

# CIVIL ENGINEERING (CVEN)

## CVEN 2300 Geomatics

This course introduces geomatics, emphasizing surveying methods and technologies for planar measurement, geo-positioning, and mapping in civil engineering. Topics include land surveying techniques, distances, elevations, angles, geodetic datums, coordinate systems, topographic mapping, measurement error theory, and traverse calculations. Students will also learn about modern advancements like GPS and remote sensing while applying Geographic Information Systems (GIS) to civil engineering challenges through spatial analysis and modeling.

Prerequisites: ENGR 1201

## CVEN 3100 Construction Materials Lab

The construction materials laboratory complements the theoretical concepts learned in the associated lecture course by providing hands-on experience in testing and analyzing various construction materials. In this lab, students will engage in practical experiments to assess the physical, mechanical, and chemical properties of materials such as concrete, steel, and asphalt.

Corequisites: CVEN 3300

## CVEN 3120 Geotechnical Engineering Lab

This laboratory course provides hands-on experience in the principles and practices of geotechnical engineering. Students will conduct various experiments to investigate soil properties. Through practical applications, students will learn to analyze soil behavior under different loading conditions and understand the significance of geotechnical data in design and construction projects.

Corequisites: CVEN 3320

## CVEN 3130 Foundations Design Lab

This laboratory course provides practical experience in the principles and methodologies of foundation design. Students will engage in hands-on activities, including site investigation, soil testing, and analysis of bearing capacity. Through a series of experiments and design projects, students will learn to evaluate different foundation types and understand the factors influencing their selection. The lab emphasizes the application of design codes and standards.

Corequisites: CVEN 3330

## CVEN 3300 Construction Materials

This course offers a comprehensive examination of the properties, behavior, and applications of materials used in construction. Students will explore a diverse range of materials, including concrete, steel, and asphalt, focusing on their physical, mechanical, and chemical characteristics. The course will emphasize the relationship between the fundamental structure of materials and their properties, particularly those relevant to civil engineering applications.

Prerequisites: ENGR 2390.

Corequisites: CVEN 3100 and CVEN 3305

## CVEN 3305 Structural Analysis

This course explores the principles and techniques used in the analysis of structures. Students will gain a solid understanding of determinate structures as well as the construction and interpretation of shear and bending moment diagrams. The course will also cover the analysis of simple and compound trusses. Key topics include the construction of influence lines for determinate beams and trusses, deflection analysis of determinate frames and trusses, and an introduction to indeterminate structures.

Prerequisites: ENGR 1304.

Corequisites: CVEN 3300

## CVEN 3310 Hydraulics and Hydrology

This course covers the fundamental concepts, theories, and analytical methods of hydraulics and hydrology, which are essential for understanding water movement and management in both natural and engineered systems. Students will explore topics such as fluid properties, flow dynamics, water flow through pipes and open channels, watershed hydrology, groundwater flow, and urban sewer systems. The course also covers the hydrologic cycle and techniques for water resource assessment and management.

Prerequisites: ENGR 2360 and GEOL 1303

## CVEN 3320 Geotechnical Engineering

This course covers the principles and practices of geotechnical engineering, focusing on how soil and rock materials interact with and affect the performance of structures built on or below the Earth's surface. Key topics include soil classification, index properties, permeability, pore water movement, soil stresses, compressibility, consolidation, settlement, and shear strength. Additionally, the course addresses subsurface exploration techniques, slope stability analysis, and the bearing capacity of foundations.

Prerequisites: GEOL 1303 and GEOL 1103.

Corequisites: CVEN 3120

## CVEN 3330 Foundations Design

This course covers the principles and practices involved in the design of foundations for various structures. Students will study the fundamental concepts of soil mechanics and geotechnical engineering that underpin foundation design, including load-bearing capacity, settlement analysis, and the interaction between soil and structure. Key topics include the types of foundations (shallow and deep), design methodologies, and construction techniques.

Prerequisites: GEOL 1303 and GEOL 1103.

Corequisites: CVEN 3130

## CVEN 3340 Transp. Planning & Design

This course will cover the fundamental principles and methods in planning, design, and operation of transportation systems. In the course, students will explore topics such as driver and vehicle performance capabilities, highway geometric and pavement design principles, and traffic analysis and transportation planning.

