MIN E 403 Mine Design Project II

Winter 2025 - January 06 to April 09

Class time: Tuesday 13:00-13:50 Location: NRE 2-016

Instructor:

Hunter Dunn, , P.Eng, (He/Him)

hmdunn@ualberta.ca
Donadeo Innovation Centre For Engineering 6-247
Office Hours: Upon Request

Course Description:

*4.5 (fi) (second term, 1-1S-6) Second phase of a dynamic scenario-based mine feasibility study from exploration through operations to final mine closure plan. This course follows MIN E 402 with detailed mine plans and equipment selection, manpower, ventilation, processing, environment and economic analyses. Prepare regular team reports and presentations. Present findings during an industry seminar. Weekly seminars with instructor and industry experts.

Prerequisites: MIN E 402. Note: Restricted to fourth-year traditional and fifth-year co-op engineering students

Course synchronous and asynchronous content delivery schedule:

This course is a group based project course where course material learned to date is applied in developing a feasibility study for a new mining project. There is no new material taught in this course and all work is done within your group. Mentorship can and will be provided by the instructor, TAs and a group of industry experts as needed.

Land Acknowledgment:

The University of Alberta acknowledges that we are located on Treaty 6 territory, and respects the histories, languages, and cultures of First Nations, Métis, Inuit, and all First Peoples of Canada, whose presence continues to enrich our vibrant community.

TA Information:

Khaleeq Ahmed (khaleeq1@ualberta.ca)

Lab Sections:

Section	Day	Time	Location
LAB H1	Mon-Thu	14:00 - 16:50	NRE 2-043

Seminar Sections:

Section	Day	Time	Location
SEM J01	Tue	013:00 - 014:00	NRE 2-043

Course Objectives & General Content:

This course involves the development of a feasibility study for a mining project using real world drillhole data. In this course, students will have the opportunity to further develop and deploy their knowledge and skills while completing the technical analysis and engineering design required to develop a complete project feasibility study, while adhering to NI 43-101 guidelines.
Activities include assessing reserves, mining method selection, open-pit, underground mine design, surface and underground operations optimization, geotechnical design, ventilation design, project risk assessment, production scheduling, equipment selection, cost estimation, financial modeling, sustainability.
Students will make use of industry-standard mine design and optimization software.

Learning Outcomes:

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

1. Assess the feasibility of a mining project with consideration to: Data analysis and interpretation, Mine layout design, Development and production planning/scheduling/Staffing, Equipment selection, Geotechnical, technical, environmental and economical factors, Ventilation, Processing, Economical factors including mining costs, commodity market, etc., Social and environmental impact, Project risk analysis, Mine closure/rehabilitation
2. Operate effectively mine design and optimization software packages.
3. Demonstrate team skills in the management of a project work
4. Demonstrate advanced written and oral communication skills
5. Recognize mining's impact on the world and Canadian economy and develop and follow a management process that minimizes project impact

Marking Scheme:

Activity	(A)Synchronous	Due/Scheduled	Weight
Chapter/Section Reports/Summaries	Synchronous	Multiple Dates	30%
Evaluations: group/instructor	Asynchronous	Multiple Dates	10%
Interim Presentations	Synchronous	Multiple Dates	15%
Final Report	Synchronous	April 4th, 2024	20%
Final presentation	Synchronous	April 9th, 2024	20%
Pass/Fail Activities	Asynchronous	April 9th, 2024	5%
			0%

The Faculty recommended grade point average for a 400 level course is 3.1.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

The groups will work in a real-world employment context where they report directly to Hunter Dunn. Hunter and the TAs may introduce various challenges throughout the course to test student's problem-solving abilities, including economic, labor-related, technical, community, or environmental challenges.

The purpose of this class is not to 'teach' students concrete mining engineering skills. Lectures in this class are unique. Students who expect to be passive learners and merely react to the instructor's requests may face challenges in 403. Students will benefit most from this capstone course by actively engaging in discussions beyond minimum requirements with instructors, TAs, industry advisors, and experts.

Groups:
Groups are the same as MINE 402, and each group should have a chapter lead for each chapter/report. It is expected that the workload be divided equally amongst the group members, but this is the sole decision of the group members. Any issues in a group should be handled as per APEGA guidelines; before discussing with the instructor, the student should make every effort to discuss the issue with the offending party and come to a resolution. Any persistent issues should be brought to the instructor's attention.

