MIN E 610 Principles of Mining Engineering

Fall 2025 - September 02 to December 08

Class time: Tuesday, Thursday 12:30-13:50 Location: NREF 2 - 080

Instructor:

Soroush Khazaei, PhD Candidate
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Office Location: NREF L1-008
Office Hours: 10:00-12:00 Mondays

Course Description:

*3 (fi) (either term, 3-0-0) Principles and fundamental subjects in Mining Engineering at the advanced level: definition of the terms used in mining, particularly those that are specific to either mines or minerals. Definition of mineral resource, reserve, and stages of mining based on applicable standards. Classification of mining methods, mining process, and selection of mining equipment. Waste dump design and management

Course synchronous and asynchronous content delivery schedule:

Course Objectives & General Content:

This course is intended to provide the students with the knowledge, techniques, principles and fundamental subjects needed for a Mining Engineer. In addition, the course covers the topics at an advanced level.

Learning Outcomes:

By the end of this course, students should be able to:

1. Explain the life cycle of a mine and identify the relationship between mineral resources and ore reserves
2. Identify and evaluate core risks in each surface and underground mining method
3. 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
4. Determine and select the suitable equipment for each mining method (surface & underground)
5. Recognize, describe, and evaluate different mine waste structures
6. Explain and perform different steps of mine planning and scheduling

7. Demonstrate awareness of major technological trends

Marking Scheme:

Activity	(A)Synchronous	Due/Scheduled	Weight
Assignments		Sep (16th), Oct (2nd, 21st), Nov (6th, 27th)	25%
Term Project		Dec 4th	25%
Final Exam		TBA	50%

The Faculty recommended grade point average for a 600 level course is 3.3. Instructors have the leeway to deviate from this average and can assign grades based on their own scheme. All grades are approved by the department chair (or delegate). The office of the Dean has final oversight on all grades.

Term Work

All term work solutions will be posted no later than the last day of classes. All term work will be returned to students by the final day of classes, with the exception of major term work due in the last week of classes. The latter will be returned by the day of the final examination or the last day of the examination period if there is no final examination in the course as per university policy; instructors will make accommodations to return these term work. It is the responsibility of the student to pick up all their term work at the specified time and place. Any unreturned term work, shall be retained and then shredded six months after the deadline for reappraisal and grade appeals. Final examinations will be kept for one year as required by university guidelines and the Government of Alberta's Freedom of Information and Protection of Privacy Act.

Additional Notes

Course delivery:
The course delivery method for MINE 610 in Fall 2025 is in-person.
In the case of instructor illness, recorded lecture material will be made available on Cancas for asynchronous consumption.

Academic Integrity:
Violations of academic integrity, including dishonesty in assignments, examinations, or other academic performances, are prohibited. The University of Alberta is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty and to uphold University policies. Students should familiarize themselves with the provisions of the Code of Student Behavior (available on the course webpage) and avoid behavior that could potentially result in suspicions of cheating, plagiarism, misrepresentation of facts and/or participation in an offence. Academic dishonesty is a serious offence and can result in suspension or expulsion from the University.

Assignments and term project:
Students are expected to submit assignments and term project as scheduled. Failure to submit when due will earn you zero for that assignment or project. It is expected that assignments will be done neatly and be complete and insightful. Late acceptance must be pre-arranged by email at least 24 hours before the

homework is due, and it will automatically incur a 50% penalty.

Office Hours:
Mondays 10:00 AM to 12:00 PM. I am also available outside office hours. Contact by email for a 10 to 30-min appointment. Please include “MINE 610 Appointment Request” in the subject line.

Calculator Policy

There is no calculator policy in this course; students are free to use the calculator they wish for all assessments.

