



UNSW Course Outline

MINE8860 Drilling, Blasting and Machine Excavation - 2024

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General Course Information

Course Code : MINE8860

Year : 2024

Term : Term 3

Teaching Period : T3

Is a multi-term course? : No

Faculty : Faculty of Engineering

Academic Unit : School of Minerals & Energy Resources Engineering

Delivery Mode : In Person

Delivery Format : Standard

Delivery Location : Kensington

Campus : Sydney

Study Level : Postgraduate

Units of Credit : 6

Useful Links

[Handbook Class Timetable](#)

Course Details & Outcomes

Course Description

The course will address the mechanics and practical applications and current technologies in rock fragmentation; theories of rock breakage and fragmentation; rock mass properties; structure and discontinuities and their impact on blast behaviour. Blasting theories and types of

explosives and blast initiation procedures; blast designs for both underground and surface mining applications; blast hazard management; blast vibration and impact on structures and mining excavations; state-of-the-art blasting practices and technologies; and alternatives to conventional blasting for rock fragmentation.

Production drilling methods and equipment, bits and drilling accessories.

Principles of coal and rock cutting mechanics; the performance of picks and free rolling cutters; cutting tool interaction; the design of cutting arrays for machine mining and tunnelling; impact breakage of rock; drill bit design and breakage mechanics; cutting tool materials and the effects of wear; methods of assessing rock cuttability; water jet cutting and water jet assisted drilling and cutting. Applications including full face and partial mining machines, drilling technologies and tunnel boring machines will be reviewed.

Course Aims

This course aims to equip the student with knowledge and skills to design and select appropriate rock breakage techniques for different mining applications.

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Explain the contribution and influence of rock breakage to the stream of mining processes and in particular the mine-to-mill concept.
CLO2 : Describe the various methods of rock breakage.
CLO3 : Select appropriate methods of drilling and rock breakage for given in-situ rock conditions.
CLO4 : Apply fundamental principles to the design and selection of safe and efficient blasting and machine mining to: design blasts to achieve particular outcomes manage and control blast damage and environmental impacts optimise design of cutterheads evaluate productivity and economics
CLO5 : Identify relevant requirements for the security, storage and handling of explosives.

Course Learning Outcomes	Assessment Item
CLO1 : Explain the contribution and influence of rock breakage to the stream of mining processes and in particular the mine-to-mill concept.	<ul style="list-style-type: none">• Machine Excavation Quiz• D&B Quiz
CLO2 : Describe the various methods of rock breakage.	<ul style="list-style-type: none">• Design Report for D&B• Machine Excavation Quiz
CLO3 : Select appropriate methods of drilling and rock breakage for given in-situ rock conditions.	<ul style="list-style-type: none">• Major Project Report for D&B• Design Report for D&B• D&B Quiz• Machine Excavation Quiz
CLO4 : Apply fundamental principles to the design and selection of safe and efficient blasting and machine mining to: design blasts to achieve particular outcomes manage and control blast damage and environmental impacts optimise design of cutterheads evaluate productivity and economics	<ul style="list-style-type: none">• Major Project Report for D&B• Design Report for D&B
CLO5 : Identify relevant requirements for the security, storage and handling of explosives.	<ul style="list-style-type: none">• Major Project Report for D&B

Learning and Teaching Technologies

Moodle - Learning Management System

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Machine Excavation Quiz Assessment Format: Individual	20%	Start Date: The first day of lecture Due Date: 30 October 2024
Design Report for D&B Assessment Format: Individual	24%	Start Date: the first day of lecture Due Date: 30 October 2024
Major Project Report for D&B Assessment Format: Individual	40%	Start Date: the first day of lecture Due Date: 30 October 2024
D&B Quiz Assessment Format: Individual	16%	Start Date: The first day of lecture Due Date: 30 October 2024

Assessment Details

Machine Excavation Quiz

Assessment Overview

To assess all aspects of machine mining covered in the class

Feedback will be provided via the learning management system (LMS)

Course Learning Outcomes

- CLO1 : Explain the contribution and influence of rock breakage to the stream of mining processes and in particular the mine-to-mill concept.
- CLO2 : Describe the various methods of rock breakage.
- CLO3 : Select appropriate methods of drilling and rock breakage for given in-situ rock conditions.

