Faculty of Engineering

School of Minerals and Energy Resources Engineering

Course Outline

MINE8120

Hazard Identification, Risk and Safety Management

Ismet Canbulat

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1 INFORMATION ABOUT THE COURSE

Course Code:	MINE8120	Term:	T2, 2021	Level:	PG	Units/Credits	6 UOC
Course Name:	**Hazard Identification, Risk and Safety Management**						

Course Convenor:	***Ismet Canbulat***		
Contact Details	School of Minerals and Energy Resources Engineering	EMAIL:	i.canbulat@unsw.edu.au
		Phone:	+61 2 9385 0721
Contact times	By appointment		

1.1 Course Description

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.

A 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 will also be presented. These include economic risks, geological risks, environmental risks, external factors and influences, and of course health and safety risks. 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.

This course is an Intensive, five-day workshop program delivered in hybrid mode (i.e., face-to-face and online) at UNSW from 31 May to 4 June 2021.

How much time is required?

This course is worth 6 UOC. It will be presented in a block mode. It is recommended that approximately 150 hours is required for this course, for satisfactory performance in this program, depending on background and experience. It is the students' responsibility to manage and plan workloads as much as possible to enable a minimum of 8 hours per week.

1.2 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.

1.3 Assumed Knowledge

This course assumes a student has knowledge of

- as this is a technical course in a postgraduate program, a fundamental understanding of both Mathematics and Physics to a standard at least equivalent to a first-year course in a university engineering program
- basic risk assessment practice and knowledge
- basic mining and geological terms and descriptions
- mining systems.

2 AIMS, LEARNING OUTCOMES AND GRADUATE ATTRIBUTES

2.1 Course Aims

This course aims to equip the student with knowledge and skills in risk and safety management in the mining industry.

2.2 Learning Outcomes

On successful completion of the course you should be able to:

- Identify the key components of a risk management framework;
- 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
- Identify gaps in a risk management system; and
- Critique a risk management report, or management process, and formulate recommendations for implementation.
- Demonstrate a broad awareness of the wide range of risks that affect and are involved in the mining industry, and how these risks are managed
- Identify the core risks associated with major mining methods;
- 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.

2.3 Graduate Attributes

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

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

3 REFERENCE RESOURCES

3.1 Reference Materials

- *Guide to Authors*. (Australasian Institute of Mining and Metallurgy: Melbourne) (Available for download from the AusIMM website)

3.2 Other Resources (if applicable)

There are significant resources available in the LTMS including a learning guide; presentations; course reader; video clips etc.

3.3 Online Resources

Selected readings as well as other supporting material (e.g. course outline and lecture notes will be made available on Moodle.

3.4 Report Writing Guide

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)

4 COURSE CONTENT AND LEARNING ACTIVITIES

4.1 Course content

1. Course introduction
2. Hazard identification and safety management
3. Human behaviour
4. Risk assessment tools
5. Control strategies
6. Risk assessment scoping
7. Types of risk 2
8. Organisational incidents
9. Environmental risk management
10. Failed mines
11. Mining methods
12. Regulation and safety
13. Sustainable mining and corporate risks

4.2 Learning Activities Summary

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.

UNSW Days	Day	Hrs.	Topic	Content/Activities	Presenter
1	31 May	8	Introduction to Risk Management	Course introduction	IC
				Discussion session on hazard identification and safety management	
				Human behaviour	
				Types of Risks	
				Control strategies	
				Risk assessment scoping	
2	1 June	8	Mining technical and economic risks	Types of risk 2	IC
				Organisational incidents	
				Risk assessment tools	
				Environmental risk management	
				Class assignment (scoping a risk assessment)	
3	2 June	8	Mine safety and environmental risks	Review of class assignment	IC
				Class assignment	
4	3 June	8	Mining methods and failed mines	Failed mines	IC
				Mining methods	
				Regulation and safety	
5	4 June	8	Sustainable mining	Sustainable mining and corporate risks	IC
				Closing remarks and discussion	

Total student effort hours: Approx. 150

(Note: The above indication of "student effort hours" is indicative only – It reflects the anticipated level of total student involvement with the course – either through accessing or participating in online materials and activities; private research; preparation of assignments. Individual students may find their level of involvement differs from this schedule.

