UNSW Course Outline

MINE8940 Mine Slope Monitoring Technologies - 2024

Published on the 28 Aug 2024

General Course Information

Course Code : MINE8940
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

This course covers the instrumentation and monitoring devices available to the mining industry to monitor and manage pit slope movement. Students will be able to detail the different types of slope movement typically observed in excavated, constructed and dumped slopes, as well as the

various warning signs of instability. The course will discuss monitoring strategies (e.g. targeted, background monitoring), and the link to the range of monitoring instrumentation and tools available to geotechnical engineers to manage and track slope movement.

Practical cases are used to demonstrate why monitoring is required in pit slope risk management and the advantages and limitations of each tool (e.g., accuracy, precision, data corrections). Practical application and deployment of available monitoring instrumentation and devices will also be demonstrated through case studies and in-class demonstration. This includes estimating time to failure from radar monitoring data and using monitoring data to reconcile numerical models. Risk management strategies are also discussed using Trigger Action Response Plans, Critical Control Registers, and Geotechnical Hazard Alerts.

The intensive four-day course will include guest lectures from industry.

Course Aims

This course aims to equip the student with the knowledge and skills to design appropriate mine slope monitoring techniques and proficiently evaluate monitoring data to assess risk. Use of real world slope cases in short-course examples and assessment will assist students to relate demonstrated technologies and strategies to operating mine requirements. Interactive guest lectures by industry personnel will enhance the students learning experience and provide them connections to technical monitoring experts.

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Describe the principles of mine slope monitoring and identify the conventional and advanced mine slope monitoring technologies that are currently in use.
CLO2 : Summarise and compare the appropriateness and effectiveness of different monitoring techniques.
CLO3 : Design a most efficient monitoring technique for any particular surface mining application
CLO4 : Determine the role and importance of these techniques in a comprehensive range of surface mining applications, both from a technical perspective, and from the risk and operational management perspective.

Course Learning Outcomes	Assessment Item
CLO1 : Describe the principles of mine slope monitoring and identify the conventional and advanced mine slope monitoring technologies that are currently in use.	• Assignment 1 • Assignment 2
CLO2 : Summarise and compare the appropriateness and effectiveness of different monitoring techniques.	• Assignment 3 • Assignment 1 • Assignment 2
CLO3 : Design a most efficient monitoring technique for any particular surface mining application	• Assignment 1
CLO4 : Determine the role and importance of these techniques in a comprehensive range of surface mining applications, both from a technical perspective, and from the risk and operational management perspective.	• Assignment 3 • Assignment 1

Learning and Teaching Technologies

Moodle - Learning Management System

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Assignment 1 Assessment Format: Individual	30%	Start Date: 13/09/2024 05:00 PM Due Date: 17/11/2024 05:00 PM
Assignment 2 Assessment Format: Individual	20%	Start Date: 13/09/2024 05:00 PM Due Date: 17/11/2024 05:00 PM
Assignment 3 Assessment Format: Individual	50%	Start Date: 13/09/2024 05:00 PM Due Date: 17/11/2024 05:00 PM

Assessment Details

Assignment 1

Assessment Overview

Students is provided a scenario as below:

A new mine is being developed in a high rainfall environment. The pit has a planned depth of 400 m through highly weathered strata at the crest of the slope (top 50 m), and competent hard rock (bottom 350 m). Bedding, with varying degrees of weathering, are modelled to dip into the excavated pit. Shearing is possible along bedding planes. Photographs of a neighbouring excavation are provided. The new pit is expected to have similar rock mass conditions.

Students are required to identify the potential hazards and implement monitoring devices prior to and during operations and explain the reasons. Students are also required to develop a TARP for each monitoring instrument.

This assignment will be conducted by individual students. The assignment will be marked against assessment criteria and written feedback will be provided within a week after the marking process is completed.

Course Learning Outcomes

- CLO1 : Describe the principles of mine slope monitoring and identify the conventional and advanced mine slope monitoring technologies that are currently in use.
- CLO2 : Summarise and compare the appropriateness and effectiveness of different monitoring techniques.
- CLO3 : Design a most efficient monitoring technique for any particular surface mining application
- CLO4 : Determine the role and importance of these techniques in a comprehensive range of surface mining applications, both from a technical perspective, and from the risk and

operational management perspective.

Assignment submission Turnitin type

This assignment is submitted through Turnitin and students do not see Turnitin similarity reports.

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.

Assignment 2

Assessment Overview

During a routine field inspection, surficial cracks are observed along an active haul road. The haul road is the main route for heavy and light vehicles in and out of the pit. Identified cracking is situated 250 m above the current operating level (i.e. current pit is 250 m deep pit). A photo is provided. Students are required to select the appropriate monitoring technique and determine the inspection frequency. Students are also required to decide if the cracking should be communicated and provide an example of communicating if the answer is yes.

The aim of this assessment is to understand the fundamental principles of slope monitoring and their use in day-to-day operations. The students will be able to plan, design and utilise the appropriate slope monitoring technique.

This assignment will be conducted by individual students. The assignment will be marked against assessment criteria and written feedback will be provided within a week after the marking process is completed.

Course Learning Outcomes

- CLO1 : Describe the principles of mine slope monitoring and identify the conventional and advanced mine slope monitoring technologies that are currently in use.
- CLO2 : Summarise and compare the appropriateness and effectiveness of different monitoring techniques.

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Assignment 3

Assessment Overview

There are many different types of radar monitoring available. Students are required to write a report to list the advantages and limitations of RAR, SAR, LiDAR, Doppler and satellite monitoring data. Students are also required to list an application of where such monitoring should be deployed for each radar type.

This assignment will be conducted by individual students. The assignment will be marked against assessment criteria and written feedback will be provided within a week after the marking process is completed.

Course Learning Outcomes

- CLO2 : Summarise and compare the appropriateness and effectiveness of different monitoring techniques.
- CLO4 : Determine the role and importance of these techniques in a comprehensive range of surface mining applications, both from a technical perspective, and from the risk and operational management perspective.

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General Assessment Information

Grading Basis

Standard

Course Schedule

Attendance Requirements

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

General Schedule Information

Day 1 Tue 10 September (9:00-17:00)

- Topics: Introduction; Prisms; GNSS

Day 2 Wed 11 September (9:00-17:00)

- Topics: Radars; Real Apeture Radar; LiDar

Day 3 Thu 12 September (9:00-17:00)

- Topics: Geosensors; Piezometers; Monitoring data analytics

Day 4 Fri 13 September (9:00-17:00)

- Topics: Satellite; Integration of monitoring data and modelling software; Accompanying systems and processes for safe mining

Course Resources

Prescribed Resources

Further information on course resources will be provided in the lectures.

Recommended Resources

Further information on course resources will be provided in the lectures.

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	Binghao Li					No	Yes
	Alison McQuillan					No	No

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: 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