



**UNIVERSITY  
OF ALBERTA**

**2026-2027**

# MASTER OF ENGINEERING

## GEOTECHNICAL ENGINEERING

### WELCOME TO THE **M.ENG. PROGRAM**

The University of Alberta's Master of Engineering (M.Eng.) course-based programs are valuable for engineers at any career stage wishing to enhance their technical, managerial, and leadership skills. Our students learn from some of the top academics in their fields and train in internationally renowned facilities. Students participate in practical Alberta-focused projects that prepare them to demonstrate their skills and knowledge to potential employers.

M.Eng. students have access to the University of Alberta's Engineering Employment Center resources (job postings, workshops, networking opportunities, career fairs) and benefit from a dedicated student coach, who provides communications support.

**DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING**

# M.ENG. PROGRAM INFO

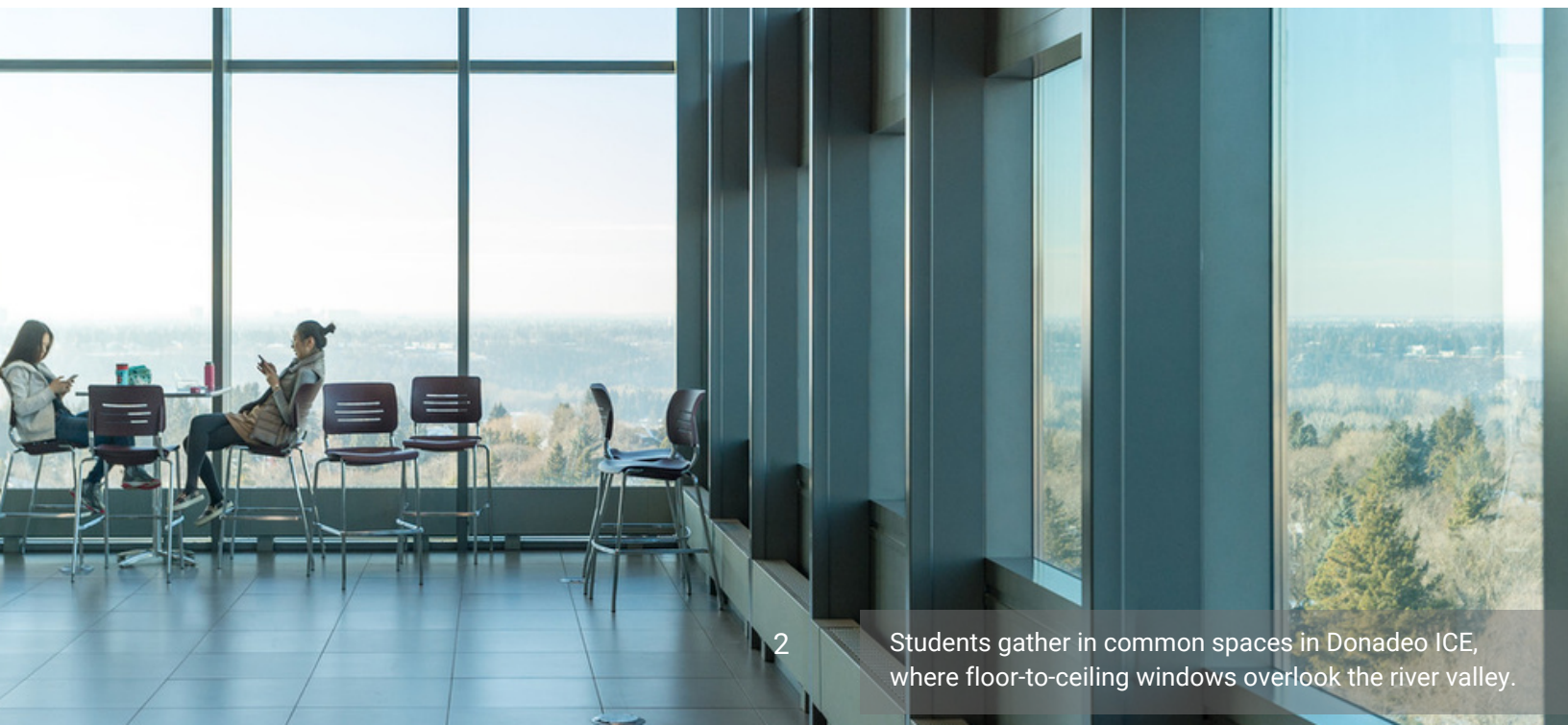
## PROGRAM OBJECTIVES

The M.Eng. Program is designed to prepare students for engineering practice in modern Geotechnical Engineering. It will also equip students with the required knowledge, skills, methods, tools, experience, and professional communication capability to contribute to Civil Engineering industry and society at large.

The program prepares students for engineering practice in modern Geotechnical Engineering, involving areas of design, analysis, inspection, monitoring, and maintenance. It will equip students with the required knowledge, skills, methods, tools, experience, and professional communication capability to contribute to the civil industry and the society.