Due dates:
Deliverables due have been highlighted on the course schedule and Canvas. The instructor may change deadlines upon request, but ONLY if that request is made 7 days before the due date posted and will only be altered for the entire class, not for individual groups.

Attendance:
All group members MUST attend the guest speaker sessions, seminars, and meetings with Hunter Dunn.

Software packages:
Students can use any software package, but the Instructor will not provide lectures on different software. The TAs can help with some software depending on their area of expertise, but in general, students should be at the point in their professional careers where they can tailor the use of software to their needs. It is not the TA's responsibility to help with software. Although we will help where/when we can, please do not expect us to be professional users of whatever software you use.

Tuesday Classes:
TA(s) will be available at exactly 1hr to answer questions until there are no questions left, this may be 2 min or the entire 50min session, depending on student questions. Various lectures by the instructor will be held

during this time as needed. Chapter leads will meet with the instructor and TA(s).

Regular Backup of Projects: A Necessary Habit
Remember, data loss can happen at any time and can be irreversible; hence, a little effort in backing up your work can protect your valuable efforts. I strongly urge each group to make it a regular practice to back up their project every week without fail. This simple yet vital routine can save each group from the stress and loss of unexpected data failures, technical glitches, or other unforeseen issues.

Meeting with Industry Advisors:
Each group should have Biweekly meetings with the industry advisor to help guide the project. Groups are responsible for connecting with their advisor, initiating contact, setting up meetings appropriately, etc. Each group should ensure that the meeting minutes are prepared using the provided template and uploaded using the appropriate section available on Canvas.

FOIP Notice:
I want to inform you that the reports and presentations you submit for MinE 403 may be shared with other instructors, professors, industry experts, industry advisors, and potentially other students in future offerings of the course. Please note that this serves as your FOIP notice. If you wish to limit the individuals with whom your deliverables will be shared, please email me to let me know.

Keep Design Lab Clean:
Students' cooperation in maintaining a clean and orderly environment is greatly appreciated. The Design Lab is a hub for students' creativity and learning. It is crucial that we present a space to our industry guests that reflects our commitment to excellence and respect for our resources. To ensure a safe and clean environment, food is strictly prohibited in the lab, especially during class times. This policy is in place to prevent spills and crumbs that could damage the equipment and detract from the lab's professional appearance.

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 (Mandatory):

[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]. Darling, P., (2011), “SME mining engineering handbook”, Vol. I and II, 3rd edition, Society for Mining, Metallurgy, and Exploration (SME), 1984 pages.
[4]. Bruce A. Kennedy, (1990), “Surface mining”, 2nd edition, Society for Mining, Metallurgy, and Exploration (SME), 1194 pages.
[5]. 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.
[6]. Hawley M., and Cunning J., (2017), “Guidelines for mine waste dump and stockpile design”, CRC Press, 368 pages.
[7]. Beale G., and Read J., (2013), “Guidelines for evaluating water in pit slope stability”, CSIRO publishing, 600 pages.
[8]. Read J., and Stacey P., (2009), “Guidelines for open pit slope design”, CRC Press, 510 pages.
[9]. Morrison K.F., (2022), "Tailings management handbook - A life-cycle approach", Society for Mining, Metallurgy, and Exploration (SME), 1004 pages.
[10]. Lottermoser B., (2010), “Mine wastes: characterization, treatment and environmental impacts”, 3rd edition, Springer, 400 pages.
[11]. Hustrulid W. A., Kuchta M., and Martin R. K. (2013), “Open Pit Mine Planning and Design”, 3rd edition, CRC Press, 1308 pages.
[12]. Jean-Michel Rendu, (2014), “An introduction to cut-off grade estimation”, 2nd edition, Society for Mining, Metallurgy & Exploration (SME), 158 pages.

Text and References (Recommended):

NI 43-101

Website:

Canvas

Previous Examples of Evaluative Materials:

Previous examples are provided on eClass. Please note these do not represent exemplar submissions. They are randomly chosen as examples to use as a starting point

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!

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 and student conduct

The University of Alberta is committed to the highest standards of academic integrity and honesty, as well as maintaining a learning environment that fosters the safety, security, and the inherent dignity of each member of the community, ensuring students conduct themselves accordingly. Students are expected to be familiar with the standards of academic honesty and appropriate student conduct, and to uphold the policies of the University in this respect.

