

## **CEE Graduate Course Descriptions – Summer 2024**

### **GENG-8020: Engineering Project Management**

This course will expose students to principles, concepts, and tools utilized in project management activities. This course will include topics such as defining project scope, and time, cost, risk, procurement and stakeholder management. The students will be engaged in working on a major project to develop proficiency in project management activities and tools. (Open to Masters of Engineering and Masters of Engineering Management students, excluding students in the MEng Auto Program. Open to engineering MAsc/PhD students on permission of the department/faculty as a qualifying course only. Will not count for credit towards MAsc/PhD degree.

Instructor: TBD

### **CIVL-8340: FRP Reinforced Concrete Structure**

Advanced composite materials - constituents and products; structural applications, reinforced concrete members, prestressed concrete members, applications with chopped fibres, repair and rehabilitation; innovative applications.

Instructor: TBD

### **CIVL 8350: Wood Design**

Introduction to structural wood design based on CSA O86 Engineering Design in Wood. Topics include: wood as an engineering material; sawn lumber; structural panels; connections; lateral-load resisting systems; glulam; and cross laminated timber.

Instructor: TBD

### **CIVL 8900-2: Special Topics: Project Planning and Control**

Practical and theoretical applications to aid project planning and control in engineering projects. Understand advanced project management practices (e.g., earned value analysis, financial risk management), decision-making methods (e.g., multi-attribute decision-making methods, decision trees, optimization), and modeling techniques (e.g., Monte Carlo simulation, machine learning). Interpret and provide critical feedback on the intended project planning and control techniques.

Instructor: TBD

### **CIVL 8900-6: Special Topics: Climate Change Adaptation**

This course explores foundational concepts of climate change; global scale, regional scale, and local scale changes; different climate models and the data produced by them; how to determine the time series of climate data for a watershed or a design precipitation for a specific site; hydrological modeling and assessing the impacts on water resources and urban water systems. After the students are exposed to these tools, they will explore adaptation strategies to mitigate the impacts, such as low impact development strategies and other planning/design alternatives. The course will be concluded with an introduction to how the strategies could be applied in the context of a watershed.

(Cross-listed with ENVE 8900-6).

Instructor: TBD

### **CIVL 8900-21: Special Topics: 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., ArcGIS10.x).  
(Cross-listed with ENVE 8900-21).

Instructor: Dr. H. Maoh

**CIVL 8900-33: Special Topics: 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 (unreinforced 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 finite element modeling; ethical and professional responsibilities of a structural engineer.

Instructor: Dr. S. Das

**CIVL-8900-41/41A: Special Topics: Design Str. Using Cdn Codes & Modern Tools**

This course covers the design of concrete and steel structures using modern software tools (STAAD Pro). It builds knowledge on 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: TBD

**CIVL 8900-47: Special Topics: Design, Deterioration & Repair of Concrete**

Design of concrete; normal concrete, high and ultra-high-performance concrete, self-compacting concrete, fibre reinforced cementitious composites, sprayable, and overlay cement based cementitious composites, textile fibre reinforced composites. Curing methods, long term performance, quality assurance (QA) and quality control (QC) of concrete materials. Relevant concrete materials specifications. Types and causes of concrete deterioration; errors during construction, scaling and disintegration, freeze-thaw, corrosion of embedded steel, cracking, shrinkage, chemical attack, alkali-silica reaction, spalling, erosion, effloresces, exposure to fire. Experimental and non-destructive testing. Repair of concrete; repair materials, repair techniques, challenges with conventional repair techniques, patch repair and materials compatibility with existing concrete, horizontal, vertical, and overhead repair methods.

Instructor: TBD

**CIVL 8900-59: Special Topics: Modular Construction, Design, and Technology**

Introduction to modular construction; Types of modular building, Steel, timber, concrete; Planning of modular buildings; Hybrid modular construction systems; Structural design of steel and light steel modules; Structural design of concrete modules; Structural design of timber-framed modules; Cladding, roofing, and balconies in modular construction; Constructional issues in modular systems; Factory production of modules; Service interfaces in modular construction.

Instructor: TBD

**CIVL 8900-98: Special Topics: Sustainable Concrete Materials Systems**

This course explores the multidisciplinary domain of concrete material systems, emphasizing the balance between high-performance requirements and sustainability objectives. It covers the entire spectrum from traditional concrete technology to innovative material design, ensuring that students are equipped with the knowledge to contribute to the development of sustainable infrastructure.

Instructor: Dr. A. Adesina

**ENVE 8500: Sustainability: Principles & 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 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.

Instructor: TBD

**ENVE 8900-4: Special Topics: 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.

(Also offered as ENVE 4820-1)

Instructor: Dr. T. Bolisetti

**ENVE 8900-31: Special Topics: Water Treatment & Reuse**

Conventional water treatment systems. Disinfection requirements, technologies, and by-products. Membrane processes, advanced oxidation processes. Chemicals of emerging concern. Water reuse criteria and applications.

Instructor: TBD

**ENVE 8900-6: Special Topics: Climate Change Adaptation (see CIVL 8900-6)****ENVE 8900-21: Special Topics: GIS Data Modeling (see CIVL 8900-21)**