



## UNSW Course Outline

# MINE8140 Mining Geomechanics - 2024

Published on the 24 May 2024

## General Course Information

**Course Code :** MINE8140

**Year :** 2024

**Term :** Term 2

**Teaching Period :** T2

**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

This course is designed to introduce engineers and geologists to the major geomechanics components associated with mining operations, primarily underground: from resource evaluation and mine design to daily operations. The course will cover both coal and metalliferous

operations. It is, therefore, ideally suited to engineers or geologists who have an understanding and experience in the mining industry but are seeking to develop more specialist skills in the geomechanics field.

The course content will include the following components:

- Site investigation
- Rock mass classification
- Rock fragmentation
- Mine Design issues
- Caving prediction and control
- Role and application of reinforcement systems
- Geotechnical instrumentation, stress analysis and stability evaluation around complex excavations
- Ground control management and environmental geomechanics.

The course is structured to provide an initial overview of basic principles and terminology plus the major geomechanical properties and behavioural characteristics of rock material. This then leads into the application of these principles to the practical issues of site investigation, excavation design and ground reinforcement.

An important component will be an emphasis on the interdependencies between geotechnical parameters and mine design/operational decisions and requirements. The link between geological and engineering disciplines is an important component in successfully managing these dependencies.

The course will be presented through a series of lectures, facilitated discussion sessions and case studies, but will also include practical tutorial sessions and laboratory exercises.

## **Course Aims**

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

# Course Learning Outcomes

Course Learning Outcomes
CL01 : Describe the basic mechanical properties of rock and how these are applied to analyse problems in mining geomechanics.
CL02 : Demonstrate a sound working knowledge of fundamental mechanisms and geotechnical principles within the context of practical mining applications.
CL03 : Recognise the role and importance of these principles in a comprehensive range of mining applications, both from a technical perspective, and from the risk and operational management perspective.
CL04 : Show a good understanding of key numerical methods used in mining rock mechanics.

Course Learning Outcomes	Assessment Item
CL01 : Describe the basic mechanical properties of rock and how these are applied to analyse problems in mining geomechanics.	<ul style="list-style-type: none"><li>• Rock mechanics laboratory work</li><li>• Rock mass classification &amp; hard rock design study</li><li>• Major Assignment</li></ul>
CL02 : Demonstrate a sound working knowledge of fundamental mechanisms and geotechnical principles within the context of practical mining applications.	<ul style="list-style-type: none"><li>• Rock mechanics laboratory work</li><li>• Rock mass classification &amp; hard rock design study</li><li>• Major Assignment</li></ul>
CL03 : Recognise the role and importance of these principles in a comprehensive range of mining applications, both from a technical perspective, and from the risk and operational management perspective.	<ul style="list-style-type: none"><li>• Rock mass classification &amp; hard rock design study</li><li>• Major Assignment</li></ul>
CL04 : Show a good understanding of key numerical methods used in mining rock mechanics.	<ul style="list-style-type: none"><li>• Rock mechanics laboratory work</li><li>• Major Assignment</li></ul>

## Learning and Teaching Technologies

Moodle - Learning Management System | Microsoft Teams

## Additional Course Information

This course assumes a student has knowledge of:

- basic mining and geological terms and descriptions;
- as this is a technical course in a postgraduate program, a fundamental understanding of mathematics and physics is required.

# Assessments

## Assessment Structure

Assessment Item	Weight	Relevant Dates
Rock mechanics laboratory work Assessment Format: Individual	20%	
Rock mass classification & hard rock design study Assessment Format: Individual	30%	
Major Assignment Assessment Format: Individual	50%	

## Assessment Details

### Rock mechanics laboratory work

#### Assessment Overview

The assessment involves a comprehensive evaluation of the mechanical properties of sandstone samples under various testing conditions.

Marking will be against assessment criteria and formal feedback on the assessment task will be provided after the marking is finalised.