Expectations for AI use

In this course, we commit to AI use guided by ethical and transparent principles. While students are allowed to use advanced automated tools (such as ChatGPT or Dall-E 2) for certain written assignments, it is crucial to adhere to the following guidelines:
Seek prior approval from the instructor for AI use in specific assignments.
When allowed, clearly attribute and cite any AI-generated content in your work, including prompts and AI outputs as part of your academic record. Include an additional reflection component in your assessments, discussing how AI tools contributed to your learning process.
IMPORTANT: Please note that AI use is strictly prohibited in assessments and assignments not approved by the instructor. Failure to abide by this guideline may be considered an act of cheating and a violation as outlined in the relevant sections of University of Alberta (November 2022) Code of Student Behaviour

Text and References (Recommended):

Course materials will be made available on the Canvas. The following references can help you understand the course materials. There is a direct link to each of the following references on Canvas, and you can read them online.

1. Darling, P., (2023), “SME surface mining handbook”, Society for Mining, Metallurgy, and Exploration, 652 pages.
2. Darling, P., (2023), “SME underground mining handbook”, Society for Mining, Metallurgy, and Exploration, 782 pages.
3. Bruce A. Kennedy, (1990), “Surface mining”, 2nd edition, Society for Mining, Metallurgy, and Exploration (SME), 1194 pages.
4. Hawley M., and Cunning J., (2017), “Guidelines for mine waste dump and stockpile design”, CRC Press, 368 pages.
5. Read J., and Stacey P., (2009), “Guidelines for open pit slope design”, CRC Press, 510 pages.
6. Hustrulid W. A., Kuchta M., and Martin R. K. (2013), “Open Pit Mine Planning and Design”, 3rd edition, CRC Press, 1308 pages.
7. Jean-Michel Rendu, (2014), “An introduction to cut-off grade estimation”, 2nd edition, Society for Mining, Metallurgy & Exploration (SME), 158 pages.
8. Hustrulid W. A. and Bullock R. L., (2001), “Underground mining methods: engineering fundamentals and international case studies”, Society for Mining, Metallurgy, and Exploration 9SME), 718 pages.
9. Thompson R., Peroni R., and Visser A. T., (2018), " Mining haul roads: theory and practice", 1st edition, CRC Press, 294 pages.

Website:

Canvas

Did you know that the University of Alberta has various low-to-no-cost services to help students succeed? Visit http://www.deanofstudents.ualberta.ca/ for information about the academic, wellness, and various other support services available to U of A students. It's never too early or too late to seek help!

MIN E 610: Principles of Mining Engineering - Fall 2025 Tentative Schedule

Day	Date	LEC/ LAB	Description	Assignment (25%)	Project (25%)
September					
Tue	2	Lec 01	Introduction		
Thu	4	Lec 02	Compositing and Block Model		
Tue.	9	Lec 03	Equ. Grade, Dilution, COG		
Thu.	11	Lec 04	Cut-off Grade Estimation (1)		
Tue.	16	Lec 05	Cut-off Grade Estimation (2)	A#1 @ 12:00 PM	
Thu.	18	Lec 06	Cut-off Grade Estimation (3)		
Tue.	23	Lec 07	Open-pit Mining		
Thu.	25	Lec 08	Ultimate Pit Limit (1)		
October					
Thu.	2	Lec 09	Ultimate Pit Limit (2)	A#2 @ 12:00 PM	
Tue.	7	Lec 10	Mine Haul Road		
Thu.	9	Lec 11	Equipment (Loading/Haulage)		
Tue.	14	Lec 12	Equipment: Time Useage Model		
Thu.	16	Lec 13	Equipment Selection		
Tue.	21	Lec 14	Midterm Review Session	A#3 @ 12:00 PM	
Thu.	23	Lec 15	Continuous Mining + IPCC		
Tue.	28	Lec 16	Oil Sands Mining		
Thu.	30	Lec 17	Mine Waste Management (Waste dump and Tailings)		
November					
Tue.	4	Lec 18	Rock Mechanics (Review)		
Thu.	6	Lec 19	Introduction to Underground Mining	A#4 @ 12:00 PM	
Tue.	11	**Fall term Reading Week**			
Thu.	13				
Tue.	18	Lec 20	Caving		
Thu.	20	Lec 21	MRMR + Stability Graph		
Tue.	25	Lec 22	Mathew Stability Method		
Thu.	27	Lec 23	Room-and-Pillar + Cut-and-Fill	A#5 @ 12:00 PM	
December					
Tue.	2	Lec 24	Final Review		
Thu.	4	Lec 24	No class!		P @ 12:00 PM
Final Exam: TBA (50%)					

University and faculty policies

Respect and professionalism

The Faculty of Engineering is committed to fostering and protecting an equitable, inclusive, and respectful work and study environment in line with University of Alberta policies and professional engineering industry standards.

