

MINE3450

Underground Mining Systems

Term 2, 2022



Course Overview

Staff Contact Details

Convenors

Name	Email	Availability	Location	Phone
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School Contact Information

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Course Details

Units of Credit 6

Summary of the Course

This course aims to equip the student with in-depth knowledge and skills in the development, production and other processes involved in underground mining systems. It builds on the fundamental knowledge acquired in the Mining Systems course.

Course Aims

This course aims to equip the student with in-depth knowledge and skills in the development, production and other processes involved in underground mining systems. It builds on the fundamental knowledge acquired in the Mining Systems course.

In addition, there may be a number of topics of special focus for a given project such as environmental factors, environmental impact/design and social responsibility. The project will be undertaken in the spirit of a pre-feasibility study to determine its economic viability using standard engineering economic methods of project evaluation.

Course Learning Outcomes

After successfully completing this course, you should be able to:

Learning Outcome	EA Stage 1 Competencies
1. Identify and mitigate core risks for an underground mining system	PE1.3, PE2.1
2. Identify, analyse, evaluate and select appropriate underground mining method/s and related equipment and support infrastructure for a mineral/coal deposit	PE1.3, PE2.2, PE2.4, PE3.2, PE3.6
3. Appraise underground mining systems with respect to safe, efficient, economic and environmentally and socially responsible operations	PE1.4, PE1.6, PE2.4, PE3.1
4. Demonstrate an awareness of legal and statutory requirements	PE1.3, PE1.6, PE2.3, PE3.1, PE3.4
5. Demonstrate an awareness of technological trends and options in underground mining systems	PE1.4, PE3.3

This course will contribute to the development of the following Graduate Attributes:

1. appropriate technical knowledge
2. having advanced problem solving, analysis and synthesis skills with the ability to tolerate ambiguity
3. ability for engineering design and creativity

4. awareness of opportunities to add value through engineering and the need for continuous improvement
5. being able to work and communicate effectively across discipline boundaries
6. having HSEC consciousness
7. being active life-long learners.

Teaching Strategies

1. Project-based learning: This course utilises project-based learning methods. Students will be given two group projects to work on. For these group projects, students are required to work in groups, share the project workload, have weekly meetings and discussions and share the outcome of their project with other groups with a presentation. A formal report has to be submitted for each project.
2. Lectures and tutorials: Project work will be supported with weekly consultative and information-sharing session. The content of these are aligned with the projects to help students. Although this is a project-based course, it is a requirement that all work is conducted within the School.
3. Group work: Each project will have a number of focus areas. Members of a group may elect to work on a topic of the project they feel more comfortable with, but should integrate their work into the whole project. This should be reported back at their team meetings. A peer review will have to be submitted by each team indicating the proportion of each individual group member's contribution to the project. Some marks will be taken from the underperforming students and allocated to the other group members. If a student makes no contribution to the project, he/she will receive zero for that project. Ideally groups of 4 will be selected by the course coordinator.
4. Effective Communication: One of the most effective means of learning is to effectively communicate what has been learned. Part of the assessment in this course will be determined by how effectively the results are communicated. There are a number of opportunities for this in the form of presentations and final reports. The process of writing reports, brainstorming within a design team, peer assessment, preparation and presentation of report both in front of an audience and in report form, requires clarity of thinking, defending and revising a design and analysing the risks inherent in a project.
5. Peer Assessment: Group performance is a key component of the assessment for this course. The sole measure of performance of team work is by peer review. Teams which are having problems with unproductive or non-cooperative members are encouraged to seek the intervention of the course coordinator as early as possible. Do not leave these problems to the last minute. The PEER REVIEW is required for all group assessments.

Additional Course Information

This course assumes that a student:

- has a good understanding of mining terms and descriptions.
- has been exposed to underground mining methods and is familiar with mining development, operations, production and materials handling

Assessment

Assessment of the research project is based on the submissions made at various project milestones over the course of the year. Specific details of the requirements of the project milestones related to each item of assessment are contained in the Learning Guide: Mining Research Project.

All assessments are due 9pm Sydney time on Sunday of the week.

The range of assessment tasks have been designed to ensure a student can demonstrate they have satisfactorily attained the minimum requirements of the course as defined in the Learning Outcomes of the course and Graduate Attributes of the program. The student is also advised to review the relevant Assessment Criteria before completing each of the assessment items.