Detailed Assessment Description

Multi-choice questions

Assignment submission Turnitin type

Not Applicable

Generative AI Permission Level

Not Applicable

Generative AI is not considered to be of assistance to you in completing this assessment. If you do use generative AI in completing this assessment, you should attribute its use.

For more information on Generative AI and permitted use please see [here](#).

Design Report for D&B

Assessment Overview

Individual report for blast design and safety evaluation.

Feedback will be provided via the learning management system (LMS)

Course Learning Outcomes

- CLO2 : Describe the various methods of rock breakage.
- CLO3 : Select appropriate methods of drilling and rock breakage for given in-situ rock conditions.
- CLO4 : Apply fundamental principles to the design and selection of safe and efficient blasting and machine mining to: design blasts to achieve particular outcomes manage and control blast damage and environmental impacts optimise design of cutterheads evaluate productivity and economics

Detailed Assessment Description

Detailed rubric will be provided during the class.

Assignment submission Turnitin type

Not Applicable

Generative AI Permission Level

No Assistance

This assessment is designed for you to complete without the use of any generative AI. You are not permitted to use any generative AI tools, software or service to search for or generate information or answers.

For more information on Generative AI and permitted use please see [here](#).

Major Project Report for D&B

Assessment Overview

Major project report to prepare blast design, costing and other analyses for a surface or underground mining operation.

Feedback will be provided via the learning management system (LMS)

Course Learning Outcomes

- CLO3 : Select appropriate methods of drilling and rock breakage for given in-situ rock conditions.
- CLO4 : Apply fundamental principles to the design and selection of safe and efficient blasting

and machine mining to: design blasts to achieve particular outcomes manage and control blast damage and environmental impacts optimise design of cutterheads evaluate productivity and economics

- CLO5 : Identify relevant requirements for the security, storage and handling of explosives.

Assignment submission Turnitin type

Not Applicable

Generative AI Permission Level

No Assistance

This assessment is designed for you to complete without the use of any generative AI. You are not permitted to use any generative AI tools, software or service to search for or generate information or answers.

For more information on Generative AI and permitted use please see [here](#).

D&B Quiz

Assessment Overview

To assess all aspects of D&B covered in the class

Feedback will be provided via the learning management system (LMS)

Course Learning Outcomes

- CLO1 : Explain the contribution and influence of rock breakage to the stream of mining processes and in particular the mine-to-mill concept.
- CLO3 : Select appropriate methods of drilling and rock breakage for given in-situ rock conditions.

Assignment submission Turnitin type

Not Applicable

Generative AI Permission Level

No Assistance

This assessment is designed for you to complete without the use of any generative AI. You are not permitted to use any generative AI tools, software or service to search for or generate information or answers.

For more information on Generative AI and permitted use please see [here](#).

General Assessment Information

Grading Basis

Standard

Course Schedule

Attendance Requirements

Please note that lecture recordings are not available for this course. Students are strongly encouraged to attend all classes and contact the Course Authority to make alternative arrangements for classes missed.

General Schedule Information

Learning Activities Summary for each day will be provided on the Moodle.

Course Resources

Prescribed Resources

Further information on Course Resources will be provided on Moodle.

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
	Joung Oh					No	Yes

Other Useful Information

Academic Information

I. Special consideration and supplementary assessment

If you have experienced an illness or misadventure beyond your control that will interfere with your assessment performance, you are eligible to apply for Special Consideration prior to, or within 3 working days of, submitting an assessment or sitting an exam.

Please note that UNSW has a Fit to Sit rule, which means that if you sit an exam, you are declaring yourself fit enough to do so and cannot later apply for Special Consideration.

For details of applying for Special Consideration and conditions for the award of supplementary assessment, please see the information on UNSW's [Special Consideration page](#).

