UNSW Course Outline

MINE8680 Geotechnical Data Collection and Analysis - 2024

Published on the 15 May 2024

General Course Information

Course Code : MINE8680
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

The course is designed to cover a broad range of geotechnical data from instrumentation, testing and rock mass characterisation including stress measurement data. Emphasis is placed on data interpretation and the role of statistics in geomechanics for design, study and

operational management. Throughout the course, practical examples of the use and misuse of data, including empirical databases will be emphasised to demonstrate the importance of understanding data before its application in design and numerical modelling. Assessment in the course will consist of a series of assignments outside lectures and an in-class examination for proof of practical competence and understanding in all of the above areas. The course content will include the following components:

1. Instrumentation in geotechnical engineering
2. Statistics for scientists and engineers
3. Data collection and interpretation for rock mass characterisation and classification
4. Data collection practices in coal mines
5. Remote monitoring applications: Pit slope monitoring
6. Empirical design databases
7. Seismic and microseismic data acquisition, processing and applications
8. Data interpretation
9. Geomechanics data uncertainty and management

Course Aims

This course aims to equip the student with the importance of instrumentation and monitoring, the importance of understanding empirical databases in geotechnical design and the benefits and limitations of statistics in geoengineering. Use of sound engineering judgement and critical thinking in geomechanics is emphasised.

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Discuss the significance of data in geo-engineering as input in numerical models and for their validation.
CLO2 : Recognise the importance of data in the development of empirical design procedures and as a means of monitoring design performance.
CLO3 : Identify the difference between theoretical statistics and its pitfalls in geomechanics when used without sound engineering judgement.
CLO4 : Develop an ability to communicate with mine geologists to create geotechnical models for mines with complex geologies.
CLO5 : Recognise, assess and interpret the geological data collected by different means and relate them with geotechnical challenges
CLO6 : Analyse and evaluate the data with respect to geotechnical problems to produce outputs that can be used as a basis for engineering design

Course Learning Outcomes	Assessment Item
CLO1 : Discuss the significance of data in geo-engineering as input in numerical models and for their validation.	• Individual report – rock characterisation
CLO2 : Recognise the importance of data in the development of empirical design procedures and as a means of monitoring design performance.	• Individual report – instrumentation and data analysis for mine design • Individual report – rock characterisation
CLO3 : Identify the difference between theoretical statistics and its pitfalls in geomechanics when used without sound engineering judgement.	• Individual report – rock characterisation
CLO4 : Develop an ability to communicate with mine geologists to create geotechnical models for mines with complex geologies.	• Individual report – instrumentation and data analysis for mine design • Individual report – rock characterisation
CLO5 : Recognise, assess and interpret the geological data collected by different means and relate them with geotechnical challenges	• Individual report – seismic monitoring and data analysis • Individual report – rock characterisation
CLO6 : Analyse and evaluate the data with respect to geotechnical problems to produce outputs that can be used as a basis for engineering design	• Individual report – seismic monitoring and data analysis • Individual report – instrumentation and data analysis for mine design • Individual report – rock characterisation

Learning and Teaching Technologies

Moodle - Learning Management System | Microsoft Teams

Learning and Teaching in this course

Link to Course MS Teams

https://teams.microsoft.com/l/team/19%3AyYlkXxzGhgnySqQVmnadG-AFVyLG66bIpft7XrzWBRU1%40thread.tacv2/conversations?groupId=4e9713b7-4d3e-446b-b2f0-ae7bf69a9363&tenantId=3ff6cfa4-e715-48db-b8e1-0867b9f9fba3

Additional Course Information

You will need to bring a notebook computer, with Wi-Fi connection to be able to participate in the In-class activities.

Assumed Knowledge

This course assumes that a student:

- has completed MINE8140 Mining Geomechanics or equivalent. Consideration will be given to candidates with significant underground mining experience for which case permission should be sought.; and
- has a sound knowledge of mining terms and systems and has had previous exposure to mining operations through industry employment and/or field trips.

Graduate Attributes

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

appropriate technical knowledge having advanced problem solving, analysis and assessment skills with the ability to tolerate ambiguity ability for engineering design and creativity awareness of opportunities to add value through engineering and the need for continuous improvement being able to work and communicate effectively across discipline boundaries having HSEC consciousness being active life-long learners.

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Individual report – instrumentation and data analysis for mine design Assessment Format: Individual Short Extension: Yes (7 days)	30%	Due Date: 14/07/2024 11:59 PM
Individual report – seismic monitoring and data analysis Assessment Format: Individual Short Extension: Yes (7 days)	40%	Due Date: 28/07/2024 11:59 PM
Individual report – rock characterisation Assessment Format: Individual Short Extension: Yes (7 days)	30%	Due Date: 04/08/2024 11:59 PM

Assessment Details

Individual report – instrumentation and data analysis for mine design

Assessment Overview

This assignment focuses on monitoring instrumentation and geomechanics in mining engineering. Students will explore various classes of monitoring instrumentation commonly used in mining geomechanics and analyse their applications, benefits, limitations, and key considerations. Additionally, the students will also utilise stress measurement data to determine the optimal panel orientation for longwall mining.

