

MINE8120

Hazard Identification, Risk and Safety Management in Mining

Term 2, 2022



Course Overview

Staff Contact Details

Convenors

Name	Email	Availability	Location	Phone
Ismet Canbulat	i.canbulat@unsw.edu.au	Appointment or emails	OMB 156	0432003064

School Contact Information

School of Minerals and Energy Resources
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Course Details

Units of Credit 6

Summary of the Course

Welcome to MINE8120 Hazard Identification, Risk and Safety Management in Mining. This course looks at the principles of risk management and risk management concepts (such as losses, hazards, risks, controls/barriers, and risk analysis and assessment techniques) primarily in mining. Risk management systems and the integration of these systems into other management processes also form a major component of this course, which makes effective use of relevant case study material.

Course Aims

The aim of this course is to provide students with an appreciation of the broad range of risks faced by a mining operation, for which a dynamic range of risk management strategies are required from feasibility, planning and design, through to normal operations. These include economic risks, geological risks, environmental risks, external factors and influences, and of course health and safety risks. The module will introduce students to the processes of hazard identification, risk assessment, and a number of risk management strategies available. In the context of mining hazards and safety related risks, the course will also review a number of generic mine safety factors and how these manifest themselves in different mining systems and methods of mining.

Course Learning Outcomes

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

Learning Outcome	EA Stage 1 Competencies
1. Identify the core risks associated with major mining methods.	PE1.5, PE2.4, PE3.1
2. Assess the major risk assessment techniques available and in use in the industry, and be capable of conducting a simple risk assessment process.	PE1.3, PE3.2
3. Recognise the generic mine safety factors and hazards that exist or have potential to exist in mining operations, and demonstrate an awareness of how these are or can be dealt with.	PE1.4, PE3.1
4. Identify gaps in a risk management systems.	PE1.5, PE3.4

- Describe the importance of risk management for today's resource industry-ethical and sustainable aspects;
- Apply appropriate risk assessment tools, with reference and compliance to relevant minerals industry standards and guidelines;
- Identify and apply appropriate controls including the identification of critical controls
- Critique a risk management report, or management process, and formulate recommendations for implementation.
- Identify the core risks associated with major mining methods.

Teaching Strategies

The course is an intensive course and will run between 4th and 8th July with the following schedule:

Day.	Topic	Content/Activities
1	Introduction to Risk Management	Course introduction
		Discussion session on hazard identification and safety management
		Human behaviour
		Types of Risks
		Control strategies
		Risk assessment scoping
2	Mining technical and economic risks	Types of risk 2
		Organisational incidents
		Risk assessment tools
		Environmental risk management
		Class assignment (scoping a risk assessment)
3	Mine safety and environmental risks	Review of class assignment
		Class assignment
4	Mining methods and failed mines	Failed mines
		Mining methods
		Regulation and safety
5	Sustainable mining	Sustainable mining and corporate risks
		Closing remarks and discussion

Additional Course Information

Presentations and reading material are provided to provide students with technical information and examples of how risk management process is applied in the mining industry.

Discussions will be used to encourage students to articulate and defend positions, consider different points of view and evaluate evidence. Case studies will be used to provide practice in identifying potential problems and evaluating alternative course of actions.

Assessment

The assessment criteria provides a framework for you to assess your own work before formally submitting major assignments to your course convenor. Your course convenor will be using this framework to assess your work and as a way to assess whether you have met the listed learning outcomes and the graduate attributes for your program. We ask that you don't use the assessment criteria guidelines as a checklist, but as a tool to assess the quality of your work. Your course convenor will also be looking at the quality, creativity and the presentation of your written assignment as they review the framework. Rubrics, wherever applicable, will be provided at the time of the assignment release.

The assessment criteria provide a framework for students when preparing assignments in the course as well as a guideline for assessors when marking an assignment. The student is advised to review the relevant framework before undertaking their assignment.

The criteria listed for each item of assessment and the descriptions contained therein are not intended to be prescriptive nor is it an exhaustive list. Rather it should be viewed as a framework to guide the student as to the type of information and depth of coverage that is expected to be evident in a submission for assessment; the framework illustrates for example what would distinguish an excellent achievement from a poor achievement.

The student should be cognisant that a range of factors is often being assessed in any one assignment; not just whether the final results are numerically correct. Consideration is given to other relevant elements that contribute to the *Learning Outcomes* of the course as well as the *Graduate Attributes* of the overall degree program.

The student is cautioned against merely using the assessment criteria as a checklist. When assessing an assignment, elements in the framework will be examined in terms of quality and creativity. Hence ensuring all the listed elements are merely covered in an assignment is often not sufficient in itself and will not automatically lead to full marks being awarded. Other factors such as how the student went about presenting information, how an argument was structured and/or the elements supporting a particular recommendation or outcome are also important.

Finally the framework can also be used to provide feedback to a student on their performance in an assignment.