II. Administrative matters and links

All students are expected to read and be familiar with UNSW guidelines and policies. In particular, students should be familiar with the following:

- [Attendance](#)
- [UNSW Email Address](#)
- [Special Consideration](#)
- [Exams](#)
- [Approved Calculators](#)
- [Academic Honesty and Plagiarism](#)
- [Equitable Learning Services](#)

III. Equity and diversity

Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with the course convener prior to, or at the commencement of, their course, or with the Equity Officer (Disability) in the Equitable Learning Services. Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made.

IV. Professional Outcomes and Program Design

Students are able to review the relevant professional outcomes and program designs for their streams by going to the following link: <https://www.unsw.edu.au/engineering/student-life/student-resources/program-design>.

Note: This course outline sets out the 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 or your primary learning management system (LMS) 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/Moodle/LMS, the description in the Course Outline/Moodle/LMS applies.

Academic Honesty and Plagiarism

UNSW has an ongoing commitment to fostering a culture of learning informed by academic integrity. All UNSW students have a responsibility to adhere to this principle of academic integrity. Plagiarism undermines academic integrity and is not tolerated at UNSW. *Plagiarism at UNSW is defined as using the words or ideas of others and passing them off 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. UNSW has produced a website with a wealth of resources to support students to understand and avoid plagiarism, visit: student.unsw.edu.au/plagiarism. The Learning Centre assists students with understanding academic integrity and how not to plagiarise. They also hold workshops and can help students one-on-one.

You are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting and the proper referencing of sources in preparing all assessment tasks.

Repeated plagiarism (even in first year), plagiarism after first year, or serious instances, may also be investigated under the Student Misconduct Procedures. The penalties under the procedures can include a reduction in marks, failing a course or for the most serious matters (like plagiarism in an honours thesis or contract cheating) even suspension from the university. The Student Misconduct Procedures are available here:

www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf

Submission of Assessment Tasks

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, per calendar day.

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 clearly 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;
- Exams, peer feedback and team evaluation surveys;
- Online quizzes where answers are released to students on completion;
- Professional assessment tasks, where the intention is to create an authentic assessment that has an absolute submission date; and,
- Pass/Fail assessment tasks.

Faculty-specific Information

[Engineering Student Support Services](#) – The Nucleus - enrolment, progression checks, clash requests, course issues or program-related queries

[Engineering Industrial Training](#) – Industrial training questions

[UNSW Study Abroad](#) – study abroad student enquiries (for inbound students)

[UNSW Exchange](#) – student exchange enquiries (for inbound students)

[UNSW Future Students](#) – potential student enquiries e.g. admissions, fees, programs, credit transfer

Phone

(+61 2) 9385 8500 – Nucleus Student Hub

(+61 2) 9385 7661 – Engineering Industrial Training

(+61 2) 9385 3179 – UNSW Study Abroad and UNSW Exchange (for inbound students)

School-specific Information

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.

Submission of Assessment Tasks

We encourage you to retain a copy of every assignment submitted for your own record, either in hardcopy or electronic form. All assessments must have an assessment cover sheet attached (if required).

Student Resources

The School has [student resources](#) section, containing useful advice and information to ensure you're able to focus on your studies.

Computing Resources and Internet Access Requirements

UNSW Minerals and Energy Resources Engineering provides blended learning using the online Moodle LMS (Learning Management System). Also see - Transitioning to Online Learning:
<https://www.student.unsw.edu.au/transitioning-online-learning>

Note that some specialist engineering software is not available for Mac computers.

- Mining Engineering Students: OMB G48
- Petroleum Engineering Students: TETB LG34 & LG35

For 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

School Contact Information

School of Minerals and Energy Resources
Old Main Building, Level 1, 159 (K15)
UNSW SYDNEY NSW 2052 AUSTRALIA

For current students, all enquiries and assistance relating to enrolment, class registration, progression checks and other administrative matters, please see [The Nucleus: Student Hub](#).

Web & Important Links:

[School of Minerals and Energy Resources](#)

[The Nucleus Student Hub](#)

[Moodle](#)

[UNSW Handbook](#)

[UNSW Timetable](#)

[Student Wellbeing](#)

[Urgent Mental Health & Support](#)

[Equitable Learning Services](#)