

# Civil Engineering (CIVE)

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## **CIVE 2000. Introduction to Civil Engineering Seminar. (1 Credit)**

Introduces various civil engineering careers and related industries. Emphasizes the importance of life-long learning and active participation in professional societies and communities through lectures given by practicing engineers using their own experiences. Covers resume creation, internship opportunities, and licensure process.

## **CIVE 2130. Engineering Economics and Statistics. (3 Credits)**

Covers fundamental engineering economic topics and introduces concepts of probability and statistics. Includes economic compound interest and discount rate factors, nominal and effective interest rates, cash flow diagrams, capitalized cost, net present worth analysis, equivalent uniform annual cost, internal rate of return, benefit-cost analysis, basic microeconomics, cost estimation, and cost indexes. Includes probability theories, random sampling, Gaussian distributions, Chi-Squared distributions, hypothesis testing, and analysis of variation.

## **CIVE 2450. Numerical Methods with Excel and VBA. (3 Credits)**

Prerequisite(s): MATH 2250

Discusses computational and symbolic methods for the solution of complex engineering problems. Introduces basic programming logic in visual basic. Discusses computer representation of numbers and algorithm error analysis. Covers the solution of multiple constraints. Covers use of Microsoft EXCEL and Visual Basic for Applications (VBA).

## **CIVE 3000. Civil Engineering Career Planning Seminar. (1 Credit)**

Prerequisite(s): CIVE 2000, Matriculation into Civil Engineering Program, and University Advanced Standing

Examines various civil engineering careers and related industries. Emphasizes the importance of life-long learning and active participation in professional societies and communities through lectures given by practicing engineers using their own experiences. Introduces various engineering codes of ethics. Prepares upper-division students for their engineering careers.

## **CIVE 3010. Introduction to Transportation Engineering. (3 Credits)**

Prerequisite(s): EGDT 1040, University Advanced Standing and (Formal Acceptance into the Civil Engineering Program or Departmental Approval)

Covers analysis and design of transportation systems and their components. Introduces technological, economic, and social aspects of transportation. Covers economic considerations, role of public policy, system planning, design, management, traffic flow models, intersection control, network analysis, and environmental impact.

Lab access fee of \$45 applies.

## **CIVE 3130. Introduction to Structural Engineering. (3 Credits)**

Prerequisite(s): ENGR 2140, Matriculation into Civil Engineering Program, and University Advanced Standing

Introduces fundamental principles of structural loads, analysis, steel, and concrete design. Covers gravity and lateral loads, and how to apply these to the analysis and design of structures. Develops the fundamentals of steel and concrete design; including materials, tension, compression, shear and bending member design.

Lab access fee of \$45 applies.

## **CIVE 3140. Structural Steel Design I. (3 Credits)**

Prerequisite(s): CIVE 3130, Matriculation into Civil Engineering Program, and University Advanced Standing

Develops code-based concepts in structural steel design. Focuses on the design of bolted and welded connections, composite beams, and seismic frames and details. Covers bolt, weld, and connected material strength, including tension, shear and moment connections. Delves deeply into seismic design of braced and moment frames, member selection, and seismic connection design and detailing Utilizes industry software for member design to familiarize students with the state of practice. Prepares students to function efficiently in a professional design office designing steel structures.

Lab access fee of \$45 applies.

## **CIVE 3150. Reinforced Concrete Design I. (3 Credits)**

Prerequisite(s): CIVE 3130, Matriculation into Civil Engineering Program, and University Advanced Standing

Develops code-based concepts in concrete design. Includes suspended slabs, footings, retaining walls, seismic design, and anchorage to concrete.

Utilizes industry software for member design to familiarize students with the state of practice. Prepares students to function efficiently in a professional design office designing concrete structures.

Lab access fee of \$45 applies.

## **CIVE 3210. Introduction to Geotechnical Engineering. (3 Credits)**

Prerequisite(s): ENGR 2140, Matriculation into Civil Engineering Program, and University Advanced Standing

Focuses on the study of soil properties, classifications, and behavior. Applies principles of mechanics to soil as an engineering material. Introduces consolidation and compaction theories, effective stresses, shear strength, and earth pressure and slope stability. Includes a design component.

Lab access fee of \$45 applies.