Course Learning Outcomes

- CLO2 : Recognise the importance of data in the development of empirical design procedures and as a means of monitoring design performance.
- CLO4 : Develop an ability to communicate with mine geologists to create geotechnical models for mines with complex geologies.
- CLO6 : Analyse and evaluate the data with respect to geotechnical problems to produce outputs that can be used as a basis for engineering design

Assignment submission Turnitin type

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

Individual report – seismic monitoring and data analysis

Assessment Overview

This assignment centres on the application of seismic methods for geotechnical purposes.

Course Learning Outcomes

- CLO5 : Recognise, assess and interpret the geological data collected by different means and relate them with geotechnical challenges
- CLO6 : Analyse and evaluate the data with respect to geotechnical problems to produce outputs that can be used as a basis for engineering design

Assignment submission Turnitin type

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

Individual report – rock characterisation

Assessment Overview

This assignment centres on widely utilised rock mass classification methods for mining and civil construction. Students will explore the databases and parameters associated with these methods. Additionally, they will examine the assumptions of the systems for various applications.

Course Learning Outcomes

- CLO1 : Discuss the significance of data in geo-engineering as input in numerical models and for their validation.
- CLO2 : Recognise the importance of data in the development of empirical design procedures and as a means of monitoring design performance.
- CLO3 : Identify the difference between theoretical statistics and its pitfalls in geomechanics when used without sound engineering judgement.
- CLO4 : Develop an ability to communicate with mine geologists to create geotechnical models for mines with complex geologies.
- CLO5 : Recognise, assess and interpret the geological data collected by different means and

relate them with geotechnical challenges
- CLO6 : Analyse and evaluate the data with respect to geotechnical problems to produce outputs that can be used as a basis for engineering design

Assignment submission Turnitin type

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

General Assessment Information

Course Completion

Course completion requires: submission of all assessment items; failure to submit all assessment items will result in the award of an Unsatisfactory Failure (UF) grade for the Course.

Assessment Requirements

- All the course materials and assignments will be available online through Moodle. Access to the Moodle site is via the Moodle icon on the MyUNSW homepage, or at https://moodle.telt.unsw.edu.au

When

- As indicated above and on moodle.
- Early submission is required in cases where the student will otherwise be absent on the due date of submission.
- Prior to submission, students should read the School Policy on Assignment Submissions.
- In particular, the student should make sure they have read and understood the:

- Declaration of Academic Integrity;

- Assignment Submission requirements detailed in the University Policies section of the Course Outline; and

- School Policy on Assignment Submission available on the School's website (the web address is given in the Course Outline). In particular note the requirement that only PDF documents should be uploaded and the required file naming convention.

Where

- Submissions must be made electronically through Turnitin in Moodle unless otherwise stated. Turnitin is a plagiarism checking service that will retain a copy of the assessment item on its database for the purpose of future plagiarism checking.

What

- The submission must be:
  - a single document in PDF format; and
  - prepared in the form of a formal report that includes a list of reference sources cited in the report, prepared in accordance with the report writing standards of the School as contained in the MEA Report Writing Guide for Mining Engineers. A copy can be obtained from the UNSW Bookshop or downloaded from the School webpage.

How

- The submitted document must be consistent with the following file naming convention: FamilyNameInitialsCourseCodeAssignmentNumber.pdf .
- A typical complaint filename would take the following form SmithPDMINE8680A01.pdf, which elements correspond to:
  - Family name of student: Smith
  - Initial(s) of student: PD
  - Course Code: MINE8680
  - Assignment number: A01...as defined in the Course Outline for the assessment task
  - File format: PDF document.

Grading Basis

Standard

Course Schedule

Teaching Week/Module	Activity Type	Content
Week 4 : 17 June - 23 June	Lecture	Monday 17th Jun 9:00 – 10:15 What to collect and how for rock mass characterisation 10:30 – 12:45 Q, RMR & GSI 12:45 –13:45 Lunch 13:45 – 15:00 Mine mapping 15:15 – 16:30 Source of stress in ground and management of stress Tuesday 18th June 9:30 – 12:30 Statistics for scientists and engineers - Describing Data - Modelling data - Visualising Data 12:30 – 13:15 Lunch 13:15– 17:00 Statistics for scientists and engineers (contd.) - Visualising Dada Cont. - Analysing Data Wednesday 19th June 9:00 – 10:30 Objectives of seismic monitoring in mines Basics of mine seismology: seismic waves and seismic sources, processing of the data 10:45 – 12:30 Seismic monitoring technologies Interpretation of seismic monitoring data 12:30 – 13:15 Lunch 13:15 – 16:30 Applications of seismic monitoring What can go wrong in seismic monitoring Thursday 20th June 9:00 – 11:30 Pit slope monitoring 11:30 – 12:30 Lunch 12:30 –13:45 Hard rock pillar design 14:00 – 15:30 Smart sensing technology for geotechnical data collection 15:30 – 16:30 Measurement parameters and methods in underground excavations and measurement data interpretation Friday 21st June 9:00 – 11:00 Selection and installation of monitoring systems, including SMART support systems - Underground monitoring 11:00 – 12:00 Floor heave in coal mines 12:00 – 12:15 Closing remarks

Attendance Requirements

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

Course Resources

Prescribed Resources

Reference Materials

Recommended Resources

Extra resources are available on the moodle.

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	Hamed Lamei Ramandi		Room 156, 1st Floor, Old Main Building, UNSW Sydney, NSW 2052, Australia	61450508830		Yes	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 polices. 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 Plagarism

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: 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

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 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