

# CIVIL ENGINEERING (CEEN)

## CEEN 2315 Geomatics and Surveying Engineering

### 3 Semester Credit Hours (3 Lecture Hours)

(3:0) Concepts, principles, and applications of surveying methods and technology for planar measurement, geo-positioning and mapping, and civil engineering project design and management are introduced. Topics include: land surveying methods for field measurement; principles of distances, elevation and angles; geodetic datums and coordinate systems; topographic mapping; basic error theory in measurement and computational adjustments; traverse calculations; introduction to Global Positioning System (GPS). Computational exercises to process, analyze, and adjust survey data will provide practical experience in civil survey design and assessment.

**Prerequisite:** MATH 1316 or 2413.

## CEEN 3320 Geotechnical Engineering I

### 3 Semester Credit Hours (3 Lecture Hours)

(3:0) Geotechnical engineering focuses on how soil supports and affects the performance of structures built on or below the earth's surface. This course will introduce the terminology used in geotechnical engineering and provide a basic understanding of important geotechnical principles and analytic methods. The topics to be covered in this class includes: index soil properties and soil classification; soil permeability and pore water movement; soil stresses; soil compressibility, consolidation and settlement; shear strength of soil; engineering soil properties and measurement.

**Prerequisite:** ENGR 3315 and 3320.

## CEEN 3321 Structural Analysis

### 3 Semester Credit Hours (3 Lecture Hours)

Analysis of statically determinate structures including beams, trusses and arches; methods of determining deflections of structures; influence lines and criteria for moving loads; analysis of statically indeterminate structures including continuous beams, frames and trusses; introduction to structural dynamics; structural engineering design process; design loads according to the ASCE/SEI 7 code; wind and earthquake loads.

**Prerequisite:** ENGR 3320.

## CEEN 3330 GIS for Civil and Environmental Engineering

### 3 Semester Credit Hours (3 Lecture Hours)

(3:0) Introductory design principles presented on the use of geographic information system (GIS) technology for modeling and analysis of civil and environmental engineering systems. Introduction to the integration of geospatial data and analysis for decision making and management for site selection, mitigation, change analysis, modeling and assessment. Topics covered include map projections and georeferencing, vector and raster data models, acquisition and manipulation of data, cartography, current topics, data quality, and basic spatial analysis. The course integrates commercial GIS software (ESRI ArcGIS) for performing engineering analysis and problem solving. Students will participate in both individual software labs and team projects.

**Prerequisite:** COSC 1330 and CEEN 2315.

## CEEN 4302 Remote Sensing

### 3 Semester Credit Hours (3 Lecture Hours)

Provides the foundations to interpret, process, and apply remotely sensed data acquired by satellites and sub-orbital platforms (aircraft, UAVs) for mapping and analysis of our natural and built environment. Principles of electromagnetic energy-matter interaction, remote sensing systems and data characteristics, digital image processing, and information extraction methods will be covered. Included is treatment of: aerial photogrammetry; multispectral, thermal, and hyperspectral sensing; earth observation satellites; radar and lidar; emergent topics. Emphasis will be on their use for geospatial and environmental applications. Offered Fall.

**Prerequisite:** PHYS 2425 and GISC 3300.

## CEEN 4304 Construction Materials Design

### 3 Semester Credit Hours (3 Lecture Hours)

(3:0) The course provides instruction on civil and construction engineering materials used in the construction of highway structures such as pavements, bridges, retaining walls, box culverts, etc. In particular, the course concentrates on the engineering properties of aggregates, metals, portland cement concrete (PCC) and hot-mix asphalt (HMA) as well as the mixture design of PCC and HMA. The course targets those interested in civil engineering or construction engineering and management.

**Prerequisite:** ENGR 3320.

## CEEN 4306 Transportation Engineering

### 3 Semester Credit Hours (3 Lecture Hours)

(3:0) This course will give an introduction to the basic concepts, theory, and practice of transportation engineering as related to planning, design, and operations of the transportation system. The topics to be covered in this class includes: fundamental principles in planning, design and operation of transportation systems; issues and challenges in transportation; driver and vehicle performance capabilities; highway geometric and pavement design principles; traffic analysis and transportation planning.