#### Course Learning Outcomes

- CL01 : Describe the basic mechanical properties of rock and how these are applied to analyse problems in mining geomechanics.
- CL02 : Demonstrate a sound working knowledge of fundamental mechanisms and geotechnical principles within the context of practical mining applications.
- CL04 : Show a good understanding of key numerical methods used in mining rock mechanics.

### Rock mass classification & hard rock design study

#### Assessment Overview

The assessment involves an assessment of the support requirements for an access decline, the stability of open stops, and advice on the corresponding geotechnical instrumentation program.

Marking will be against assessment criteria and formal feedback on the assessment task will be provided after the marking is finalised.

#### Course Learning Outcomes

- CL01 : Describe the basic mechanical properties of rock and how these are applied to analyse problems in mining geomechanics.

- CL02 : Demonstrate a sound working knowledge of fundamental mechanisms and geotechnical principles within the context of practical mining applications.
- CL03 : Recognise the role and importance of these principles in a comprehensive range of mining applications, both from a technical perspective, and from the risk and operational management perspective.

## Major Assignment

### Assessment Overview

The assessment includes topics for both general geomechanics and underground coal geomechanics. A technical report is required to address the provided questions.

Marking will be against assessment criteria and formal feedback on the assessment task will be provided after the marking is finalised.

### Course Learning Outcomes

- CL01 : Describe the basic mechanical properties of rock and how these are applied to analyse problems in mining geomechanics.
- CL02 : Demonstrate a sound working knowledge of fundamental mechanisms and geotechnical principles within the context of practical mining applications.
- CL03 : Recognise the role and importance of these principles in a comprehensive range of mining applications, both from a technical perspective, and from the risk and operational management perspective.
- CL04 : Show a good understanding of key numerical methods used in mining rock mechanics.

## General Assessment Information

Further information about course assessments will be provided on Moodle.

### Grading Basis

Standard

## Course Schedule

### Attendance Requirements

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

## General Schedule Information

This is a five day block course, and the course schedule is provided in the course program in Moodle.

# Course Resources

## Recommended Resources

- Rock Mechanics for Underground Mining GHG Brady & ET Brown, 3rd edition, Kluwer Academic Press, 2004.
- Rock Mechanics and the Design of Structures in Rock. L Obert & WI Duvall, John Wiley & Sons (1967)
- Fundamentals of Rock Mechanics, JC Jaeger & NGW Cook, Chapman & Hall (1979).
- Rock Fracture Mechanics. BN Whittaker, RN Singh & G Sun, Elsevier (1992).
- Coal Mine Ground Control. SS Peng, John Wiley & Sons (1986).
- Geotechnical Instrumentation and Monitoring in Open Pit and Underground Mining. T Szwedzicki (ed.), AA Balkema (1993).
- Rock Support in Mining and Underground Construction. PK Kaiser & DR McCreath (eds.), AA Balkema (1992).
- Rock Slope Engineering. E Hoek & JW Bray, Inst. of Mining & Metallurgy, London (1994).
- Rockbursts in Coal Mines and their Prevention. G Brauner, AA Balkema (1994).
- Australian Coal Mining Practice – Monograph 12. AJ Hargraves, CH Martin (eds.), AusIMM (1975).
- Subsidence Engineers' Handbook. National Coal Board (1975).
- Rock Support and Reinforcement Practice in Mining. E Villaescusa, C Windsor & A Thompson (eds.), AA Balkema (1999).
- Cablebolting in Underground Mines. D Hutchinson & M Diederichs, BiTech Publishers (1996).
- ISRM Online Journals
  - (Note: This is not intended to be a complete list, but a guide only.)

## 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. Your feedback is taken seriously, and continual improvements are made to the course based, in part, on such feedback.

## Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	Chengguo Zhang		R159, Old main building K15, UNSW Sydney	9385 4035		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](http://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](http://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: [www.covid19studyonline.unsw.edu.au](http://www.covid19studyonline.unsw.edu.au)

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](http://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](http://www.moodle.telt.unsw.edu.au)

## School Contact Information

School of Minerals and Energy Resources Engineering  
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](#)