Assessment task	Weight	Due Date	Course Learning Outcomes Assessed
1. Risk assessment scoping	20%	06/07/2022 11:59 PM	1, 2, 3
2. Learning the lessons from the past	40%	24/07/2022 11:59 PM	1, 2, 3, 4
3. Mining risks in developing countries	40%	07/08/2022 11:59 PM	1, 2, 3, 4

Assessment 1: Risk assessment scoping

Due date: 06/07/2022 11:59 PM

To be completed by each person: Documentation of a risk assessment scope by defining the:

- Background and Context
- Expected objective based on the expected deliverable
- System boundaries & potential hazards to be considered
- Risk Assessment Method – Select the right tool
- Risk Analysis Method – Select the right method
- The Team
- Time and Venue
- Results, Feedback and Taking Action

Max length – 1500 words excluding plans, photographs etc.,

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

Assessment criteria

See assessment criteria (rubric) under assessment tab on Moodle.

Assessment 2: Learning the lessons from the past

Due date: 24/07/2022 11:59 PM

Using one of the incidents below, in 2500 words or less (word count please), (roughly 10 pages @ 12 font, 1.5 spacing) plus diagrams, plans, photographs etc.

1. Describe the accident/incident
2. Describe the scenario/events leading up to the incident
3. Describe the outcome or repercussions (after the accident)
4. How could the event have been avoided using risk assessment and other tools?

Marks will be allocated based on your analysis of the above points.

You are allowed to select an incident from the list below:

1. Gretley
2. Northparkes airblast
3. Kinross or Vaals Reef (South Africa)
4. Sago mine West Virginia 2005
5. Chernobyl
6. Space shuttle Challenger
7. Coalbrook (SA)
8. Ensham mine flood
9. Crandall Canyon Utah
10. Pike River, NZ
11. Fukushima
12. Samarco, Brazil

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

Assessment criteria

See assessment criteria (rubric) under assessment tab on Moodle.

Assessment 3: Mining risks in developing countries

Due date: 07/08/2022 11:59 PM

The maximum length of the report is 2500 words or less (word count please), (roughly 10 pages @ 12 font, 1.5 spacing) plus diagrams, plans, photographs etc.

You have been asked by your corporate office, specifically the business development group, to provide a report for them on the potential risks in investing in or continuing to invest in a particular country. Mining is considered an important or potentially important component of the country's economy.

The report should be clear and concise. You may wish to use the themes below as a guide (but don't be constrained by these headings). Although the web will be a necessary source of information please be innovative in collecting your data.

Socio-political

- Government
- Economy
- People
 - Education & literacy
 - Per capita income etc
- Workforce
- Ethnicities
- Religion etc
- NGOs

Geography

- Location
- Climate
- Topography
- Geomorphology etc

Geology

- Regional
- Local
- Seismically active etc
- Prospectivity

Governance

- Mining laws
 - Incl OHS
 - Environmental
 - Security of tenure
 - Royalty regime

- Corruption, human rights

Construction

- Existing infrastructure
- Power, water etc
- Skill shortage etc

Mining

- Existing and potential new mines

The exam countries include the following. However, if you would like to use another country as an example, feel free to do so.

- PNG, Indonesia, Thailand, Laos, Cambodia, China, India, Vietnam, Chile, Peru, DRC (Congo), Philippines, Madagascar, Romania, New Caledonia, Brazil, Zambia, Zimbabwe, Tanzania, South Africa, Malawi, Kazakhstan, Argentina, Bolivia, Mongolia, Russia, Mexico.

Marks will be allocated based on your analysis of:

- Overall risks
- Mining risks
- Recommendation/investment potential
- Report polish

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

Assessment criteria

See assessment criteria (rubric) under assessment tab on Moodle.

Attendance Requirements

To pass this course it is expected that you will attend 100% of lectures. If you have misadventure or ill-health, please contact your course coordinator as soon as possible. The attendance requirement is not meant to be punitive. It is included because participation is an important part of achieving the course outcomes.

Resources

Recommended Resources

- MEA Report Writing Guide for Mining Engineers. P Hagan and P Mort (Mining Education Australia (MEA)). (Latest edition available for download from the School website or a hardcopy version is available from the UNSW Bookshop)
- Ground Engineering - Principles and Practices for Underground Coal Mining JM Galvin, Springer 2016.
- 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.
- Longwall mining. SS Peng and HS Chiang. John Wiley and Sons Ltd. ISBN 10: 0978938305 ISBN 13: 9780978938307.
- 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.

Course Evaluation and Development

Students' constructive feedback is valued. Results from this survey help enhance courses and teaching at UNSW. Your feedback makes a difference for the next group of students taking your courses, just as feedback from students taking courses you plan to take makes a difference for you.

myExperience is confidential, your identity is not included in reports. Results of the survey are not made available until your course results are released.

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 Assessment

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 can apply for special consideration through [The Nucleus Student Hub](#) when illness or other circumstances interfere with your assessment performance. Sickness, misadventure or other circumstances beyond your control may:

- Prevent you from completing a course requirement
- Keep you from attending an assessable activity
- Stop you submitting assessable work for a course
- Significantly affect your performance in assessable work, be it a formal end-of-semester

examination, a class test, a laboratory test, a seminar presentation or any other form of assessment

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.

More details on special consideration can be found at: www.student.unsw.edu.au/special-consideration

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
- UNSW Learning Centre - www.lc.unsw.edu.au
- Counselling support - 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.

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 writing skills, please contact the Learning Centre or view some of the resources on their website: www.lc.unsw.edu.au. The Learning Centre is designed to help you improve your academic writing and communication 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

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

Report writing guide

The School has a [Report Writing Guide \(RWG\)](#) available. A copy of this is available on the course Moodle site.

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

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

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

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.microsoftcrmporthals.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	