**Prerequisite:** CEEN 2315.

## CEEN 4310 Water Resources Engineering

### 3 Semester Credit Hours (3 Lecture Hours)

(3:0) This course will give an overview of the basic concepts, analysis methods, and design procedure. The topics to be covered includes: hydraulic processes, hydrological cycle, streamflow prediction, uncertainty analysis, water demands, water distribution systems, reservoir and dams, urban stormwater drainage, and water resources planning and management.

**Prerequisite:** ENGR 3315.

## CEEN 4312 Hydraulics and Hydrology

### 3 Semester Credit Hours (3 Lecture Hours)

(3:0) This course will give an introduction to the basic concepts, theory, and analytic methods of hydraulics and hydrology. The topics to be covered in this class includes: water flow through pipes and pumping systems, water flow through open channels and hydraulic structures, watershed hydrology, and urban sewer systems.

**Prerequisite:** ENGR 3315.

**CEEN 4322 Geotechnical Engineering II – Coastal Environment**

**3 Semester Credit Hours (3 Lecture Hours)**

(3:0) This course introduces key concepts and basic analysis and design techniques in geotechnical engineering for coastal environments. Emphasis is on the interaction between oceanic dynamic processes (waves, currents, tides, and sediment transport) and coastal regions (harbors, structures, beaches and estuaries) and on the engineering approaches necessary to prevent adverse effects caused by this interaction. Geotechnical aspects of coastal engineering projects will include design of traditional structures and exposure to softer coastal engineering techniques.

**Prerequisite:** CEEN 3320.

**CEEN 4323 Structural Steel Design**

**3 Semester Credit Hours (3 Lecture Hours)**

This class will provide students with a solid background on the design of structural steel elements according to the AISC specifications, including tension members, compression members, beams, beam-columns and base plates; design of bolted and welded simple connections; design of bolted eccentric connections; design of bolted and welded partially and fully restrained connections. Hands-on design experience and skills will be gained and learned through problem sets and a comprehensive design project. An understanding of real-world open-ended design issues will be developed.

**Prerequisite:** CEEN 3321 and 4304.

**CEEN 4324 Structural Engineering**

**3 Semester Credit Hours (3 Lecture Hours)**

(3:0) This class will provide students with a solid background on principles of structural engineering. Students will be exposed to the theories and concepts of both concrete and steel design and analysis both at the element and system levels. Hands-on design experience and skills will be gained and learned through problem sets and a comprehensive design project. An understanding of real-world open-ended design issues will be developed.

**Prerequisite:** ENGR 3320 and MATH 3315.

**CEEN 4325 Reinforced Concrete Design**

**3 Semester Credit Hours (3 Lecture Hours)**

This class will provide students with a solid background on the behavior, design, and detailing of reinforced concrete structural members according to the ACI Building Code Requirements subject to axial loads, bending, torsion and shear. Applications include continuous beams and frames. Hands-on design experience and skills will be gained and learned through problem sets and a comprehensive design project. An understanding of real-world open-ended design issues will be developed.

**Prerequisite:** CEEN 3321 and 4304.

**CEEN 4330 Introduction to Bridge and Pavement Engineering**

**3 Semester Credit Hours (3 Lecture Hours)**

(3:0) This course focuses on the materials, technology and procedures used to design and manage road pavements, with reference to the National Roads Authority (NRA) Design Manual for roads and bridges, and guidelines issued by the Department of Transport, Tourism and Sport (DTTS).

**Prerequisite:** CEEN 4304.

**CEEN 4332 Traffic Engineering**

**3 Semester Credit Hours (3 Lecture Hours)**

(3:0) The purpose of this course is to introduce fundamentals of traffic engineering including data collection, analysis, and design. Emphasis is on the safe and efficient operations of roadway intersections. Traffic engineering studies traffic control devices, capacity and level of service analysis of freeways and urban roads. Applications of traffic operations include computer simulation models to the design of isolated intersection and coordinated traffic signal control systems.

**Prerequisite:** CEEN 4306.

**CEEN 4342 Construction Management**

**3 Semester Credit Hours (3 Lecture Hours)**

The course focuses on management techniques to solve the unique problems associated with a construction project. Study of Construction Management functions including Project Management, Cost Management, Time Management, Quality Management, Contract Administration, and Safety Management will be covered. Emphasis is put on the application of each function throughout the project phases.

**Prerequisite:** CEEN 4304.

**CEEN 4396 Directed Independent Study**

**1-3 Semester Credit Hours**

(1-3) Requires a formal proposal of study to be completed in advance of registration, approval of supervising faculty and department chairperson.