

# MINE5060

Operational Geotechnical Management (Underground Coal Mining)

Term 2, 2023



## Course Overview

### Staff Contact Details

#### Convenors

Name	Email	Availability	Location	Phone
Ismet Canbulat	<a href="mailto:i.canbulat@unsw.edu.au">i.canbulat@unsw.edu.au</a>	By appointment	159G	93820721

### 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](#)

## Course Details

### Units of Credit 6

### Summary of the Course

Risk assessment methodologies and core geotechnical risks in underground and open cut mining; geotechnical risk management strategies; preparation of strata control management plans; geotechnical hazard mapping; geotechnical instrumentation; role and design of geotechnical measurement and monitoring systems; underground data collection; rock fall recovery techniques; geotechnical audits, quality assurance; geotechnical variability and dealing with non-compliance; geotechnical training; safe operating procedures; use of specialist consultants; geotechnical reporting and management interaction; professional responsibilities and accountabilities.

### Course Aims

This course aims to equip the student with knowledge and skills in practical operational geotechnical management and other relevant processes and systems for all stages of mining operations, including design and implementation. It will also cover the duty of care, current legislation and the responsibilities of geotechnical engineers working in the industry, design elements of documentation, communication and training with the aim of safe and efficient mining operations.

### Course Learning Outcomes

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

Learning Outcome	EA Stage 1 Competencies
1. Knowledge of risk management and assessment methodologies and core geotechnical risks in underground coal mining	PE1.4, PE2.4, PE3.1
2. Practical considerations in preparation of strata control management plans and hazard mapping	PE1.3, PE2.3, PE3.2
3. Knowledge of geotechnical instrumentation and the geotechnical measurement and monitoring systems	PE1.3, PE1.5, PE2.1
4. Understanding of geotechnical training and safe operating procedures	PE1.5, PE3.3, PE3.4
5. Knowledge of the legislation and the role of professional responsibilities and accountabilities	PE2.4

### Teaching Strategies

Please refer to the information in Moodle

## Assessment

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. H&S regulation	35%	02/07/2023 11:59 PM	1, 4, 5
2. Conflicting advice	35%	16/07/2023 11:59 PM	1, 2, 3, 4, 5
3. Crandall Canyon	30%	30/07/2023 12:59 PM	1, 2, 3, 4

### Assessment 1: H&S regulation

**Due date:** 02/07/2023 11:59 PM

Analyse the relevant Health and Safety Act(s) and the Regulation(s) in your relevant State and answer the following questions:

1. What are the relevant Act(s) and Regulation(s) regarding the coal mine strata control?
2. What other specific Codes of Practices (or similar) are available in your state or other states related to strata control? Provide a summary of them.
3. Which are the specific sections in the Act(s) and Regulation(s) regarding the strata control?
4. What are the requirements?
5. What are the process and systems you have at your operation to meet all requirements of the legislation? (please explain them one-by-one rather than stating only Principal Hazard Management Plan)?
6. What additional process/systems would you recommend for your mine and why

This assignment is submitted through Turnitin and students can see Turnitin similarity reports.

### Assessment criteria

See Moodle for the assessment criteria.

### Assessment 2: Conflicting advice

**Due date:** 16/07/2023 11:59 PM

You are a Strata Control Officer at an operating underground coal mine, having successfully completed your Graduate Diploma in Coal Mine Strata Control from UNSW. The mine is developing into a new part of the lease and you have engaged the services of two different geotechnical consultants to prepare and advise on appropriate ground control management plans, specifically with respect to design of chain and

mains pillars.

The two consultants provide two quite different responses. One consultant advises a relatively smaller pillars, at least for the first period, which will represent some significant operational productivity benefits. The second consultant recommends larger pillars, with potentially reduced development rates. The mine manager is aware of the recommendations and favours the first one which she/he determines to go with.

1. How do you respond to this situation at this time? Discuss the process of consultant engagement, consultation, management decision making and subsequent actions for this scenario.
2. Provide some further appropriate and realistic responses to the scenario (including discussions relating to professional responsibilities and duty of care), in the case of three subsequent alternative outcomes:
  - The first recommendation adopted by the manager proves appropriate for the first longwall, and then the next set of pillars need to be designed.
  - In the second longwall panel, there are significant tailgate stability issues, which decreases the retreat rates of longwall.
  - During the course of the second longwall retreat, the tailgate conditions deteriorate, and a major roof fall occurs within a pillar length of the face and results in a fatality to one of the crew.