Assessment task	Weight	Due Date	Course Learning Outcomes Assessed
1. Presentation Metal Project Progress Presentation	15%	End of Wk 4	1, 2, 3, 4, 5
2. Report - Final Report Metal Project	35%	End of Wk 6	1, 2, 3, 4, 5
3. Presentation Coal Project Progress Presentation	15%	End of Wk 9	1, 2, 3, 4, 5
4. Report - Final Report Coal Project.	35%	End of wk 11	1, 2, 3, 4, 5

Assessment 1: Presentation Metal Project Progress Presentation

Due date: End of Wk 4

Presentation on the progress in metal project.

Assessment 2: Report - Final Report Metal Project

Due date: End of Wk 6

Final report on the metal project detailing the findings.

Assessment 3: Presentation Coal Project Progress Presentation

Due date: End of Wk 9

Presentation on the progress in coal project.

Assessment 4: Report - Final Report Coal Project.

Due date: End of wk 11

Final report on the coal project detailing the findings.

Attendance Requirements

Students are strongly encouraged to attend all classes and review lecture recordings.

Course Schedule

[View class timetable](#)

Timetable

Date	Type	Content
Week 1: 30 May - 3 June	Lecture	A: Course Introduction B: Groups- Hand out Metal Project with milestones. Selection of Groups. Groups commence project work
Week 2: 6 June - 10 June	Group Activity	Metal Project - Tutorial session Review project mining systems. Provide links to useful resources. Provide a methodology for development systems selection; equipment selection; continuation of project work
Week 3: 13 June - 17 June	Group Activity	Tutorial session - Metal Project Finalise overall design. Estimate productivity. Suitability of methods. Determine equipment and labour requirements as well as practicality. Continuation with project work
Week 4: 20 June - 24 June	Presentation	A: Metal Project Progress Presentation B: Feedback on presentation. C: Continuation of project work
Week 5: 27 June - 1 July	Group Activity	A: Legal, socio-environmental considerations. B: Risk assessment. C: Finalisation of project work.
Week 7: 11 July - 15 July	Lecture	Coal Project: Hand out Project description with milestones Mining systems refresher (specific to project) Methodology for system selection

Week 8: 18 July - 22 July	Group Activity	<p>Coal Project - Tutorial session.</p> <p>Selection of mining systems specific to application. Continuation of project work Equipment selection. Mining method and costs. Practicality and timing. Determine labour requirement. Continuation of project work</p>
Week 9: 25 July - 29 July	Presentation	<p>A: Coal Project Progress Presentation</p> <p>B: Feedback on presentation.</p> <p>C: Continuation of project work</p>
Week 10: 1 August - 5 August	Group Activity	<p>A: Legal, socio-environmental considerations.</p> <p>B: Risk assessment.</p> <p>C: Finalisation of project work.</p>

Resources

Recommended Resources

- MEA Report Writing Guide for Mining Engineers. P Hagan and P Mort (Mining Education Australia (MEA)). (Latest edition available for download from the School website or a hardcopy version is available from the UNSW Bookshop).
- Learning Guide: Mining Research Project
- Hartman, H.L. 1987. Introductory Mining Engineering, Wiley, New York. (Call Number: TN275 • .H35 1987).
- Noakes, M & Lanz, T, 1993. Cost Estimation Handbook for the Australian Mining Industry, Monograph / Australasian Institute of Mining and Metallurgy, No: 20, pp 412, Australasian Institute of Mining and Metallurgy, (Call Number:TN272 .C68 1993)
- SME Mining Engineering Handbook, 1992, Editor, Howard L Hartman
- Hustrulid, WA, Bullock, R. (Editors), 2001. Underground Mining Methods: Engineering Fundamentals and International Case Studies. (Society for Mining Metallurgy & Exploration: • Littleton), 728p
- Australasian Coal Mining Practice, Monograph Series No.12, Edition 3, AusIMM 2009
- Underground Mining Methods: Engineering Fundamentals and International Case Studies, Editor, W Hustrulid, R L Bullock
- Techniques in Underground Mining, 1998, Editor, Howard L Hartman, SME,
- Design and Operation of Caving and Sublevel Stoping Mines, D Stewart, SME,
- Bojesen, FW, 2003. Small Scale Underground Mining, Hesperian Press,
- Brown E. Block Caving 2003
- Hartman, H.L. 1987. Introductory Mining Engineering, Wiley, New York
- Cost Estimation Handbook for the Australian Mining Industry, 2006
- Underground Operators Conferences, AusIMM, various years
- Rudenno, V. 2004. The Mining Valuation Handbook. Wrightbooks, Milton, QLD.
- www.austlii.edu.au – for all Acts & Regulations for all states and territories
- <http://www.undergroundcoal.com.au/longwall/cuttingmethods.aspx>