## LEARNING OUTCOMES

- Gain and apply knowledge of mechanics, analysis, design, and data analytics in engineering practice for a variety of geotechnical structures (e.g., cut slopes, embankments, foundations, dams)
- Understand and follow national or international standards, codes and industry manuals to design safe and economical geotechnical structures and perform ground investigations
- Obtain relevant knowledge about emerging technologies and techniques to manage geotechnical projects in the modern society
- Collaborate effectively with team members on capstone projects and communicate to team members as well as other target audiences
- Develop the foundational knowledge and awareness for life-long learning to continue the professional growth, thus being adaptable to the ever-evolving industry needs
- Understand ethical and professional responsibilities and make informed judgments considering the impact of engineering solutions in global, economic, environmental, and societal contexts





# M.ENG. PROPOSED COURSE SEQUENCE

The length of the program is two years. Students can accelerate the program or prolong it after approval from the M.Eng. Academic Advisor (see program contacts on page 4).

All general electives must be approved by M.Eng. Academic Advisor. Please refer to the Graduate Handbook for full program policies. For more information about graduate courses offered, visit our Grad Program page at <https://civileng-uofa.ca/Grad%20program/>

|                        |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>FALL<br/>2026</b>   | CIV E 680 Engineering Properties of Soils <sup>1</sup><br>CIV E 684 Terrain Analysis <sup>2</sup><br>Engg 700 Technical Communication <sup>3</sup>                                                                                                                                                                                                                                                                               |
| <b>WINTER<br/>2027</b> | CIV E 690 Advanced Foundation Engineering <sup>1</sup><br>CIV E 695 Soil Structures <sup>1</sup><br>One of the following: <ul style="list-style-type: none"> <li>• CIV E 609 Underground Trenchless Construction <sup>3</sup></li> <li>• CIV E 698 Petroleum Geomechanics <sup>2</sup></li> <li>• One elective: any 500-, 600, or 700-level Engineering or Science, as approved by MEng Academic advisor <sup>3</sup></li> </ul> |
| <b>FALL<br/>2027</b>   | CIV E 697 Rock Engineering <sup>2</sup><br>CIV E 664 Solid Mechanics <sup>2</sup><br>One elective: any 500-, 600, or 700-level Engineering or Science, as approved by MEng Academic advisor <sup>3</sup>                                                                                                                                                                                                                         |
| <b>WINTER<br/>2028</b> | CIV E 900 Capstone project (Directed Research)                                                                                                                                                                                                                                                                                                                                                                                   |

1. Core courses; 2. Discipline-related elective; 3. General elective

# STUDENT SUPPORT

## GRADUATE PROGRAM ADVISORS

Trina Catral – 7-387 Donadeo ICE  
Christina Ezekowitz – 7-381 Donadeo ICE  
Arlene Figley – 7-389 Donadeo ICE

Email: [cgradvis@ualberta.ca](mailto:cgradvis@ualberta.ca)

## ASSOCIATE DEAN GRADUATE STUDENTS CEE/MP

Dr. Zaher Hashisho – 7-241 Donadeo ICE  
Email: [ad.ceegrad@ualberta.ca](mailto:ad.ceegrad@ualberta.ca)

## GEOTECHNICAL GRADUATE COORDINATOR

Dr. Gonzalo Zambrano Narvaez – 6-217  
Donadeo ICE  
Email: [gonzalo@ualberta.ca](mailto:gonzalo@ualberta.ca)

## M.ENG. ACADEMIC ADVISOR

Dr. Lijun Deng – 6-261 Donadeo ICE  
Email: [civmeng@ualberta.ca](mailto:civmeng@ualberta.ca)

## STUDENT COACHING SERVICES

The Department of Civil and Environmental Engineering and the School of Mining and Petroleum Engineering are committed to fostering the academic and professional success of its M.Eng. students throughout the duration of their program.

To support this goal, students are offered tailored coaching and development services designed to help them clarify academic and career goals, identify and overcome challenges, and build on their personal and professional strengths. Through one-on-one sessions, group workshops, and targeted resources, students are guided in navigating the complexities of graduate studies, enhancing their communication and leadership skills, and preparing for success in the Canadian and global engineering workforce.

These services aim to empower students to take ownership of their academic journey, grow with confidence, and transition effectively into professional roles upon graduation.



# WELCOME HOME

Edmonton is Alberta's capital city and is one of the sunniest cities in Canada with an average of 2,300 hours of sunshine per year. The river valley that winds through the city has more than 160 kilometres of maintained pathways and 20 major parks.

## HOUSING

You may choose from many housing options for students, both on campus and around Edmonton. [International Student Services](#) has online resources for finding a place to live, including temporary accommodations when you first arrive.



### EXCEPTIONAL PUBLIC SCHOOLS

Our Kindergarten through grade 12 public school system is one of the best in Canada. Alberta's students rank No. 2 in the world for reading and science and in the top 12 for math.



### UNIVERSAL HEALTH CARE

[Alberta Health Services](#) provides health care to all Albertans in hospitals, at the doctor's office, and on the Internet. 811 is a telephone service providing free 24/7 nurse advice and general health information for Albertans.