Prerequisites: CVEN 2300

## CVEN 4152 Internship in Civil Engr

A directed internship in a public or private organization that aligns with the student's career objectives in civil engineering. Students will apply analytical and technical knowledge acquired in their civil engineering program in a real-world setting, gaining valuable on-the-job training experience. Seminars and training sessions will be held to discuss field experiences from both theoretical and applied perspectives. Performance evaluation will be on a Pass or Fail basis.

Prerequisites: Permission of the instructor

## CVEN 4185 Special Topics in Civil Engr

This course will center around selected topics in an identified area of civil engineering. May be repeated for credit when the topic changes.

Prerequisites: Junior standing or permission of instructor.

## CVEN 4195 Undergraduate Research

This course permits work on a research engineering project. May be repeated twice for credit.

Prerequisites: Junior Standing and Permission of instructor

**CVEN 4199 Directed Study in Civil Engr**

A directed study course focusing on topics selected from contemporary developments in the field of civil engineering. Students will engage in in-depth exploration of current trends, innovations, and challenges within the discipline. May be repeated twice for credit.

Prerequisites: Permission of the instructor

**CVEN 4252 Internship in Civil Engr**

A directed internship in a public or private organization that aligns with the student's career objectives in civil engineering. Students will apply analytical and technical knowledge acquired in their civil engineering program in a real-world setting, gaining valuable on-the-job training experience. Seminars and training sessions will be held to discuss field experiences from both theoretical and applied perspectives. Performance evaluation will be on a Pass or Fail basis.

Prerequisites: Permission of the instructor

**CVEN 4285 Special Topics in Civil Engr**

This course will center around selected topics in an identified area of civil engineering. May be repeated twice for credit when the topic changes.

Prerequisites: Junior standing or permission of instructor.

**CVEN 4295 Undergraduate Research**

This course permits work on a research engineering project.

Prerequisites: Junior Standing and permission of instructor

**CVEN 4299 Directed Study in Civil Engr**

A directed study course focusing on topics selected from contemporary developments in the field of civil engineering. Students will engage in in-depth exploration of current trends, innovations, and challenges within the discipline. May be repeated twice for credit.

Prerequisites: Permission of the instructor

**CVEN 4301 Senior Design I**

This is the first course in the senior design sequence for civil engineering students. The course provides students with the opportunity to design and implement a system, component, or process that addresses specific needs and requirements within various constraints, such as time, budget, materials, and regulatory standards. Students will be expected to develop an iterative and innovative engineering design solution that will be further refined and implemented in CVEN 4390. This course should be taken in the semester prior to enrolling in CVEN 4390. Additionally, students will learn essential project management techniques and gain preparation for civil engineering licensure, focusing on the Fundamentals of Engineering (FE) and Principles and Practice of Engineering (PE) exams.

Prerequisites: ENGL 2311 and Senior Standing

**CVEN 4305 Reinforced Concrete & Steel**

Students in this course can expect to learn about the design of reinforced concrete structures by working stress and strength design concepts theory and design of reinforced concrete beams, slabs, columns, and footings, reinforcement detailing, and design practice. Additionally, students in the course will learn about the design of steel structures, design of flexural members, axially loaded members, and beam-columns.

Prerequisites: CVEN 3305

**CVEN 4310 Environmental Impact Asmnt**

This course provides a comprehensive overview of the principles, processes, and methodologies involved in Environmental Impact Assessment (EIA). Students will learn to evaluate the potential environmental effects of proposed projects and developments. The course emphasizes the importance of sustainable development and the role of EIA in promoting environmentally responsible decision-making in land use, infrastructure, and resource management projects.

Prerequisites: CVEN 3320 and CVEN 3120

**CVEN 4315 Green Buildings**

This course explores the principles and practices of green building design and sustainable architecture. Students will examine the environmental, economic, and social effects of buildings from site selection and construction to operation and decommissioning. Key topics include sustainable materials selection, energy-efficient design strategies, water conservation, indoor environmental quality, and the integration of renewable energy systems. The course will also cover relevant building codes, standards, and certification programs, such as LEED (Leadership in Energy and Environmental Design).