Course Evaluation and Development

Feedback on the course is gathered periodically using various means, including the UNSW

myExperience process, informal discussions with students inside and outside of class, and the School's Student/Staff meetings. Your feedback is taken seriously, and continual improvements are made to the course based, in part, on such feedback.

Submission of Assessment Tasks

The School has developed a guideline to help you when submitting a course assignment.

We encourage you to retain a copy of every assignment submitted for assessment for your own record either in hardcopy or electronic form.

All assessments must have an assessment cover sheet attached.

Course completion

Course completion requires submission of all assessment items. Failure to submit all assessment items may result in the award of an Unsatisfactory Failure (UF) grade for the Course unless special consideration has been submitted and approved.

Late Submission of an Assessment

Full marks for an assessment are only possible when an assessment is received by the due date. Work submitted late without an approved extension by the course coordinator or delegated authority is subject to a late penalty of five percent (5%) of the maximum mark possible for that assessment item. The late penalty is applied per calendar day (including weekends and public holidays) that the assessment is overdue. There is no pro-rata of the late penalty for submissions made part way through a day. This is for all assessments where a penalty applies.

Work submitted after five days (120 hours) will not be accepted and a mark of zero will be awarded for that assessment item.

For some assessment items, a late penalty may not be appropriate. These will be indicated in the course outline, and such assessments will receive a mark of zero if not completed by the specified date. Examples include:

- Weekly online tests or laboratory work worth a small proportion of the subject mark, or
- Online quizzes where answers are released to students on completion, or Professional assessment tasks, where the intention is to create an authentic assessment that has an absolute submission date, or Pass/Fail assessment tasks.

We understand that at times you may not be able to submit an assignment on time, and the School will accommodate any fair and reasonable extension. We would recommend you review the UNSW Special Consideration guidelines – see section below.

Special Consideration

You can apply for special consideration through [The Nucleus Student Hub](#) when illness or other circumstances interfere with your assessment performance. Sickness, misadventure or other circumstances beyond your control may:

- Prevent you from completing a course requirement
- Keep you from attending an assessable activity
- Stop you submitting assessable work for a course
- Significantly affect your performance in assessable work, be it a formal end-of-semester

examination, a class test, a laboratory test, a seminar presentation or any other form of assessment

We ask that you please contact the Course Convenor immediately once you have completed the special consideration application, no later than one week from submission.

More details on special consideration can be found at: www.student.unsw.edu.au/special-consideration

Student Support

The University and the Faculty provide a wide range of support services for students, including:

- Library training and support services - www.library.unsw.edu.au
- UNSW Learning Centre - www.lc.unsw.edu.au
- Counselling support - www.counselling.unsw.edu.au

Equitable Learning Services aims to provide all students with a free and confidential service that provides practical support to ensure that your health condition doesn't adversely affect your studies. <https://student.unsw.edu.au/els>

Academic Honesty and Plagiarism

Your lecturer and the University will expect your submitted assignments are truly your own work. UNSW has very clear guidelines on what plagiarism is and how to avoid it. Plagiarism is using the words or ideas of others and presenting them as your own. Plagiarism is a type of intellectual theft. It can take many forms, from deliberate cheating to accidentally copying from a source without acknowledgement. The University has adopted an educative approach to plagiarism and has developed a range of resources to support students. All the details on plagiarism, including some useful resources, can be found at www.student.unsw.edu.au/plagiarism.

All MERE students are required to complete a student declaration for academic integrity which is outlined in the assignment cover sheets. By signing this declaration, you agree that your work is your own original work.

If you need some additional support with your writing skills, please contact the Learning Centre or view some of the resources on their website: www.lc.unsw.edu.au. The Learning Centre is designed to help you improve your academic writing and communication skills. Some students use the Centre services because they are finding their assignments a challenge, others because they want to improve an already successful academic performance.