## COMMUNITY

More 150 neighbourhood community leagues provide plenty of opportunities to participate in social and recreational activities and get to know your neighbours.

Plus farmers' markets offer small agricultural producers the opportunity to sell fresh produce, including meat and vegetables that are grown in the Edmonton area. The city supports community gardens for those who want to grow their own food but need the space to do it.



### TRANSPORTATION BUS, BIKE, TRAIN

Public transit buses and Light Rail Transit (LRT) connect the city along with well-maintained bike lanes and paths.

Maps, schedules and fare info at: [edmonton.ca/edmonton-transit-system-ets](http://edmonton.ca/edmonton-transit-system-ets)

# WORKING IN CANADA

## INTERNATIONAL STUDENT SERVICES

International Student & Visitor Services (ISVS) provides programs, services and events for U of A international students. Their team of licensed immigration consultants and student advisors supports international students with adjusting to living in Edmonton, immigration and additional support to help international students succeed at the U of A.

You can book time with their team of licensed immigration consultants, who can assist you with study permits and extensions, immigration, and working in Canada. Drop-in appointments are available Monday, Tuesday, and Friday (9 am -12 pm & 1–3 pm) by visiting the International Services Centre (142 Telus Centre) or book an appointment online at: [ualberta.ca/international/about-uai/contact-us/international-services-centre](http://ualberta.ca/international/about-uai/contact-us/international-services-centre)

## POST GRADUATION WORK PERMIT

The Post-Graduation Work Permit Program (PGWPP) allows students who have graduated from eligible Canadian designated learning institutions (DLIs) to obtain an open work permit to gain valuable Canadian work experience. Our program also provides academic credentials that are recognized by Alberta licensing organization (APEGA) for students with an undergraduate program in a foreign engineering program.

To work in Canada after you graduate, you must apply for a work permit under the Post-Graduation Work Permit Program (PGWPP). Check the University's ISVS and the Government of Canada websites for more information about the post-graduation work permit program.

Our program's learning outcomes are in line with Engineers Canada competencies and professional development hours count towards yearly professional requirements.

## UNIVERSITY OF ALBERTA RANKINGS

|                                        | WORLD          | CANADA   |
|----------------------------------------|----------------|----------|
| ACADEMIC RANKING OF WORLD UNIVERSITIES | <b>101-150</b> | <b>5</b> |
| QUACQUARELLI SYMONDS                   | <b>96</b>      | <b>4</b> |
| TIMES HIGHER EDUCATION                 | <b>116</b>     | <b>5</b> |



# LET'S TALK

**SAVE THE DATE:**

**OUR ANNUAL INDUSTRY MIXER HAS BEEN SCHEDULED FOR FEBRUARY 2ND, 2027.**

## INDUSTRY NETWORKING MIXER

**Academic knowledge is only part of the equation when preparing students for the workforce. Therefore, we commit to helping our students develop communication skills and professional networks.**

Since February 2023, the Department of Civil and Environmental Engineering and the School of Mining and Petroleum Engineering at the University of Alberta have hosted an annual networking mixer to support the professional development of Master of Engineering (MEng) students. This initiative is part of a broader program designed to enhance students' communication skills and prepare them for successful careers in engineering.

The three-hour event features guest speakers, professional networking opportunities, and a catered reception. This year, the event will be held in the heart of downtown Edmonton, at the Art Gallery of Alberta.

Distinguished University of Alberta engineering alumni deliver keynote presentations, sharing insights from their professional journeys. Their talks often emphasize practical advice on career growth, lifelong learning, and the value of hands-on experience. A common and compelling theme across all events has been the critical role of effective communication in engineering practice.

To help students maximize the value of this experience, a preparatory networking skills workshop is conducted in advance. This training session covers key topics such as professional attire, networking etiquette, initiating and sustaining conversations, making strong introductions, and post-event follow-up strategies.

Together, the mixer and its preparatory workshop form a vital component of our commitment to supporting graduate students as they develop into well-rounded, professionally prepared engineers in Canada.

## BENEFITS OF NETWORKING

**Career opportunities** Networking allows students to connect with potential employers, learn about job opportunities, and gain insights into the engineering profession.

**Industry insights** By connecting with professionals in their field, students can stay up-to-date with industry news and developments, helping them make informed career decisions.

**Mentorship** Networking provides students with the opportunity to connect with experienced professionals who can offer guidance and support as they navigate their career path.

**Collaboration** Working with others can help graduate students develop new skills, gain experience, and expand their engineering knowledge.

**Personal development** Networking helps students develop essential skills such as communication, teamwork, and interpersonal competence. By attending events, meeting new people, and building relationships, students develop confidence and expand their professional network.



Grad students Aisha Elgarhy, Veronica Wambura, and Syeda Narmeen Zehra at the networking mixer.

Photo: Heather Egger

## APEGA PROFESSIONAL DEVELOPMENT SERIES

In collaboration with the Association of Professional Engineers and Geoscientists of Alberta (APEGA) and the [U of A Career Centre](#), our department offers a series of sessions to equip students with the professional tools, knowledge, and confidence they need to thrive after graduation and successfully transition into professional roles. We also provide students with access to job fairs, networking events, and other professional development opportunities to help them build relationships and make valuable industry connections.