## **CIVE 3310. Civil Engineering Fluid Mechanics. (3 Credits)**

Prerequisite(s): Matriculation into Civil Engineering Program and University Advanced Standing

Covers the fundamentals of fluid mechanics including fluid properties, fluid statics, the Bernoulli equation, fluid kinematics, the integral and differential analyses of fluid flow. Introduces dimensional analysis, similitude, and modeling. Covers viscous internal and external flows, and turbomachines.

Includes a design component.

**CIVE 3320. Introduction to Water Resources. (3 Credits)**

Prerequisite(s): CIVE 2130, CIVE 3310, University Advanced Standing, and Matriculation into Civil Engineering Program

Pre- or Corequisite(s): ENGR 2450 or CIVE 2450

Covers weather patterns, precipitation measurement, distribution, and runoff. Focuses on pipe flow and open channel flows. Introduces storm hydrograph and peak flow analysis, flood design, reservoir and channel routing. Includes a design component.

Lab access fee of \$45 applies.

**CIVE 3335. Hydrology and Hydraulics Lab WE. (2 Credits)**

Prerequisite(s): CIVE 3310, University Advanced Standing, and Matriculation into Civil Engineering Program

Pre- or Corequisite(s): CIVE 3320

Covers temperature, pressure, and flow measurement, along with calibration of thermal/fluid sensors in a lab setting. Focuses on experiments to investigate various phenomena in fluid flow, hydraulics, and hydrology. Investigates the performance of pumps. Includes a writing component.

Lab access fee of \$45 applies.

**CIVE 3410. Introduction to Civil Engineering Materials. (3 Credits)**

Prerequisite(s): ENGR 2140, Matriculation into Civil Engineering Program, and University Advanced Standing

Focuses on introducing concepts and designs related to civil engineering materials, especially concrete, asphalt, steel and wood. Includes aspects of mechanical properties, testing methods, manufacturing or construction processes, distresses and degradation mechanisms, and their effects on design or selection of various materials used in civil engineering infrastructure.

**CIVE 3415. Civil Engineering Materials Lab WE. (2 Credits)**

Prerequisite(s): CIVE 2130, ENGR 2140, Matriculation into Civil Engineering Program, and University Advanced Standing

Pre- or Corequisite(s): CIVE 3410

Focuses on testing of civil engineering materials such as soil, asphalt, concrete, and metals related to geotechnical, pavement, and structural aspects of civil engineering. Evaluates writing skills with individual laboratory reports.

Course lab fee of \$25 applies.

Lab access fee of \$45 applies.

**CIVE 3610. Environmental Engineering. (3 Credits)**

Prerequisite(s): CHEM 1210, MATH 2250, University Advanced Standing, and (Formal Acceptance into the Civil Engineering Program or Departmental Approval)

Introduces the fundamentals of environmental engineering. Focuses on chemical, biological, and physical principles dealing with water, waste water, and solid waste management. Covers analyses of air, surface, and ground water quality. Includes a design component.

Lab access fee of \$45 applies.

**CIVE 4010. Traffic Engineering. (3 Credits)**

Prerequisite(s): CIVE 3010 and University Advanced Standing

Introduces elements of traffic engineering including: road use, traffic flow theories, traffic control devices, traffic data collection. Covers freeways and rural highways and principles of intersecting signalization, service level and capacity. Includes a design component.

Lab access fee of \$45 applies.

**CIVE 4020. Highway Design. (3 Credits)**

Prerequisite(s): CIVE 3010 and University Advanced Standing

Covers classification of highways. Focuses on the process involved in design of highways and their elements. Introduces design of highway cross sections, intersections, and interchanges. Covers design of vertical and horizontal alignment and establishment of sight distances. Includes a design component.

Lab access fee of \$45 applies.

**CIVE 4160. Timber and Masonry Design. (3 Credits)**

Prerequisite(s): CIVE 3130, Matriculation into the Civil Engineering Program, and University Advanced Standing

Introduces code-based concepts for the design of timber and reinforced masonry structures. Covers timber design including material behavior, beam, column, wall, seismic, and connection design. Covers masonry design including materials, beams and lintels, columns and pilasters, shear walls, and anchorage. Prepares students to function efficiently in a professional design office designing these materials.

