

CEE Graduate Course Descriptions – Winter 2027

CIVL 8300: Water Pollution Control (see ENVE 8300)

CIVL 8900-7: Special Topics: ITS Methods

This course will explore vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communications, sensing technologies, and transportation applications of connected and autonomous vehicles (CAVs). Students will develop a solid understanding of CAV systems from a transportation perspective. The course aims to deepen students' understanding of emerging CAV technologies and their applications. State-of-the-art theories and methodologies, along with case studies, will be integrated into the curriculum.

Instructor: TBA

CIVL 8900-10: Special Topics: Traffic Operation Control

This course introduces concepts and methods for the analysis of the performance of vehicle traffic and explains how these are applied to operational design of efficient transportation facilities including freeways and signalized/unsignalized intersections. Students will evaluate the impacts of various operational design techniques on traffic performance using mathematical and analytical methods.

Instructor: Dr. C. Lee

CIVL 8900-16: Special Topics: Renewable Energy Systems

The course explores prominent and developing renewable energy technologies in a systems context. Energy systems infrastructure components and architectures are studied including centralized and decentralized grid topologies; select generation, transmission, distribution and storage assets will be examined. The fundamentals of energy markets and grid operations are considered including basic unit commitment dynamics and optimization. Offshore energy and energy storage solutions will be examined. Fundamental wind and solar energy design principles and essential battery, pumped hydro, flywheel and compressed air energy storage design considerations will be evaluated.

(Cross-listed with ENVE 8900-13)

Instructor: Dr. R. Carriveau

CIVL 8900-22: 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: Dr. R. Ruparathna

CIVL 8900-41: Special Topics: Design Structure Using Canadian Codes & Modern Tools

This course focuses on the analysis of various structural systems, including buildings and bridges, using modern industry software (STAAD.Pro), Canadian codes and standards, and professional engineering practices. Students develop proficiency in structural conceptualization, modeling, analysis, and graphical communication. Approximate methods of structural analysis and hand calculations are incorporated to interpret and verify computer-generated results. The course emphasizes critical thinking, problem-solving, and engineering judgment, preparing students to apply structural analysis principles and modern computational tools effectively in professional engineering practice.

Instructor: Dr. W. Polies

CIVL 8900-55: Special Topics: Waste to Energy (see ENVE 8900-55)**CIVL 8900-98: 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

CIVL 8900-99: Pavement Materials, Design and Management

Fundamentals of pavement design, construction, and management for flexible and rigid pavements including pavement materials, application of traditional (Traffic Analysis for Pavement Design (ESAL), Standard Sections (RTAC Guide), AASHTO 93, Asphalt Institute method) and Mechanistic-Empirical pavement design (Pavement Stress and Strain, AASHTOWare Pavement ME Design) approaches, airport pavement design in Canada, introduction to Pavement Management Systems (PMS), sustainability aspects in pavement engineering (Lifecycle Cost Analysis and Lifecycle Assessment).

Instructor: Dr. G. Oyeyi

ENVE 8300: Water Pollution Control

Water quality criteria; methods of wastewater disposal and their effects on ecology; theory and design of different unit operations and processes for water purification; theory and design of different design operations and processes of wastewater treatment; reuse and recycling of wastewater. (3 lecture hours a week.)

(Cross-listed with CIVL 8300)

Instructor: Dr. N. Biswas

ENVE 8340: Environmental Separation Processes

Application of the principles of surface chemistry to separation processes involving phase equilibria, ion exchange, membrane separation, adsorption, absorption, flocculation, spherical agglomeration, sedimentation, filtration, and centrifugation. (3 lecture hours a week.)

Instructor: Dr. A. Asfour

ENVE 8900-13: Special Topics: Renewable Energy Systems (see CIVL 8900-16)**ENVE 8900-55: Special Topics: Waste to Energy**

This course material will focus on producing energy from carbon based waste materials as well as from nuclear waste. Introductory lectures will review global as well as Canada's energy needs. Canadian energy producers and the various consuming sectors will be discussed. The basis for climate change will be reviewed together with air pollution and sustainability. Various energy technologies which will be considered include nuclear, thermochemical (incineration, pyrolysis, gasification) and biochemical (anaerobic bioreactors) conversion. Design examples to be discussed include heat exchangers, a steam turbine, a gasifier, and a bioreactor. Typical design specifications will be reviewed for technologies such as for example a steam turbine, a gasifier and a subsurface/below ground bioreactor. Installing a polyethylene liner and polyethylene gas cover will be discussed for a subsurface/below ground bioreactor. ASME, API, TEMA, CSA and DIN standards will be reviewed for specific technologies.

(Cross-listed with CIVL 8900-55)

Instructor: Dr. J. Lalman