**A range of workshops are offered (in-person and online) which cover topics including:**

- APEGA's Work Readiness Program
- Post-program Insights from a Graduate
- Upgrading your Resume
- Rapid Resume Review
- How to Have a Great Interview
- Mock Interviews
- Intercultural Competency
- Personal Branding
- Leveraging LinkedIn
- Mixer Preparation and Networking skills
- APEGA Requirements for Registration
- Breaking Down Job Postings
- Flourishing in the Workplace

**A minimum attendance of 8 distinct sessions** (over the duration of the program) is a graduation requirement for MEng students in CEE+MP. Some students may be eligible for an exemption. MEng Students will be automatically enrolled.

**PD CREDIT:** Students who attend a session AND complete the corresponding mini quiz will receive 1 hr of PD credit (per session). QUIZ + PD Credit component is **OPTIONAL**. The mini quizzes are not part of the graduation requirement.

### About the Career Centre

The Career Centre is the source for career and employment information and expertise at the University of Alberta. We strive to empower the talented people of the U of A in developing the skills, knowledge, experiences, and connections they need to confidently manage their careers.

### About APEGA

Created on April 10, 1920, the Association of Professional Engineers and Geoscientists of Alberta (APEGA) regulates the practices of engineering and geoscience in Alberta on behalf of the Government of Alberta through the Engineering and Geoscience Professions Act. They are the largest regulator of self-regulated professionals in Western Canada. Their main regulatory function is licensing individuals and companies that want to practise engineering and geoscience in Alberta. Applicants and companies that meet APEGA's standards for ethical, professional, and technical competency earn the right to practise and use reserved titles and designations.

# CREATIVITY THROUGH COLLABORATION

## M.ENG. DESIGN CAPSTONE

The Capstone course encourages teamwork and problem-solving skills, equipping students for success as they transition from academia to industry.

Our Capstone design-build course offers MEng in Structural and Construction Engineering a unique, hands-on learning experience under the guidance of experienced industry professionals. Through this course, students form interdisciplinary teams and engage with real-world challenges that reflect the complexity and dynamics of professional engineering projects.

Throughout the term, students assume roles similar to those of contractors and consultants, navigating technical, logistical, and collaborative aspects of project delivery. The weekly three-hour sessions combine lectures on essential topics—including design thinking, quality and risk management, sustainability, and professional communication—with dedicated time for team collaboration. Emphasis is placed on developing the ability to communicate technical concepts to non-technical audiences, a skill critical to success in the workplace.

For example, in Winter 2024, the final project involved preparing comprehensive proposals for installing a solar array over the iconic Butterdome. This was not a hypothetical assignment—the request for proposals (RFP) was developed in consultation with the University of Alberta’s Project Management Office, presenting a genuine opportunity for students to influence potential implementation on campus. Student feedback underscores the course’s real-world relevance and educational value:

*“The guest speakers were especially beneficial. They shared real-world experiences and showcased their projects, which helped us apply these processes to our own projects.”*

— Goldy Thevaruparambil Raju

*“The collaboration in this course provided a rich learning environment and equipped me with valuable skills in working with construction engineers. It was truly enlightening to witness how our diverse perspectives complemented each other, leading to more comprehensive project outcomes.”*

— Belal Abdelbaky Elshal, Structural Engineering

This course exemplifies our commitment to providing MEng students with applied, interdisciplinary learning experiences that prepare them for the challenges and expectations of the engineering profession.



M.Eng. Capstone Class Winter 2024

## ADVANTAGES OF CAPSTONE DESIGN COURSE AND WORKING AS A TEAM

- **Diverse Perspectives:** Teams consist of individuals with different backgrounds, skills, and experiences, fostering creativity and innovation through unique viewpoints in problem-solving. Additionally, the course is designed with a well-defined timeline, ensuring everyone stays on track while contributing to the collective goals.
- **Division of Tasks:** Tasks are divided among team members based on their strengths and expertise, increasing efficiency and productivity. With clearly defined expectations and problem formulations, individuals can focus on their areas of strength, leading to better outcomes and effective time management.
- **Support and Collaboration:** Team members provide mutual support, share knowledge, and collaborate, leading to better decision-making and problem-solving as ideas are discussed collectively. The structured timeline and clear milestones further enhance collaboration, ensuring the team progresses cohesively toward the final goal.
- **Learning Opportunities:** Teamwork offers a chance to learn from others through acquiring new skills or understanding different approaches. A clear problem formulation helps guide this learning process, allowing individuals to focus on tackling well-defined challenges efficiently and effectively.
- **Personal Growth:** Working in a team enhances interpersonal skills such as communication, collaboration, and conflict resolution, which are valuable both personally and professionally. Additionally, a well-structured course timeline helps individuals practice and improve time management and goal-setting skills, further contributing to their professional development.