Prerequisites: CVEN 3300, CVEN 3100, and Senior Standing

**CVEN 4320 Construction Management**

This course will introduce the principles of construction, project management, project delivery systems, construction equipment, site layout, project planning, progress measurement, critical path method, resource management, construction safety, quality systems, and modern construction technology.

Prerequisites: CVEN 3305, CVEN 3330, and CVEN 3130

**CVEN 4325 Water and Wastewater Engr**

This course explores the principles and practices involved in the design, analysis, and management of water and wastewater systems. Students will gain a comprehensive understanding of potable water supply and wastewater treatment processes. They will also study various desalination methods, including reverse osmosis and thermal distillation. Additionally, the course will cover the design criteria established by the Texas Commission on Environmental Quality for wastewater treatment plants.

Prerequisites: CHEM 1311, CHEM 1111, and CVEN 3310

**CVEN 4330 Advanced Green Buildings**

This advanced course focuses on the principles and practices of sustainable building design, with an emphasis on LEED (Leadership in Energy and Environmental Design) certification. Students will examine various LEED rating systems to gain a thorough understanding of the certification requirements and processes. The course also prepares students for the LEED Green Associate credential, a foundational certification in the green building industry.

Prerequisites: CVEN 4315

**CVEN 4335 Slopes & Retaining Structures**

This course examines the principles and practices associated with earth slopes and retaining structures. Students will explore essential topics such as soil compaction, seepage, and drainage, focusing on their impact on slope stability and earth pressures. They will also study slope stability theories and considerations for staged construction and rapid drawdown scenarios.

Prerequisites: CVEN 3305 and CVEN 3320 or permission of the instructor

**CVEN 4340 Wastewater Treatment Ops Mgmt**

This course is designed to equip students with the practical skills necessary for the operation and maintenance of wastewater treatment plants. Emphasizing safety practices and procedures, the course provides in-depth coverage of the instrumentation equipment and systems used in these facilities. Students will understand the technical and operational aspects of wastewater management.

Prerequisites: Permission of the instructor

**CVEN 4350 Disaster-Resilient Structures**

This course focuses on the principles and methodologies required for the design of structures that are resilient to natural disasters such as earthquakes, floods, and hurricanes. Students will explore advanced concepts in structural engineering that enhance the durability and safety of buildings and infrastructure in the face of extreme events. The course covers performance-based design, risk assessment, and the integration of innovative materials and technologies to improve structural resilience.

Prerequisites: CVEN 3305 and CVEN 3300



**CVEN 4352 Internship in Civil Engr**

A directed internship in a public or private organization that aligns with the student's career objectives in civil engineering. Students will apply analytical and technical knowledge acquired in their civil engineering program in a real-world setting, gaining valuable on-the-job training experience. Seminars and training sessions will be held to discuss field experiences from both theoretical and applied perspectives. Performance evaluation will be on a Pass or Fail basis. Prerequisites: Permission of the instructor

**CVEN 4385 Special Topics in Civil Engr**

This course will center around selected topics in an identified area of civil engineering. May be repeated twice for credit when topic changes. Prerequisites: Junior standing or permission of instructor.

**CVEN 4390 Senior Design II**

This is the second and final course in the senior design experience for civil engineering students. In this course, students will implement and construct the system, component, or process developed during CVEN 4301. Students are expected to demonstrate their ability to complete their projects within identified constraints, such as budget, time, and regulatory requirements, while adhering to applicable civil engineering standards. Each student will produce a comprehensive technical report and deliver an oral presentation designed for both technical and non-technical audiences, showcasing the documentation of the iterative process involved in their engineered designs. The course will also emphasize essential project management techniques and provide preparation for civil engineering licensure, specifically focusing on the Fundamentals of Engineering (FE) and Principles and Practice of Engineering (PE) exams. Prerequisites: CVEN 4301

**CVEN 4395 Undergraduate Research**

This course permits work on a research engineering project. Prerequisites: Junior Standing and permission of instructor

**CVEN 4399 Directed Study in Civil Engr**

A directed study course focusing on topics selected from contemporary developments in the field of civil engineering. Students will engage in in-depth exploration of current trends, innovations, and challenges within the discipline. Prerequisites: Permission of the instructor