The faculty prepares students to uphold industry standards to become a Professional Engineer (P.Eng). Therefore, respect, professionalism, and accountability must be upheld within the Faculty of Engineering and the University of Alberta.

Academic integrity

All students are expected to follow the University of Alberta's Student Code of Behaviour and Student Conduct Policy. The faculty expects an environment free of harassment, discrimination, and bullying. We encourage you to talk to the Office of Safe Disclosure and Human Rights about experiences, questions, or concerns. Additional resources and support for students are attached below.

Engineering students studying in the province of Alberta must also follow the Code of Ethics set by the Association of Professional Engineers and Geoscientists of Alberta (APEGA).

Course outline policies, course requirements, evaluation and grading information can be found in the University Calendar.

Safety during learning activities

In all Faculty of Engineering courses, labs, seminars or other learning activities, safety is of paramount importance. In some cases, laboratory work in a program requires high standards for risk management to keep potential hazards safely under control.

Anyone found to be unable to function safely in the class, lab, seminar or other learning activity may be asked to leave or be removed for their and the safety of other participants and instructors in alignment with the Student Code of Behaviour and Student Conduct Policy. As members, or prospective members, of the engineering profession, it is your responsibility to identify and inform the proper authorities of unsafe work.

Audio and video recording

Audio or video recording, digital or otherwise, of lectures, labs, seminars or any other teaching environment by students is allowed only with the prior written consent of the instructor or as a part of an approved accommodation plan.

Student or instructor content, digital or otherwise, created and/or used within the context of the course is to be used solely for personal study and is not to be used or distributed for any other purpose without prior written consent from the content author(s).

Only those items specifically authorized by the instructor may be brought into the exam facility. Students must not bring any unauthorized electronic device into an examination room, including cell phones or other devices.

Student services and support

Health & Wellness Support

Counselling and Clinical Services

Free, short-term, appointment-based counselling and psychiatric services. Also offers drop-in workshops. Book an initial consultation. Visit uab.ca/CCS to learn more.

Wellness Supports Social Workers

Free one-on-one support for students in the areas of housing, finances, academics, personal wellness, life skill development, family dynamics, system navigation, and any area of life where there is a desire to invite change. Visit uab.ca/wellness to learn more.

Sexual Assault Centre

Free, anonymous, and confidential drop-in counselling. Visit uab.ca/UASAC to learn more.

The Office of Safe Disclosure & Human Rights (OSDHR)

The OSDHR advises confidentially on sensitive issues you may not feel comfortable solving on your own. Contact the OSDHR if you want to get help or to make a report while keeping your privacy. Visit uab.ca/OSDHR to learn more.

HIAR (Helping Individuals at Risk)

If you're worried about someone, contact HIAR, who can help assess risk and connect individuals to support. Learn more at uab.ca/HIAR.

Immediate External Supports

Health Link Alberta: 811
Suicide Crisis Helpline: 988

Academic support

Academic Success Centre

Access to a variety of services to maximize your academic success. Learn more at uab.ca/ASC.

Accessibility Resources

Connects students with disabilities to accommodations. Learn more at uab.ca/Access under accommodations + accessibility.

Decima Robinson Support Centre

Academic support for 100- or 200-level introductory calculus, linear algebra and statistics courses. Visit uab.ca/DSC to learn more.

Engineering Student Success Centre

The Faculty of Engineering provides drop-in tutoring for first-year courses. Visit uab.ca/ESSC to learn more.

Office of the Student Ombuds

Call for complex problems and conflict mediation. Learn more at uab.ca/ombuds.

Financial support

Student Service Centre

For awards and other funding support. Learn more at uab.ca/ask.

Campus Food Bank

The Campus Food Bank Society is an independent charity supporting University of Alberta students, faculty, staff, and alumni for up to five years. For additional information visit their website at campusfoodbank.com.