Other UNSW Key dates: https://student.unsw.edu.au/new-calendar-dates

5 COURSE ASSESSMENT

5.1 Assessment Summary

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.

Item No.	*Assessment*	*Due Date*	*Weighting*	*Learning outcomes*
A01	**Individual report** – Scoping a risk assessment*	**2 June 11:59pm**	**20%**	**1,2,3,4**
A02	**Individual report** - Investigation of a major mining incident	**13 June 11:59pm**	**40%**	**1,2,3,4**
A03	**Individual report** - Risks of mining in developing countries	**27 June 11:59pm**	**40%**	**1,2,3,4**

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

5.2 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.
- 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* which can be viewed at: www.engineering.unsw.edu.au/mining-engineering/what-we-do/about-the-school/school-general-guidelines
- 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

- Submission requirements for all assignments are listed in Section 5.
- 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: < **FamilyNameInitials_CourseCode_AssignmentNumber.pd**f >.
- A typical complaint filename would take the following form < *SmithPD_MINE8120_A01.pdf* > which elements correspond to:
  - Family name of student: Smith
  - Initial(s) of student: PD
  - Course Code: MINE8120
  - Assignment number: A01...as defined in the Course Outline for the assessment task
  - File format: PDF document

6 ASSESSMENT CRITERIA

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 following 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.

6.1 Risk assessment scope

The assessment criteria and relative weighting that will be used in assessing the Risk Assessment Scope is summarised in the following table.

Assessment Criteria – *Risk Assessment Scoping*

Criteria	*Excellent*	*Good*	*Satisfactory*	*Unsatisfactory*	*Poor*	*nil*
Quality of scope	• scope contains all essential elements; and • in the form of a formal report that was written and presented to a professionally high standard; and, • all referencing and references were correct; and • total word count was not less than 750 and did not exceed 1500 words.	• scope contains most essential elements; and • in the form of a formal report that was well written and presented; and, • all referencing and references were correct; and • total word count was not less than 750 and did not exceed 1500 words.	• scope contains many essential elements; and • in the form of a formal report with only a few very minor errors and exceptions; and • all referencing and references were mostly correct; and • total word count was not less than 500 and did not exceed 1000 words.	• scope lacks many of the essential elements; and/or • in the form of a formal report but contained many minor errors and exceptions; and/or • many errors in referencing and/or references; and/or • total word count was less than 500 words.	• scope does not contain most of the essential elements; and/or • was not presented in form of a formal report and/or contained major non-conformance issues; and/or • majority of referencing and/or references were not correct; and/or • total word count was less than 250 words.	• no scope submitted; and/or • not submitted on time; and/or • was not consistent with requirements of a formal report in terms of format, structure and style; and/or • missing sections; and/or • no references while referring to others work; and/or • did not conform with assignment submission requirements; and/or
	20 16.5	16 12.5	12 10	9.5 6	5.5 2	0

6.2 Assignment Reports

The assessment criteria that will be used in assessing the assignment reports is summarised in the following table.

