

MINE3430

Mining Systems

Term 1, 2022



Course Overview

Staff Contact Details

Convenors

Name	Email	Availability	Location	Phone
Simit Raval	simit@unsw.edu.au		159 Old Main Building K15	93855005

Lecturers

Name	Email	Availability	Location	Phone
Chengguo Zhang	chengguo.zhang@unsw.edu.au		159 Old Main Building K15	
Guangyao Si	g.si@unsw.edu.au		159 Old Main Building	

School Contact Information

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[Engineering Student Services](#)

E: mere.teaching@unsw.edu.au

W: www.engineering.unsw.edu.au/minerals-energy-resources

Course Details

Units of Credit 6

Summary of the Course

This course presents a systems approach to the principles, design and application of the major surface and underground mining methods together with the associated equipment, services and infrastructure.

Course Aims

The aim of this course is to provide students with the capability to select the appropriate mining method, together with its associated equipment, services and infrastructure, for a given deposit.

Course Learning Outcomes

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

Learning Outcome	EA Stage 1 Competencies
1. Describe and illustrate major mining methods and related equipment and support infrastructure	PE2.2
2. Identify, assess and select mining systems appropriate to specific types of deposits	PE1.1, PE2.1
3. Conduct productivity analysis for selected mining system(s)	PE1.5, PE2.3
4. Appraise mining systems with respect to safe, efficient, economic and environmentally and socially responsible operations	PE1.3, PE1.5, PE1.6
5. Identify and evaluate core risks in each mining system	PE1.6, PE2.4
6. Demonstrate awareness of major technological trends	PE3.3

Teaching Strategies

1. Lectures and tutorials: This course will have weekly traditional lectures along with tutorials to supplement the learning. The tutorials will be held in class and have to be submitted on the same day. They will be collected and marks will be provided at the end of the semester. Discussion on the tutorials will be held at the start of class on the next tutorial session.

Assessment

Assessment task	Weight	Due Date	Course Learning Outcomes Assessed
1. Tutorials	10%	Not Applicable	1, 2, 3, 4, 5, 6
2. Mid Term Test	40%	Not Applicable	1, 2, 3, 4, 5, 6
3. Two quizzes on Mining Systems	10%	Not Applicable	1, 2, 3, 4, 5, 6
4. Final examination	40%	Not Applicable	1, 2, 3, 4, 5, 6

Assessment 1: Tutorials

Students need to submit their worked tutorials at the end of each session. Total 10 submissions will be added to their individual portfolio.

Assessment 2: Mid Term Test

Assessment length: 2 hrs

Submission notes: The test will be held at the first class session in week 7

Mid term test covering understanding of the topics covered from week 1 to week 5.

Assessment 3: Two quizzes on Mining Systems

Two quizzies to test understanding of the mining systems. Each worth 5% and consist of multiple choice/short response questions

Assessment 4: Final examination

Assessment length: 2 hrs

End of term exam covering underground mining systems

Attendance Requirements

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

Course Schedule

[View class timetable](#)

Timetable

Date	Type	Content
O-Week: 7 February - 11 February		
Week 1: 14 February - 18 February	Blended	Course Introduction Introduction to Systems Engineering Mine Services & Infrastructure Surface vs Underground Mining - Method Selection
Week 2: 21 February - 25 February	Blended	<ul style="list-style-type: none"> • Strip Mining – Introduction and Principles • Strip Mining – Draglines, Bucket Wheel Excavators & Dozer
	Group Activity	Tutorial 1 – Dragline Selection & Productivity
Week 3: 28 February - 4 March	Blended	<ul style="list-style-type: none"> • Open Pit Mining – Introduction and Principles • Open Pit Mining – Loading Equipment • Open Pit Mining – Truck Haulage
	Assessment	Quiz 1 (5%)
	Group Work	Tutorial 2 – Open Pit Mining – Bench and Pit Slope Geometry
Week 4: 7 March - 11 March	Blended	<ul style="list-style-type: none"> • Haul Road Design • Highwall Mining
	Group Work	<ul style="list-style-type: none"> • Tutorial 3 – Truck & Shovel Selection • Tutorial 4 – Truck Fleet Dispatch and TALPAC
Week 5: 14 March - 18 March	Blended	<ul style="list-style-type: none"> • Surface Miners • Solution Mining & Other Mining Methods
	Group Work	Tutorial 5 – Systems Engineering

Week 6: 21 March - 25 March	Reading	Review of week 1 to week 5
Week 7: 28 March - 1 April	Assessment	Mid Term Test (worth 40%)
	Blended	Underground Mine Access & Development Tutorial 6 – Shaft vs Decline
Week 8: 4 April - 8 April	Blended	<ul style="list-style-type: none"> • UG Coal – Introduction & Longwall Mining • Bord & Pillar Coal Mining and Room & Pillar Metal Mining • UG Coal – Thick Seam Mining Tutorial 7 – Longwall Mining
Week 9: 11 April - 15 April	Blended	<ul style="list-style-type: none"> • UG Metal – Introduction • UG Metal – Method Selection • UG Metal – Cut & Fill • Tutorial 8 – UG Metal Mining Method Selection & Stoping Quiz 2 (5%)
Week 10: 18 April - 22 April	Blended	<ul style="list-style-type: none"> • UG Metal – Sublevel Stoping • UG Metal – Narrow Vein Mining • UG Metal – Caving Methods Tutorial 9 – Room & Pillar Tutorial 10 – Caving Methods

Resources

Prescribed Resources

Darling, P (ed.), 2011. Mining Engineers Handbook, 3rd edition, SME, Littleton, USA.

Recommended Resources

- Kininmonth, RJ and Baafi, EY, 2009. Australasian Coal Mining Practice Monograph 12, 3rd edition, The AusIMM: Melbourne. ISBN. 0 978 1 921522 07 9.
- Hartman, HL, 2002. Introductory Mining Engineering, 2nd edition. Wiley, New York.
- Hustrulid, W and Kuchta, M, 2006. Open Pit Mine Planning & Design, Balkema, Rotterdam.
- Kennedy, BA (ed.), 1990. Surface Mining, 2nd edition, SME, Littleton, Colorado, USA. ISBN 0-87335-102-9.
- Noakes, M and Lanz, T. 1993. Cost Estimation Handbook for the Australian Mining Industry, Monograph No: 20/ Australasian Institute of Mining and Metallurgy.
- Hustrulid, WA, and Bullock, R. (eds.), 2001. Underground Mining Methods: Engineering Fundamentals and International Case Studies, SME, Littleton, USA.
- Gertsch, RE and Bullock, RL (eds.), 1998. Techniques in Underground Mining, SME, Littleton, USA

Course Evaluation and Development

The assessment criteria provide a framework for you to assess your own work before formally submitting major assignments to your course convenor. Your course convenor will be using this framework to assess your work and as a way to assess whether you have met the listed learning outcomes and the graduate attributes for your program. We ask that you don't use the assessment criteria guidelines as a checklist, but as a tool to assess the quality of your work. Your course convenor will also be looking at the quality, creativity and the presentation of your written assignment as they review the framework. Rubrics, wherever applicable, will be provided at the time of the assignment release.

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. Please note, a competency hurdle of 50% is applied to the final assessment.

Late Submission of an Assignment

Full marks for an assignment are only possible when an assignment is received by the due date.

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.

Late submission will not be accepted and will be considered as no submission.

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 Mining Engineering 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

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.microsoftcrmportals.com/web-forms/>
- Course inquiries should be directed to the Course Convenor

Image Credit

Synergies in Sound 2016

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	