# COURSE INFO

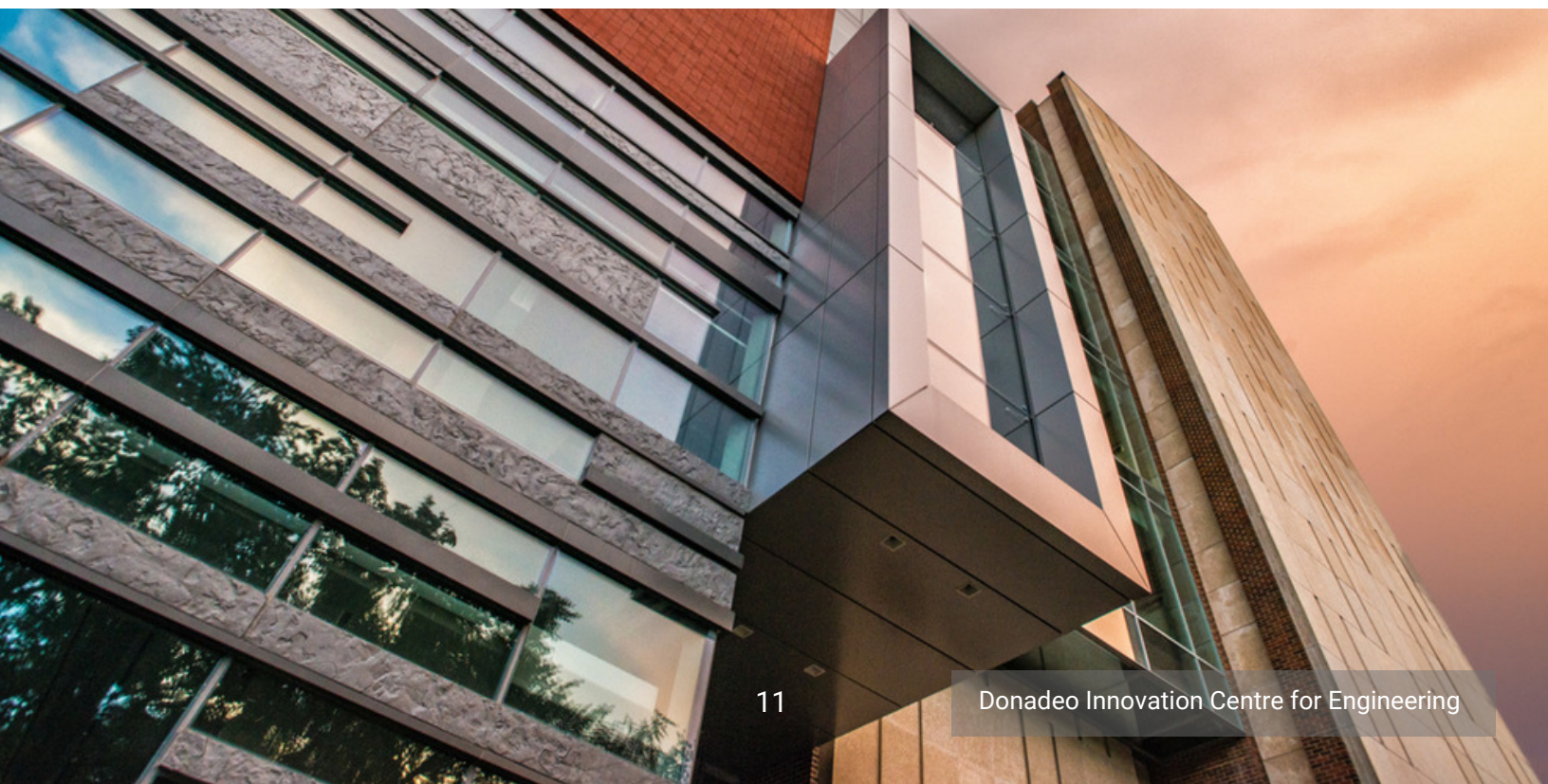
## CIV E 609 UNDERGROUND TRENCHLESS CONSTRUCTION

### COURSE OBJECTIVES

Introduction to underground pipeline infrastructure. Focus on pipeline condition assessment. New construction such as horizontal directional drilling, pilot tube microtunneling, pipe bursting, and pipe jacking. Rehabilitation methods such as cured in place pipe lining, geotechnical consideration. Risk considerations for underground projects.

### LEARNING OUTCOMES

- Understand the underground infrastructure and learn about the complexities of the utility system
- Learn about different underground trenchless construction methods and the advantages and disadvantages of each method
- Design a new pipe installation method using Horizontal Directional Drilling (HDD) from a desktop study to complete the design stage and learn all aspects of the construction phase
- Design a rehabilitation method using Cured In Place Pipe (CIPP) method and identify all details required for the lining of a pipe
- Get a comprehensive skill with respect to reading and understanding ground conditions and identifying the right technology for the proposed utility line



# COURSE INFO

## CIV E 680 ENGINEERING PROPERTIES OF SOILS

### COURSE OBJECTIVES

Principle of effective stress, clay-water systems, soil compressibility and theories of consolidation. Pore pressure parameters. Strength of granular and cohesive media. Anisotropy of soils. Laboratory measurement of strength and deformation properties. Stress-strain relations.

