CEE Course Descriptions for Graduate Courses
Summer 2020

Civil Engineering

CIVL 8310-1 Prestressed Concrete
Materials, principles of prestressing systems; prestressing losses; analytical treatment of the effect of shrinkage, creep of concrete, and cable friction on stresses; analysis and design of statically determinate and indeterminate structures; design codes; research background; introduction to prefabricated concrete structures. (Instructor: Dr. W. Tape)

CIVL 8900-16 Bridge Engineering
Limit state design principles; structural forces within bridge structures; design requirements for prestressed members; relation between code requirements and practical design; CSA requirements for design; code requirements for design and assessment of bridge elements; detailed analysis and design of bridge systems; role of structural engineers and professional ethics responsibility. (Instructor: Dr. W. Tape)

CIVL 8900-21: GIS Data Modeling
This course examines a range of advanced topics that are utilized to analyze and model spatial datasets with emphasis on transportation related problems. Key topics covered include: spatial data management, data representation and integration; data automation & model building; multi-criteria evaluation; site suitability; least-cost path analysis; network analysis; location-allocation problems; spatial statistics methods to explore and model spatial datasets (namely point events, continuous and area data); machine learning and big data analysis. The course follows a problem-solving based approach to study real world data in a GIS environment using contemporary GIS software (e.g. ArcGIS 10.x) (Also offered as ENVE 8900-21) (Instructor: Dr. H. Maoh)

CIVL 8900-33 Advanced Masonry Design
Elements in masonry structures; experimental approach to testing masonry prisms, beams and walls; concept of Ultimate Limit State (ULS); masonry beam and masonry wall design (un-reinforced and reinforced); load stress in different elements of masonry beams and walls; stability in masonry beams and walls; concept of general safety factor; computer software and design of masonry structural elements; basics of fine element modeling; ethical and professional responsibilities of a structural engineer. (Instructor: Dr J. Zohrehheydariha)

CIVL 8900-39 Foundation Engineering

Subsurface exploration, Lateral earth pressure, Braced cuts, Shallow foundations and eccentrically loaded foundations. Settlement of foundations, Raft foundations, and Pile foundations. (Instructor: Dr. W. Polies)

CIVL-8900-41 Structures-Mod Tools/Cdn Codes
This course covers the design of concrete and steel structures using modern software tools (STAAD Pro.). It builds knowledge on of analysis of various structures such as buildings and bridges. Students will gain proficiency in structural conceptualization and induced load determination, modeling and analysis. The course will cover also graphical communication. Approximate method of analyzing frames will be included to interpret and verify the output from computer-based structural analysis software. Students must have a Windows 10 computer with at least 2 GB RAM, 1 GB available hard drive space and dependable internet connection. (Instructor: Dr. W. Polies)

CIVL 8900-45 Sustainability Principles and Practices
See ENVE 8500-1

CIVL 8900-48 Intelligent Transportation Systems
This course will expose you to a range of modeling techniques used to represent the flow of vehicles. The course starts with macroscopic models which approximate vehicles as a continuous fluid; this is a major simplification but yields an elegant theory which has proven useful in practice. More detailed representations of vehicle flow, with brief coverage of vehicle dynamics and driver behavior will be covered. It will explore cellular automata and car-following models which treat vehicles as discrete entities. Then, the course moves toward to the basic concepts of transportation network analysis, as well as explore some applications. Basically, any problem which requires a "big-picture" view of what routes people will take relies on a network model. Basically, any problem which requires a "big-picture" view of what routes people will take relies on a network model. Finally, it will connect the traditional traffic and network models and Connected and Autonomous vehicles (CAVs) technologies to understand the future transportation systems. (Instructor: Dr. Y.H. Kim)

CIVL 8900-50 Building Information Modelling
Practical and theoretical applications of building information modeling (BIM) in civil and environmental engineering projects. Understand BIM standards (e.g., ISO), use BIM software for buildings, and conduct BIM-based analysis (e.g., solar analysis, structural analysis, and energy analysis). Enhance the efficiency of project management with the aid of BIM.
(Instructor: Dr. R. Ruparathna)

Environmental Engineering

ENVE 8500-1 Sustainability Principles and Practices
This course examines the evaluation, design, and management of products, processes, or projects to achieve sustainability. The main topics include assessing and scoping environmental effects from engineering and other technical activities; eco-balance approaches; life cycle assessment; design-for-environment principles; and decision making for environmental and sustainability objectives. The course will discuss typical examples (e.g., automobiles, infrastructure, electronics), and also draw upon the industrial and research experience and knowledge of the class attendees. Class-based projects will focus on understanding, interpreting, and implementing the knowledge acquired. (Also offered as CIVL 8900-45) (Instructor: Dr. E. Tam)

ENVE 8900-1 Air Pollution Modelling
Air quality standards; emission inventory, source estimation; development of transport models; models with chemical reactions. (Instructor: Dr. I. Xu)

ENVE 8900-4 Hydrogeological Engineering
Fundamental physics and properties of groundwater flow in porous geologic material; anisotropy, heterogeneity. Introduction to the theory of groundwater flow; groundwater flow equations and patterns, recharge and discharge, flow nets, aquifer pumping, two-phase flow and well hydraulics. Aquifer development and management. Introduction to chemical hydrogeology and non-aqueous phase liquids, Wellhead protection. Numerical modeling concepts. (Instructor: Dr. T. Bolisetti)

ENVE 8900-21 GIS Data Modeling
See CIVL 8900-21