**CIVE 4210. Foundation Design. (3 Credits)**

Prerequisite(s): CIVE 3210 and University Advanced Standing

Covers foundation classifications. Applies fundamentals of soil mechanics to analysis and design of soil structure systems. Covers shallow and deep foundations, piles and caissons, and retaining structures. Includes a design component.

Lab access fee of \$45 applies.

**CIVE 4220. Ground Improvement Methods. (3 Credits)**

Prerequisite(s): CIVE 3210 and University Advanced Standing

Focuses on the analysis, design, and application principles of ground improvement methods to address soil and rock engineering problems. Includes compaction theory and methods, deep dynamic compaction, compaction by explosion, vibro-compaction, stone columns, in-situ control tests, dewatering, preloading, mechanically stabilized (reinforced) earth.

**CIVE 4310. Storm Water Management. (3 Credits)**

Prerequisite(s): CIVE 3310 and University Advanced Standing

Applies fluid mechanics and hydrology principles to the analysis and design of storm water management facilities. Covers environmental issues related to storm water management. Includes a design component.

Lab access fee of \$45 applies.

**CIVE 4320. Open Channel Flow. (3 Credits)**

Prerequisite(s): CIVE 3320 and University Advanced Standing

Covers analysis of open channel flow systems. Introduces natural and designed channels, steady and unsteady flows, uniform and non-uniform flows and flow transitions. Includes lectures and design projects.

Lab access fee of \$45 applies.

**CIVE 4510. Civil Engineering Seminar. (1 Credit)**

Prerequisite(s): University Advanced Standing

Pre- or Corequisite(s): CIVE 4810

Introduces various civil engineering careers and related industries. Emphasizes the importance of life-long learning and active participation in professional societies and communities through lectures given by practicing engineers using their own experiences. Introduces various engineering codes of ethics. Intended as a culminating seminar for graduating seniors to prepare for their engineering careers.

Lab access fee of \$45 applies.

**CIVE 4610. Water and Wastewater. (3 Credits)**

Prerequisite(s): CIVE 3320 and University Advanced Standing

Introduces municipal water and wastewater treatment and distribution practices. Applies physical, chemical, and biological principles to design and operation of water and wastewater distribution systems.

Lab access fee of \$45 applies.

**CIVE 4810. Civil Engineering Capstone I. (3 Credits)**

Prerequisite(s): University Advanced Standing, Formal Acceptance into Civil Engineering Program, and Department Approval

Serves as a comprehensive two-semester civil engineering design experience with practical constraints. Focuses on applying civil engineering principles and the design process along with economic analysis and project management methods to a real-world project, and present the findings to other engineers and the public. Capstone I and II must be taken in consecutive semesters.

Lab access fee of \$45 applies.

**CIVE 481R. Internship. (1-3 Credits)**

Prerequisite(s): Matriculation to civil engineering program, Instructor Approval, and University Advanced Standing.

Provides opportunities to apply classroom theory while students work as employees in a job that relates to their careers. Students communicate regularly with a coordinator. Credit is determined by the number of hours a student works during the semester and completion of individually set goals.

May apply for up to 3 credits; may be graded as credit/no credit.

**CIVE 4820. Civil Engineering Capstone II. (3 Credits)**

Prerequisite(s): CIVE 4810 and University Advanced Standing

Serves as a second semester of the two-semester design experience from conception to modeling or prototype. Focuses on applying civil engineering principles and the design process along with economic analysis and project management methods to a real-world project, and present the findings to other engineers and the public. Capstone I and II must be taken in consecutive semesters.

Lab access fee of \$45 applies.

**CIVE 490R. Advanced Current Topics in Civil Engineering. (1-3 Credits)**

Prerequisite(s): University Advanced Standing and (Formal Acceptance into the Civil Engineering Program or Department Approval)

Provides exposure to emerging topics and technologies of current interest in civil engineering. Varies each semester depending upon the state of technology. May be repeated for a maximum of 6 credits toward graduation without prior written department approval.

Lab access fee of \$45 applies.

**CIVE 491R. Independent Study in Civil Engineering. (1-3 Credits)**

Prerequisite(s): Prior written Program Chair approval and University Advanced Standing.

Offers independent study including literature review, designed project activities/tasks and reports or presentations as defined and approved in collaboration between the student and the faculty advisor. May be Graded Credit/No Credit. May be repeated for a maximum of 6 credits toward graduation.