### LEARNING OUTCOMES

- Develop an understanding of the impact of soil composition and clay mineralogy on the mechanical behaviours of soils
- Develop an advanced understanding of the concept and importance of effective stress
- Be able to calculate and plot the total and effective stress paths of common soil testing methods. And the basis for deriving these paths for other conditions
- Identify the meaning of the concepts of yield, strength and critical state and relate this to observed soil responses to triaxial testing
- To apply elastic-plastic models (example: Cam Clay) to represent elastic and plastic deformation of soil in both shear and volumetric strain and to evaluate the effect of the soil's pore pressure response to loading during undrained or partially drained conditions

## CIV E 681 SEEPAGE AND DRAINAGE

### COURSE OBJECTIVES

Elements of hydrogeology; regional groundwater flow, borehole logging methods. Theory of groundwater flow through soils and rocks, permeability, Darcy's law, field governing equations and their solution by approximate methods, finite difference and finite element methods, unsaturated flow. Civil engineering applications, seepage in earth structures, design of dewatering systems for excavations and slopes, field testing, grouting.

### LEARNING OUTCOMES

- Understand the nature of groundwater flow
- Analyze and quantify seepage through porous media
- Design for the influence of seepage on engineering projects
- Design seepage control methods.
- Understand seepage in rocks and contaminant transport

# COURSE INFO

## CIV E 682 ENVIRONMENTAL GEOTECHNICS

### COURSE OBJECTIVES

Environmental laws and regulatory processes; geotechnical characterization for environmental problems; transfer processes; concepts in thermodynamic equilibrium chemistry; geochemical processes in groundwater and mineral-water-atmosphere interaction; geotechnical and geochemical aspects of mine waste management.

### LEARNING OUTCOMES

- Understand and apply management practices that protect the geoenvironment from deleterious and adverse stressor impacts generated from sources associated with the efforts in support of the needs of humans. Specific objectives and topics include
- Understand the physical and chemical stressors imposed by mining resource extraction on the geoenvironment
- Understand the regulatory environment pertaining to mine waste management
- Apply the fundamental principles and theories of geotechnical engineering and geomechanics for sustainable management of mine waste
- Understand the fundamental principles and theories of geochemistry for sustainable management of mine waste

## CIV E 683 SITE INVESTIGATION PRACTICE

### COURSE OBJECTIVES

Techniques of site investigation for geotechnical engineering, in situ testing, instrumentation for field performance studies, case histories covering both rock and soil applications.

### LEARNING OUTCOMES

- Plan, review and criticize geotechnical site investigations for a variety of geotechnical projects, with the aim of developing adequate geotechnical models
- Select the most appropriate methods for sub-surface investigation, testing, and sampling, in light of the required level of detail for the project (conceptual, feasibility, detail design, etc.)
- Identify the needs for adopting geophysical and remote sensing techniques, as well as knowing the advantages these techniques bring in terms of enhanced density of information and potential cost-reduction for increased design confidence; and their limitations
- Plan, review and criticize geotechnical monitoring requirements, instrumentation selected and frequency; to monitor for deformations and pore water pressures and with some discussions of stress and load measurements
- Understand the site investigation requirements for geo-environmental investigations

# COURSE INFO

CIV E 684

## ENGINEERING GEOLOGY AND TERRAIN ANALYSIS

### COURSE OBJECTIVES

Information sources in engineering geology and terrain analysis, elements of the geology of sediments and glacial geology. Glacial and periglacial land forms. Photogeology and airphoto interpretation applied to geotechnical engineering. Case histories based on specific materials and regional problems.

### LEARNING OUTCOMES

- Recognize and identify virtually all the significant terrain types and landforms found in Canada
- Understand and describe the geomorphology and landforming processes active in Canadian landscapes
- Understand and apply the basic principles of terrain evaluation using aerial photographs
- Predict and estimate the engineering properties of surface soils on the basis of aerial photographs
- Design, optimize and plan comprehensive field investigations and drilling programs with aerial photos
- Complete conceptual level engineering designs for large engineering projects such as river crossings, dams and waste repositories using aerial photos
- Complete route location and associated risk analysis for major infrastructure projects such as railways, pipelines, power lines with aerial photos

CIV E 690

## ADVANCED FOUNDATION ENGINEERING

### COURSE OBJECTIVES

Theories of lateral pressures. Limit equilibrium methods, elasticity methods, semi-empirical methods. Soil anchors. Design of retaining walls and strutted excavations. Bearing capacity of shallow and deep foundations. Allowable settlement of structures. Analysis of settlement of shallow and deep foundations. Behavior of pile groups. Design problems in foundation engineering.

