



**UNIVERSITY
OF ALBERTA**

2023-2024

MASTER OF ENGINEERING

MINING 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 equip students with advanced knowledge, skills, and practical expertise in Mining Engineering. It aims to develop professionals who tackle the industry's complex challenges and emerging trends, particularly in geostatistics, mine design, mine planning, and production scheduling. The program also provides students with the necessary knowledge, skills, tools, and experience to contribute to the mining engineering industry and society.

LEARNING OUTCOMES

- Develop advanced knowledge and skills in mining engineering principles, practices, and technologies to effectively plan, design, and manage mining operations in a safe, efficient, and environmentally sustainable manner
- Implement necessary tools and techniques to analyze complex mining problems using computer-based models, simulations, and data analysis methods
- Collaborate effectively with team members on capstone projects and communicate effectively with team members and other target audiences.
- Develop the foundational knowledge and awareness for life-long learning to continue 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.



Students gather in common spaces in Donadeo ICE, where floor-to-ceiling windows overlook the river valley.



M.ENG. PROPOSED COURSE SEQUENCE

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

Please refer to the Department's Graduate Handbook for full program policies.

FALL
2023

MIN E 610 (Principles of Mining Engineering)
MIN E 612 (Principles of Geostatistics)
CIV E 789 (Writing/Comm for Engineers)

WINTER
2024

MIN E 613 (Non-Parametric & Multivariate
Geostatistics)
MIN E 620 (Rock Mechanics)
MIN E 641 (Discrete-event Simulation)

FALL
2024

MIN E 614 (Risk Management with Geostatistics)
or elective (as below)
Plus two 500/600/700 level Engineering or Science
electives, **as approved by the MEng Academic
Advisor**

WINTER
2025

MIN E 900 Capstone project (Directed Research –
Mining section)

STUDENT SUPPORT

GRADUATE PROGRAM ADVISORS

Trina Catral – 7-387 Donadeo ICE
Christina Ezekowitz – 7-381 Donadeo ICE
Arlene Figley – 7-389 Donadeo ICE
Ellie Kim – 7-385 Donadeo ICE

Email: cgradvis@ualberta.ca

ASSOCIATE DEAN GRADUATE STUDENTS CEE/MP

Dr. Zaher Hashisho – 7-241 Donadeo ICE
Email: ad.ceegrad@ualberta.ca

MINING GRADUATE COORDINATOR

Dr. Yashar Pourrahimian – 6-243 Donadeo ICE
Email: yashar.pourrahimian@ualberta.ca

M.ENG. ACADEMIC ADVISOR

Dr. Yuntong (Amy) She – 7-259 Donadeo ICE
Email: civmeng@ualberta.ca

STUDENT COACHING SERVICES

The Department of Civil and Environmental Engineering is committed to supporting its M.Eng. students as they move through the program.

Students will be provided career and professional development supports throughout their program to aid them in developing their academic and career goals, recognizing and addressing challenges, and building upon their personal strengths to move past their limitations.

Dr. Robyn Braun will support students with their various writing projects and serve as instructor for the communications course. Dr. Braun will also serve as an additional resource and support for students as they navigate the program, the University, and the city of Edmonton.

Contact Dr. Braun at: robyn4@ualberta.ca

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 to Friday (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

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 inline with Engineers Canada competencies and professional development hours count towards yearly professional requirements.

UNIVERSITY OF ALBERTA RANKINGS

	WORLD	CANADA
ACADEMIC RANKING OF WORLD UNIVERSITIES	91	4
QUACQUARELLI SYMONDS	111	4
TIMES HIGHER EDUCATION	118	6



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



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.

In February 2023, the Department of Civil and Environmental Engineering and the School of Mining and Petroleum hosted a networking mixer for our Master of Engineering students. The mixer was part of an ongoing program to support grad students by providing communications training and professional development opportunities.