### **Assessment criteria**

See Moodle for the assessment criteria

### **Assessment 3: Crandall Canyon**

**Due date:** 30/07/2023 12:59 PM

Using your own specialist geotechnical and professional thinking (please do not be constrained by the US findings), review the overall report of the Crandall Canyon incident (USA 2007). Based on your own assessment of the issues:

1. identify and discuss the roles of the mine management;
2. the approval authority;
3. the geotechnical consultants;
4. any other parties – in terms of their professional responsibilities with respect to what was done wrongly; and
5. what should have been done to avoid this accident (if it had been a mine in Australia)?
6. what could you have done differently if you were the geotechnical engineer at Crandall Canyon Mine during the planning stage, and during mining before the incident?

### **Assessment criteria**

See Moodle for the assessment criteria.

## **Attendance Requirements**

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

## **Course Schedule**

This course will be presented in a block mode. Please refer to Moodle for the detailed course program.

## Resources

### Recommended Resources

There are no required textbooks for this program. The recommended references include:

- Galvin, J.M. (2016). Ground Engineering Principles and Practices for Underground Coal Mining. Springer International Publishing. ISBN 978-3-319-25003-8. DOI 10.1007/978-3-319-25005-2.
- Bieniawski, Z.T. (1984). Rock mechanics design in mining and tunnelling, A.A. Balkema, Rotterdam.
- Bieniawski, Z.T. (1987). Strata control in mineral engineering, John Wiley and Sons. pp. 29-37.
- Bieniawski, Z.T. (1989). Engineering rock mass classifications. Wiley, NY, 251 pp.
- Brady, B. H. G., and Brown, E. T. (2006). Rock Mechanics for Underground Mining. (Third ed.). Cordrecht: Springer.
- Deep Mines Coal Industry Advisory Committee (DMCIDC), (1996). Guidance on the use of rockbolts to support roadways in coal mines. HSE Books, UK.
- Deep Mines Coal Industry Advisory Committee, Health and Safety Commission. (1996). Guidance on the use of rockbolts to support roadways in coal mines.
- Hoek, E. (2007). Practical Rock Engineering. Rocscience Hoek's corner. <http://www.rocscience.com/hoek/Hoek.asp>.
- Hoek, E. and Brown, E. T. (1980). Underground excavations in rock. Institution of Mining and Metallurgy.
- Hoek, E., Kaiser, P. K., and Bawden, W. F. (1995). Support of Underground Excavations in Hard Rock. Rotterdam: A.A. Balkema.
- Hutchinson, D. J., and Diederichs, M. S. (1996). Cablebolting in Underground Mines. Richmond, BC: BiTech Publishers.
- Jaeger, J. C., and Cook, N. G. W. (1979). Fundamentals of Rock Mechanics (Third ed.). London: Chapman and Hall.
- Peng, S.S. (1986). Coal mine ground control, 2nd edition, John Wiley and Sons, Inc. U.S.A.
- Van der Merwe, J.N. and Madden, B.J. (2002). Rock engineering for coal mining. Safety in Mines Research Advisory Committee (SIMRAC). SAIMM Special Publications Series 7. April.

During the program many other publications and papers will be available in Moodle.

## 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 Assignment

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 may be eligible for special consideration, when an illness or other short-term events beyond your control (exceptional circumstances) affect your assessment performance. More details on special consideration can be found at: [www.student.unsw.edu.au/special-consideration](http://www.student.unsw.edu.au/special-consideration)

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.



## 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](http://www.library.unsw.edu.au)
- Academic Skills Support - <https://www.student.unsw.edu.au/skills>
- Psychology and Wellness - [www.counselling.unsw.edu.au](http://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](http://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 academic skills, please contact the Academic Skills Support or view some of the resources on their website: <https://www.student.unsw.edu.au/skills>. The Academic Skills Team can provide resources, support and assistance to help you improve your academic 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](http://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

### Student Resources

This engineering [student resources](#) section collates 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 on-line Moodle LMS (Learning Management System). Also see - Transitioning to Online Learning: [www.covid19studyonline.unsw.edu.au](http://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](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)

*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

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	