### LEARNING OUTCOMES

- Select insitu investigation methods including SPT and CPT and interpret engineering parameters for design purpose
- Design shallow foundations using the principle of ultimate limit states; be familiar with the foundation design manuals in Canada
- Design single deep foundations and pile groups for the axial and lateral limit states using the manuals in Canada; understand the piling practice and pile test methods
- Calculate earth pressures for design purpose; select and design earth retaining systems of various types and the structures for deep excavation support; be familiar with the manuals
- Understand the functions of geosynthetics; design for internal and external stability of mechanically-stabilized earth walls and slopes; select and design geosynthetics for drainage purpose

# COURSE INFO

## CIV E 695 SOIL STRUCTURES

### COURSE OBJECTIVES

Stresses in slopes. Limit equilibrium methods of analysis. Landslides in soil. Design of earth dams and embankments. Case histories of earth and rockfill dams. Dam foundations. Soft ground tunnelling.

### LEARNING OUTCOMES

- Develop an understanding of the physical meaning of limit equilibrium analyses for evaluating slope stability and the underlying calculations, assumptions and implications associated with common methods of limit equilibrium analyses
- Conduct and critically review limit equilibrium analyses of slopes, and evaluate Factors of Safety
- Develop an understanding of the physical meaning of shear strength reduction methods for evaluating slope stability and the underlying calculations, assumptions and implications associated with these methods
- Conduct and critically review shear strength reduction analyses of slopes, and evaluate Factors of Safety
- Develop an understanding of the impacts of soil type and settings on evaluating the Factors of Safety
- Identify the setting for stability analyses applicable to dams and the design and construction methods employed to improve the survivability and serviceability of final structures



# COURSE INFO

## CIV E 697 ROCK ENGINEERING

### COURSE OBJECTIVES

Elements of structural geology, analysis of the geometry of rock defects, properties of intact rocks. Properties of rock masses and stresses in rock masses, stability of rock slopes. Rock foundations and underground excavations in rock. Case studies.

### LEARNING OUTCOMES

- Describe key geological features and rock properties relevant to engineering applications and understand the significance of in-situ stress in rock masses
- Compare continuum and discontinuum concepts in rock engineering analyses and apply concepts of energy and stress to rock fracturing
- Provide geotechnical descriptions of rock discontinuities and assess their shear strength
- Apply the Geological Strength Index (GSI), the Hoek-Brown criterion, and the Cohesion Weakening Friction Strengthening (CWFS) model to evaluate rock mass strength
- Employ empirical rock mass classification systems such as Q and RMR, calculate the modulus of rock masses, and understand its significance in engineering design
- Comprehend the concepts of Discrete Fracture Network (DFN) and Synthetic Rock Mass models and their applications, as well as analyze the interplay of thermal, hydraulic, and mechanical processes in rock masses for engineering purposes

## CIV E 698 PETROLEUM GEOMECHANICS

### COURSE OBJECTIVES

Application geotechnical engineering principles to petroleum engineering problems. Principles of thermo-poroelasticity are reviewed. Borehole stability, hydraulic fracturing, subsidence/heave, sand production, formation damage and reservoir-geomechanical modelling are the major topics for the course. Special attention is given to geomechanical influences on reservoir flow processes.

### LEARNING OUTCOMES

- Gain a solid knowledge of geomechanical principles and their applications in subsurface energy industries
- Understand in situ stress and pore pressure predictions, mechanical earth models, poroelasticity, and wellbore stability
- Gain some knowledge of hydraulic fracturing, multiphase flow mechanics, unconventional developments, and practical applications of geomechanics