The mixer, held at the prestigious Royal Glenora Club in Edmonton's River Valley, brought together about 100 grad students and more than a dozen industry representatives for three hours of speakers, professional networking, and delicious food.

Structural engineer at DIALOG and UofA graduate Cam Franchuk gave an inspirational talk reflecting on what he's learned over his 21 years as an engineer. He gave practical advice about lifelong learning and getting your boots muddy, but a recurrent and appropriate overarching theme was the importance of communication. After his presentation, each industry representative came to the podium to introduce themselves, their company, and their work. The last part of the evening was dedicated to mingling and conversation between industry professionals and students.

Our students prepared for the event with a mock mixer training workshop earlier in the week. Dr. Robyn Braun, the Department's Instructor of Communications, and consultants from WorkSpark covered professional dress, conversation starters, handshakes, introducing yourself, and following up after the event.

The mixer and preparation workshop are just part of the support we provide graduate students to help them develop as professional engineers in Canada.



M.Sc. students Aisha Elgarhy, Veronica Wambura, and Syeda Narmeen Zehra at the graduate networking mixer.
Photo: Heather Egger

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.

Our department supports students with opportunities to develop professional communication skills and access to career resources.

We support our students in developing effective communication, teamwork, and adaptability through industry networking events, experiential learning opportunities, and professional development.

Through our professional development and communications support team, we help students develop their resumes, practice interviewing skills, and connect with potential employers. 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.

INSTRUCTOR OF COMMUNICATIONS

Dr. Robyn Braun – 7-240 Donadeo ICE
Email: robyn4@ualberta.ca

WORKSPARK CONSULTING

Professional development workshops in resume writing and networking
Web: workspark.ca

COURSE INFO

MIN E 610 PRINCIPLES OF MINING ENGINEERING

COURSE OBJECTIVES

This course provides students with the knowledge, techniques, principles, and fundamental subjects required for a career as a Mining Engineer. Moreover, the course covers advanced topics in this field.

LEARNING OUTCOMES

- Explain the life cycle of a mine and identify the relationship between mineral resources and ore reserves
- Identify the mining method most appropriate for ore extraction from a given deposit based on consideration of cost and market conditions, ore grades and stripping ratios, access, environmental limitations, and available infrastructure
- Identify and evaluate core risks in each surface and underground mining method
- Determine and select the suitable equipment for each mining method
- Explain and perform different steps of mine planning and scheduling
- Demonstrate awareness of major technological trends





MIN E 612 PRINCIPLES OF GEOSTATISTICS

COURSE OBJECTIVES

Geostatistical methods are presented for characterizing the spatial distribution of regionalized variables, such as ore grades, porosity, permeability, and contaminant concentrations. This class focuses on the geostatistical methodologies for quantifying spatial variability with variograms/covariance functions, estimation with kriging techniques, and stochastic simulation with Gaussian, indicator, and annealing-based methods. Important subjects such as uncertainty quantification, volume-variance relations, and modelling multiple variables will also be addressed. Case studies will be presented from mining, petroleum, and environmental engineering. Students will undertake a variety of theoretical and practical assignments.

LEARNING OUTCOMES

- Understand the importance of geological heterogeneity modeling for resources and reserves
- Describe the sequence of steps required for constructing a fit-for-purpose geostatistical model
- Appreciate how to calculate, interpret and model a variogram for spatial variability quantification
- Implement a kriging estimator for optimal block model estimates
- Explain how uncertainty is a consequence of natural variability and sparse data
- Express how optimal decisions can be made in the presence of geological uncertainty

COURSE INFO

MIN E 613

NON-PARAMETRIC AND MULTIVARIATE GEOSTATISTICS

COURSE OBJECTIVES

Cell-based geology modeling methods include indicator formalism for categorical data and truncated Gaussian simulation. Object-based and process-based approaches for fluvial reservoirs. Indicators for continuous variable estimation and simulation. Multivariate geostatistics, including models of coregionalization, cokriging, Gaussian cosimulation, Markov-Bayes simulation and multivariate data transformation approaches. Introduction to advanced simulation approaches including direct simulation, simulated annealing and multiple point simulation.

