Prerequisite: on their use for geospatial and environmental applications. Offered Fall.

Observation satellites; radar and lidar; emergent topics. Emphasis will be on photogrammetry; multispectral, thermal, and hyperspectral sensing; earth extraction methods will be covered. Included is treatment of: aerial and sub-orbital platforms (aircraft, UAVs) for mapping and analysis of our natural and built environment. Information system (GIS) technology for modeling and analysis. Principles of electromagnetic energy-matter interaction. Geotechnical aspects of coastal engineering projects will be covered. 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: ENGR 3315 and 3320.

CEEN 4304 Civil and Construction Materials
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 Principles of 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 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:** CEEN 3320 and MATH 3315.

**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.