3360. F, S

### **CE 3350 Mechanics of Materials: 3 semester hours.**

Theories of stresses and strains for ties, shafts, beams, columns and connections. Determination of deflections and the investigation of indeterminate members. An introduction to design. Equivalent to ME 3350. PREREQ: CE 2210 or ME 2210, PHYS 2211, CE 1105 or ME 1105; and MATH 1175. F, S

### **CE 3351 Engineering Hydrology: 3 semester hours.**

Quantitative descriptions of hydrologic processes and dynamics for the understanding and prediction of precipitation, storm water runoff, groundwater flow, flood routing, and water quality, ground water and detention and retention systems. PRE-or-COREQ: CE 3341/ME 3341. S

### **CE 3360 Engineering Economics: 2 semester hours.**

Economic analysis and comparison of engineering alternatives by annual cost, present and future worth, and rate of return methods. Study of cost factors upon which management decisions are based. PREREQ: CE 2210 or ME 2210 or permission of instructor. F, S

### **CE 3361 Engineering Economics and Management: 3 semester hours.**

Economic analysis and comparison of engineering alternatives by annual cost, present and future worth, and rate of return methods. Study of cost factors upon which management decisions are based. Introduction to design/construction processes, cost estimating and scheduling with applications to civil engineering projects. PREREQ: CE 2210/ME 2210. F, S

### **CE 3362 Structural Analysis: 3 semester hours.**

Analysis of statically determinate and indeterminate trusses, beams, and frames; effects of moving loads; matrix stiffness method; computer applications. PREREQ: CE 2210 or ME 2210, CE 3350 or ME 3350 with minimum grade of C-, and MATH 2240. F

**CE 3366 Civil Engineering Materials: 2 semester hours.**

Mechanical behavior of materials used in civil engineering: metals, masonry, concrete, asphalt, and wood. Micro and macroscopic behavior. Methods of laboratory testing. Analysis and presentation of data and preparation of written reports. PREREQ: CE 3350 or ME 3350, CE 2210 or ME 2210. COREQ: CE 3367. F

**CE 3367 Civil Engineering Materials Laboratory: 1 semester hour.**

Laboratory measurement of mechanical behavior of civil engineering materials. Design of experiment. PREREQ: ENGL 1102, CE 3350 or ME 3350, CE 2210 or ME 2210. COREQ: CE 3366. F

**CE 3399 Experimental Course: 1-6 semester hours.**

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**CE 4406 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. PREREQ: CHEM 1111. D

**CE 4424 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. Restricted to seniors. PREREQ: CE 3351. D

**CE 4425 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/CE 5535, Hydraulic Design, and CE 4424/CE 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. D

**CE 4431 Advanced Mechanics of Solids: 3 semester hours.**

An introduction to elasticity, plasticity, and energy foundations, stability, plates. PREREQ: CE 3350/ME 3350 and MATH 3360. F

**CE 4434 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: CE 3350/ME 3350 and CE 3332 with minimum grade of C-. F

**CE 4435 Hydraulic Design: 3 semester hours.**

Hydraulic design of water control and transport structures, pipelines, and distribution systems. Computer methods utilized. PREREQ: Minimum grade of C- in CE 3341 or ME 3341. F

**CE 4436 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. PREREQ: CE 3301, CE 3337, and CE 3367. S

**CE 4438 Foundation Engineering: 3 semester hours.**

Advanced geotechnical analysis and performance of shallow, driven pile and drilled shaft foundations (including lateral loads and seismic bearing capacity), braced excavations, retaining walls, dynamic slope stability, soil-structure interaction and soil liquefaction. PREREQ: CE 3332, CE 3337 and CE 4434. D

**CE 4454 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 4454. PREREQ or COREQ: GEOL 3314 or CE 3332. D

**CE 4455 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 4455. PREREQ: CE 4454 or GEOL 4454. D

**CE 4460 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 aids. PREREQ: CE 3360 or CE 3361. D

**CE 4462 Design of Steel Structures: 3 semester hours.**

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

**CE 4464 Design of Concrete Structures: 3 semester hours.**

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

**CE 4465 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 4464. F

**CE 4466 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. D

**CE 4467 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. S

**CE 4468 Behavior of Composite Materials: 3 semester hours.**

Macro and micromechanical behavior of laminae and laminates; bending, buckling and vibration of laminated beams and plates. PREREQ: CE 3350/ME 3350 and MATH 2240. D

**CE 4475 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 4475. PREREQ: GEOL 4421 or CE 3350/ME 3350. D

**CE 4476 Engineering Geology Project: 1 semester hour.**

Team projects studying actual problems in engineering geology. Equivalent to GEOL 4476. PREREQ: GEOL 4454 or CE 4454. D

**CE 4480 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. PREREQ: GEOL 3313, CE 3332, or permission of instructor. D

**CE 4481 Independent Problems: 1-3 semester hours.**

Students are assigned to, or request assignment to, independent problems on the basis of interest and preparation. May be repeated for a maximum of 6 credits. Equivalent to EE 4481. PREREQ: Permission of instructor. D

***CE 4496A Project Design I: 3 semester hours.***

Semester one of a two semester sequence dealing with the conceptual design of multi-disciplinary projects requiring multi-disciplinary teams. PREREQ: COMM 1101, CE 3361, CE 3362, CE 3341, CE 3301, CE 3332, CE 3337, CE 3366, CE 3367 and CE 3351 or CE 4462 or CE 4464 or CE 4435 or CE 4434 or ENVE 4408. F

***CE 4496B Project Design II: 3 semester hours.***

Continuation of design sequence dealing with the design, analysis, implementation, and consequences of multi-disciplinary projects. PREREQ: CE 4496A. S

***CE 4499 Experimental Course: 1-6 semester hours.***

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