LEARNING OUTCOMES

- Understand the importance of categorical variable modeling in mineral resource and mining reserve calculations
- Explain the relevance and procedures for multivariate rock property modeling
- Describe the sequence of steps required for constructing a comprehensive geological, geomechanical and geometallurgical model
- Review the place of different techniques for different purposes

MIN E 614

RISK MANAGEMENT WITH GEOSTATISTICS

COURSE OBJECTIVES

Advanced methods for the modeling of heterogeneity, quantification of uncertainty and management of risk. The theory and place of historical and advanced methods in geostatistics. Matrix methods, alternative variogram measures, kriging with a trend, dual kriging, spectral simulation, direct simulation and multiple point statistics.

COURSE INFO

MIN E 620 ROCK MECHANICS

COURSE OBJECTIVES

The students will learn the latest rock mechanics, blasting and applied geophysics research and field applications supported by fundamentals and practical aspects of rock engineering in mining and civil engineering. Topics ranging from in-situ stress measurements, electrical resistivity topography, ground penetrating radar, and learning to contour slopes of surface and underground excavations using blasting will be covered.

LEARNING OUTCOMES

- Develop an advanced understanding of the principles and theories of rock mechanics to analyze and predict the behavior of rock materials under different loading conditions
- Acquire proficiency in conducting laboratory tests and interpreting experimental data to determine the mechanical properties of rocks
- Gain practical skills in numerical modeling techniques and software applications commonly used in rock mechanics
- Explore advanced topics in rock mechanics to develop the ability to apply advanced concepts in practical engineering scenarios.
- Explain electrical resistivity topography and ground penetrating radar techniques for subsurface imaging





MIN E 641 DISCRETE-EVENT SIMULATION

COURSE OBJECTIVES

Advanced methods for the modeling of heterogeneity, quantification of uncertainty and management of risk. The theory and place of historical and advanced methods in geostatistics. Matrix methods, alternative variogram measures, kriging with a trend, dual kriging, spectral simulation, direct simulation and multiple point statistics.

LEARNING OUTCOMES

- Understand the importance of geological heterogeneity modeling for resources and reserves
- Describe the sequence of steps required for constructing a fit-for-purpose geostatistical model
- Appreciate how to calculate, interpret and model a variogram for spatial variability quantification
- Implement a kriging estimator for optimal block model estimates
- Explain how uncertainty is a consequence of natural variability and sparse data
- Express how optimal decisions can be made in the presence of geological uncertainty

COURSE INFO

CIV E 789

WRITING/COMMUNICATION SKILLS FOR ENGINEERS

COURSE OBJECTIVES

This course introduces M.Eng. students to the development of standard documents used in an engineering career, as well as the fundamentals of technical writing and communication, and of effective professional communication.

LEARNING OUTCOMES

- Communicate effectively and respectfully in diverse settings, in person and via standard business documents, such as email.
- Identify and abide by the rules of plagiarism and academic and professional standards of communication.
- Evaluate their own writing process and institute changes when necessary.
- Solicit and provide actionable feedback on writing and other forms of communication.
- Recognize and produce standards for specific technical documents.
- Research and consider the context, audience, and purpose of their writing projects.
- Write a thesis statement and organize their writing at various levels, from document-level through to sentence structure.
- Identify active and passive voice, and use each appropriately.
- Recognize and evaluate rhetorical devices, strategies, and techniques.

MIN E 900

CAPSTONE DIRECTED RESEARCH PROJECT

MINING

The Department of Civil and Environmental Engineering offers the Capstone project course to M.Eng. students in the Mining 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 Coordinator for information about the Mining directed research project.

NOTES

NOTES