# COURSE INFO

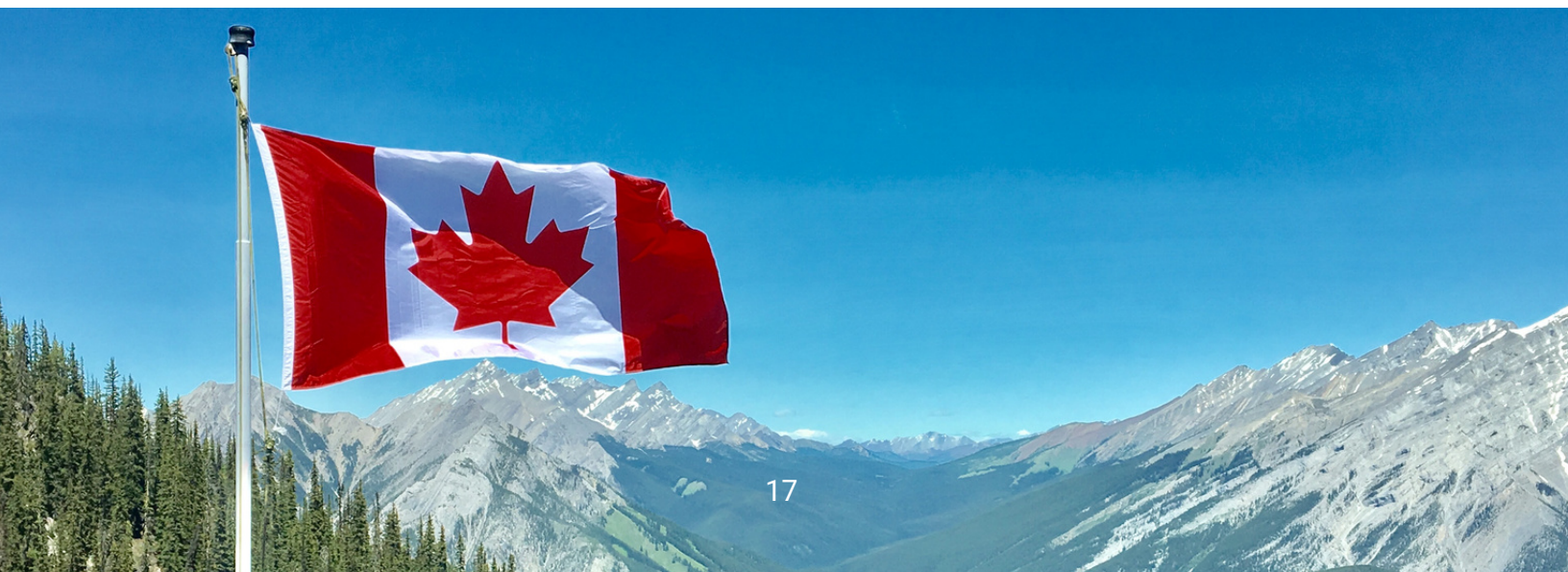
## CIV E 789 RISK ENGINEERING

### COURSE OBJECTIVES

Risk management fundamentals; Safety Management Systems in Engineering design, construction and operation; Incident investigations; Root Cause Analyses; Bow Tie analyses; Management of residual risks.

### LEARNING OUTCOMES

- Build skills, competencies, and capabilities in risk management principles and tools through application of the incident investigation and root cause analysis work processes in both process (technical) safety and occupational safety risk management
- Appraise the safety culture of an organization and obtain skills to positively influence the safety culture of an organization towards improving or sustaining the safety performance
- Apply several leadership tools to evaluate workplace conditions and practices and recommend management system improvements
- Apply a set of incident investigation and root cause analysis tools to historical loss incidents; adapt those tools to a variety of engineering contexts; link latent causes to management system elements; and recommend management actions to improve the safety performance of an organization
- Explain relevant portions of Alberta's Occupational Health and Safety Code and the Engineering and Geoscience Professions Act in relation to due diligence and the application of risk management principles within the practice of professional engineering
- Apply risk management tools to evaluate and mitigate risk from a loss incident or relevant aspect of graduate studies research work
- Undertake an incident investigation and perform a root cause analysis on a loss incident
- Develop and present a term paper critiquing a loss incident with respect to RME weaknesses and provide recommendations for eliminating latent causes



# COURSE INFO

## ENGG 700 TECHNICAL AND PROFESSIONAL COMMUNICATION

### COURSE OBJECTIVES

Engineers spend much of their professional lives communicating—working with colleagues, leading teams, negotiating ideas, presenting recommendations, engaging stakeholders, and producing technical documents that inform important decisions. This course develops the communication competencies required for professional engineering practice. Students will explore interpersonal, team, and organizational communication alongside written, visual, and oral communication in engineering contexts. Topics include communication strategies for collaboration and leadership, giving and receiving feedback, conflict management, communicating with diverse audiences, presentations, visual communication, professional identity, ethical and inclusive communication, and the effective use of AI to support engineering communication.

### LEARNING OUTCOMES

- Analyze and adapt communication strategies to suit different audiences, occasions, and purposes across interpersonal, organizational, and professional contexts.
- Explain and demonstrate concepts such as impression management, disclosure, perception, listening, conflict resolution, and relational maintenance in diverse interpersonal scenarios.
- Apply communication strategies for professionalism, ethical awareness, boundary setting, and workplace messaging, including email, instant messaging, social media, and internal communications.
- Develop and present engaging, audience-centered speeches using appropriate delivery methods, anxiety management techniques, and verbal and nonverbal strategies.
- Compose resumes and related documents (e.g., cover letters, thank you notes) that reflect audience needs, professional tone, and job-specific language and achievements.
- Write technical and business communication documents (e.g., reports, proposals, instructions) using appropriate formats, tone, style, and structure, while integrating feedback and revision practices.
- Design documents and presentations that combine clear prose with meaningful, ethically constructed visuals to effectively convey data and technical content.
- Demonstrate understanding of rhetorical situation, genre conventions, and audience expectations to shape message content, organization, and tone.
- Participate in group and team projects using appropriate interpersonal and organizational communication strategies, including leadership, feedback, and consensus-building techniques.
- Assess your own communication strengths and challenges, recognize the role of identity and culture in communication, and implement strategies for ongoing personal and professional growth.

# COURSE INFO

## CIV E 900 CAPSTONE DIRECTED RESEARCH PROJECT **GEOTECHNICAL SECTION**

The Department of Civil and Environmental Engineering offers the Capstone project course to M.Eng. students in the Geotechnical Engineering stream.

Students will complete directed research projects as part of this course using the knowledge they have gained throughout their undergraduate and graduate program.

Please see the M.Eng. Academic Advisor for information about the directed research project.

# NOTES

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