

CEIE 100 Environmental Engineering Around the World (3 credits)

Instructor: Mark Houck

Introduces environmental engineering as practiced in different societies around the world. Environmental engineering is broadly defined as organizational and physical infrastructure to manage natural resources. Focuses on how different societies today and in the past have responded to environmental challenges related to engineering opportunities. Issues include construction of large dams to manage river systems; use of forecast climate and weather data to improve agriculture, emergency response, or water supply; collection and treatment of wastewater; public health and pollution control; disposal of waste nuclear materials; and management of significantly polluted sites. (Prerequisite: None) . *This course meets the Mason Core Requirement in GLOBAL UNDERSTANDING.*

CEIE 402 Highway Design and Construction (1.5 credits)

Instructor: Staff Federal Highway Administration

Provides a survey of the tools, techniques, and methods used by the various civil engineering off-campus at disciplines to design and construct highways. Combines lectures, individual readings, and hands-on exposure to the tools and processes used by planning, environment, project management, survey and mapping, preliminary design, geotechnical, pavements, hydraulics, bridge design, PS&E design, materials, and construction. (Prerequisite: Senior CEIE Status). *Note: Course meets off campus at the Federal Highway Administration Eastern Federal Lands Highway Division, Sterling, VA.*

CEIE 499 Water Resources Planning and Design (3 credits)

Instructor: Joseph Mannous

The course is concerned with effective use of water as a manageable natural resource. It begins with instruction on the tools required by water resources managers to make sound decisions in their field. The course assesses current needs for water and the structural (engineered) and non-structural approaches available to meet these needs. Elements of engineering design and the design process are introduced. The bulk of the course is concerned with assessment of the impacts of various water resources development activities on the economic, socio-cultural and ecological sectors of the environment. Methods for conducting tradeoff analyses among the engineered and environmental aspects of projects are developed and applied in a term project. The course makes use of case studies of current water resource projects. (Prerequisites: C or better in CEIE 355 and CEIE 340)

CEIE 490.201 Senior Design: Design-Build Project (3 credits)

Instructors: David Laib and Daniel Novack

The course centers on responding to a Request for Proposal (RFP) to provide design-build services for a project on the Fairfax campus. The class will be divided into project teams that will work together for the duration of the course. During the semester, lectures will focus on a diverse range of activities and topics relevant to the development required in the RFP. Teams will generate designs, estimate costs, and produce schedules for implementing their proposed development plan. The teams will make milestone progress submissions to be evaluated by the instructors during the course. At the end of the semester, the teams will create, submit and present competitive proposals to respond to the specific requirements of the RFP. (Please see catalogue for prerequisites)

CEIE 490.203 Senior Capstone Design Project: Urban Development Design (3 credits)

Instructor: Eric Teitelman

This course will enable students to experience real life engineering problem solving, design, team work, project execution and management. It will involve the design of a new urban roadway called Metro Center Avenue. The roadway will bridge the interstate to provide multi-modal access between the east and west areas of the region's core urban center. The class will emphasize Roadway Engineering, Light Rail Design, Traffic Engineering, Geotechnical and Structural Engineering, Storm Water Engineering, Utilities Engineering, Environmental Review and Permitting, and Landscaping and Architecture. The whole class will function as one project team, with students working within smaller interdisciplinary design groups; Roadway Design, Traffic Engineering, Structural Engineering, and Storm Water Management. Students will develop conceptual design project drawings, project reports, and make a technical presentation. (Please see catalogue for prerequisites)

CEIE 639 Tunneling and Ground Improvement (3 Credits)

Instructors: Chris Woods and Mohamed Younis

This course will serve to provide an introduction and the basics of design for both tunneling and ground improvement, with each component covering half the semester. The tunneling component of the class will introduce students to the fundamentals of underground construction, design considerations, and risk management, and will cover the various tunneling techniques including tunnels, caverns, and cut and cover construction. As ground improvement techniques play an essential role in tunneling, overlap between the subjects will be introduced as applicable. From a ground improvement standpoint, students will be provided with an understanding of both densification-based and reinforcement-based improvement techniques and the basics of designing various systems of each. Specific techniques anticipated to be covered include surcharging, grouting, densification, and rigid inclusions. *This course is open to graduate students.*

CEIE 667 Multi-modal Transportation Systems (3 Credits)

Instructor: Jay Evans

Topical coverage of freight and logistics; non-motorized transportation considerations; and public transit planning. Freight topics include demand and supply modeling concepts; freight flow data sources; and truck size and weight policies. Bicycle and pedestrian planning considering traveler response to facility and policy improvements and identifying common resources for addressing non-motorized project concerns. Public transportation planning coverage including mass transit technology typologies, corridor planning and operations concepts, and finance and public policy issues, including environmental justice. *This course open to graduate students.*

CEIE 690 Coastal Flood Hazards (3 credits)

Instructor: Celso Ferreira

Introduction to the theory and practice of coastal flooding and hazards engineering. Topics include the theory of hurricane storm surges, tides, coastal hydrodynamics, waves and coastal processes. Use of the Surface Water Modeling System (SMS) for coastal flooding analyses. Introduction to High Performance Computing (HPC) modeling of hurricane storm surge. Introduction to Geographic Information Systems (GIS) applications to support coastal flood modeling and hazard analyses. Applications of coastal engineering to support coastal flood mapping and hazard prevention. *This course is open to all graduate students and undergraduate students with senior standing with permission of instructor.*