Academic Information

Course Results

For details on UNSW assessment policy, please visit: www.student.unsw.edu.au/assessment

In some instances your final course result may be withheld and not released on the UNSW planned date. This is indicated by a course grade result of either:

- LE – indicates you have not completed one or more items of assessment; or
- WD – indicates there is an issue with one or more assignment; or
- WC – which indicates you have applied for Special Consideration due to illness or misadventure and the course results have not been finalised.

In either event it would be your responsibility to contact the Course Convener as soon as practicable but no later than five (5) days after release of the course result. If you don't contact the convener on time, you may be required to re-submit an assignment or re-sit the final exam and may result in you failing the course. You would also have a NC (course not completed) mark on your transcript and would need to re-enroll in the course.

Studying a course in the School of Minerals and Energy Resources Engineering at UNSW

Report writing guide

The School has a [Report Writing Guide \(RWG\)](#) available. A copy of this is available on the course Moodle site.

Computing Resources and Internet Access Requirements

UNSW Minerals and Energy Resources Engineering provides blended learning using the on-line Moodle LMS (Learning Management System). Also see - Transitioning to Online Learning: www.covid19studyonline.unsw.edu.au

It is essential that you have access to a PC or notebook computer. Mobile devices such as smart phones and tablets may compliment learning, but access to a PC or notebook computer is also required. Note that some specialist engineering software is not available for Mac computers.

- Mining Engineering Students: OMB G48
- Petroleum Engineering Students: TETB LG34 & LG 35

It is recommended that you have regular internet access to participate in forum discussion and group work. To run Moodle most effectively, you should have:

- broadband connection (256 kbit/sec or faster)
- ability to view streaming video (high or low definition UNSW TV options)

More information about system requirements is available at www.student.unsw.edu.au/moodle-system-requirements

Accessing Course Materials Through Moodle

Course outlines, support materials are uploaded to Moodle, the university standard Learning Management System (**LMS**). In addition, on-line assignment submissions are made using the assignment dropbox facility provided in Moodle. All enrolled students are automatically included in Moodle for each course. To access these documents and other course resources, please visit: www.moodle.telt.unsw.edu.au

This course outline sets out description of classes at the date the Course Outline is published. The nature of classes may change during the Term after the Course Outline is published. Moodle should be consulted for the up to date class descriptions. If there is any inconsistency in the description of activities between the University timetable and the Course Outline (as updated in Moodle), the description in the Course Outline/Moodle applies.

How We Contact You

At times, the School or your course convenors may need to contact you about your course or your enrolment. Your course convenors will use the email function within Moodle or we will contact you on your @student.unsw.edu.au email address.

We understand that you may have an existing email account and would prefer for your UNSW emails to be redirected to your preferred account. Please see instructions on how to redirect your UNSW emails: ["How can I forward my emails to another account?"](#)

How You Can Contact Us

We are always ready to assist you with your inquiries. To ensure your question is directed to the correct person, please use the email address below for:

- Enrolment or other admin questions regarding your program: <https://unswinsight.microsoftcrmpartals.com/web-forms/>
- Course inquiries should be directed to the Course Convenor.

Image Credit

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CRICOS

CRICOS Provider Code: 00098G

Acknowledgement of Country

We acknowledge the Bedegal people who are the traditional custodians of the lands on which UNSW Kensington campus is located.

Appendix: Engineers Australia (EA) Professional Engineer Competency Standard

Program Intended Learning Outcomes	
Knowledge and skill base	
PE1.1 Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline	
PE1.2 Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline	
PE1.3 In-depth understanding of specialist bodies of knowledge within the engineering discipline	✓
PE1.4 Discernment of knowledge development and research directions within the engineering discipline	✓
PE1.5 Knowledge of engineering design practice and contextual factors impacting the engineering discipline	
PE1.6 Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline	✓
Engineering application ability	
PE2.1 Application of established engineering methods to complex engineering problem solving	✓
PE2.2 Fluent application of engineering techniques, tools and resources	✓
PE2.3 Application of systematic engineering synthesis and design processes	✓
PE2.4 Application of systematic approaches to the conduct and management of engineering projects	✓
Professional and personal attributes	
PE3.1 Ethical conduct and professional accountability	✓
PE3.2 Effective oral and written communication in professional and lay domains	✓
PE3.3 Creative, innovative and pro-active demeanour	✓
PE3.4 Professional use and management of information	✓
PE3.5 Orderly management of self, and professional conduct	
PE3.6 Effective team membership and team leadership	✓