Students are particularly urged to familiarize themselves with the provisions of the Student Academic Integrity Policy and the Student Conduct Policy, and avoid any behaviour that could

potentially result in suspicions of academic misconduct (e.g., cheating, plagiarism, misrepresentation of facts, participation in an offence) and non-academic misconduct (e.g., discrimination, harassment, physical assault). Academic and non-academic misconduct are taken very seriously and can result in suspension or expulsion from the University.

All students are expected to consult the Academic Integrity website for clarification on the various academic offences. All forms of academic dishonesty are unacceptable at the University. Unfamiliarity of the rules, procrastination or personal pressures are not acceptable excuses for committing an offence. Listen to your instructor, be a good person, ask for help when you need it, and do your own work -- this will lead you toward a path to success. Any academic integrity concern in this course will be reported to the College of Natural and Applied Sciences. Suspected cases of non-academic misconduct will be reported to the Dean of Students. The College, the Faculty, and the Dean of Students are committed to student rights and responsibilities, and adhere to due process and administrative fairness, as outlined in the Student Academic Integrity Policy and the Student Conduct Policy. Please refer to the policy websites for details on inappropriate behaviours and possible sanctions.

The College of Natural and Applied Sciences (CNAS) has created an Academic Integrity for CNAS Students eClass site. Students can self-enroll and review the various resources provided, including the importance of academic integrity, examples of academic misconduct & possible sanctions, and the academic misconduct & appeal process. Students can also complete assessments to test their knowledge and earn a completion certificate.

"Integrity is doing the right thing, even when no one is watching." -- C.S. Lewis

The Faculty of Engineering 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 Academic Integrity Policy 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)

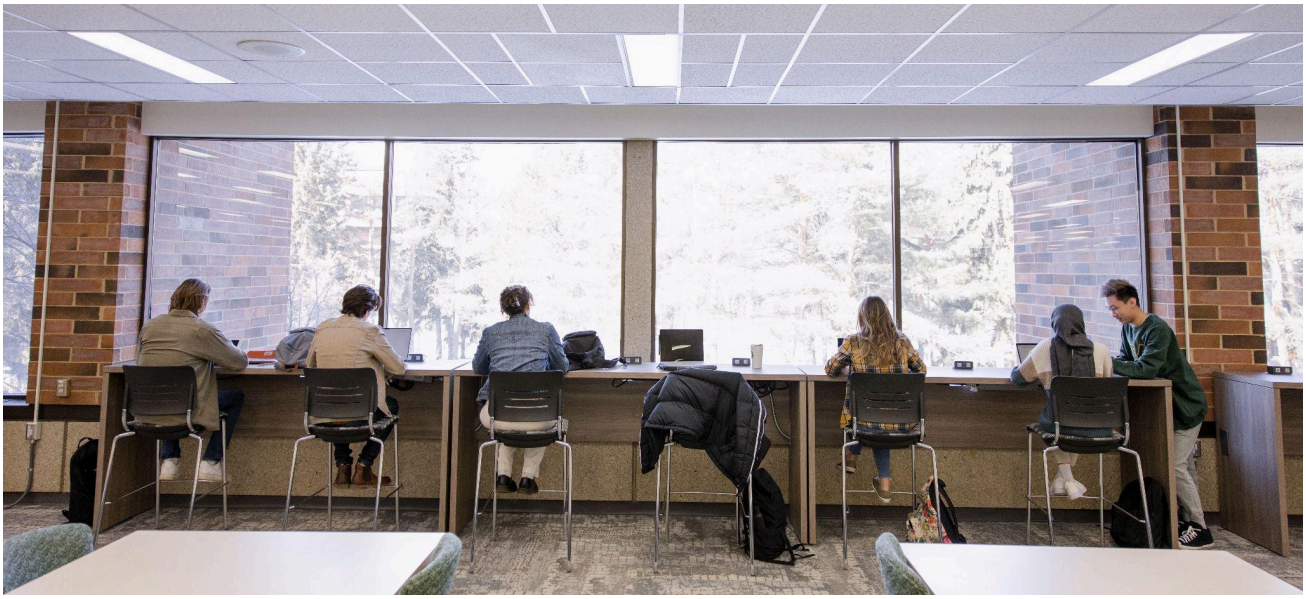
The OSDHR advises confidentially on sensitive issues you may not feel comfortable solving on your own. Contact the OSDHR if you want to get help or to make a report while keeping your privacy. Visit uab.ca/OSDHR to learn more.

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.