Criteria	Excellent	Good	Satisfactory	Unsatisfactory	Poor	-
Introduction	The introduction has clearly defined objectives of the assignment and includes a comprehensive summary of the findings and outcomes of the assignment.	The introduction has defined objectives of the assignment and includes some summary of the findings and outcomes of the assignment.	The introduction has defined objectives and methodology of the assignment with minor errors in summary of the findings and outcomes of the assignment.	The introduction has some defined objectives and methodology of the assignment with errors in summary of the findings and outcomes of the assignment.	The introduction has poorly defined objectives and methodology of the assignment with major errors in summary of the findings and outcomes of the assignment.	Provided no introduction.
	5	4	3	2	1	0
Assumptions in the assignment	Provided a comprehensive list of all the assumptions for the with sound justification for the selection.	Provided a list of some of the assumptions for the assignment with sound justification for the selection.	Provided an incomplete list of assumptions for the assignment with some justification for the selection.	Provided an incomplete list of assumptions for the assignment with little justification for the selection.	Provided a limited list of assumptions for the assignment with little justification for the selection.	Provided no assumptions
	5	4	3	3	1	0
Assessment and analysis of relevant risks	Provided comprehensive risk assessment analysis for the assignment. Provide full details of the following: • Background and Context • Expected objective based on the expected deliverable • 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 and Feedback	Provided comprehensive risk assessment analysis for the assignment with minor errors. Provide details of the following: • Background and Context • Expected objective based on the expected deliverable • 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 and Feedback	Provided sound risk assessment analysis for the assignment with minor errors. Provide some of the following: • Background and Context • Expected objective based on the expected deliverable • 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 and Feedback	Provided sound risk assessment analysis for the assignment with some errors. Provide some of the following: • Background and Context • Expected objective based on the expected deliverable • 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 and Feedback	Provided limited risk assessment analysis for the proposed mining system.	Provided no risk assessment analysis for the proposed mining system.
	20 / 16.5	16 / 12.5	12 / 10	9.5 / 6	5.5 / 2	0
Layout and standard of Report	Excellent logical structure, physical layout and attention to detail. No or few spelling mistakes or grammatical errors.	Good logical structure and physical layout. No or few spelling mistakes or grammatical errors.	Acceptable structure and physical layout. Some spelling mistakes or grammatical errors. Some errors in referencing.	Unacceptable structure and physical layout. Numerous spelling mistakes or grammatical errors. Errors in referencing.	Very little structure and physical layout. Numerous spelling mistakes or grammatical errors. Errors in referencing.	Report has no layout and structure.
	5	4	3	2	1	0
Conclusions and recommendations	The analysis of the work conducted highlights your comprehension and shows insight into the significance of the outcomes. The report concludes with a clear concise summary of the outcomes and includes qualification.	The analysis of the work conducted demonstrates some comprehension. The report concludes with a summary of outcomes.	The analysis of the work conducted demonstrates limited comprehension. The report concludes with some summary of outcomes.	The analysis of the work conducted demonstrates limited or no comprehension. The report concludes with a poor summary of outcomes.	The analysis of the work conducted demonstrates lack of comprehension. The report concludes with a poor summary of outcomes.	No conclusions drawn from the analysis.
	5	4	3	2	1	0

7 STUDYING A UG COURSE IN UNSW MINERALS AND ENERGY RESOURCES ENGINEERING

7.1 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 these instructions on how to redirect your UNSW emails: https://www.it.unsw.edu.au/students/email/index.html

7.2 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.microsoftcrmportals.com/web-forms/

Course inquiries: these should be directed to the Course Convenor.

7.3 Computing Resources and Internet Access Requirements

UNSW Minerals and Energy Resources Engineering provides blended learning using the on-line Moodle LMS (Learning Management System).

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 G48/49
Petroleum Engineering Students: TETB

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

7.4 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

7.5 Assignment Submissions

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 a assessment cover sheet attached.

7.6 Late Submission of an Assignment

Full marks for an assignment are only possible when an assignment is received by the due date.

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 following section.

7.7 Special Consideration

You can apply for special consideration through UNSW Student Central 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

7.8 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:

- WD – which usually indicates you have not completed one or more items of assessment or 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.

7.9 Students Needing Additional Support

The Student Equity and Disabilities Unit (SEADU) aims to provide all students with support and professional advice when circumstances may prevent students from achieving a successful university education. Take a look at their webpage: www.studentequity.unsw.edu.au/

7.10 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 Mining Engineering 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.

7.11 Continual Course Improvement

At the end of each course, all students will have the opportunity to complete a course evaluation form. These anonymous surveys help us understand your views of the course, your lecturers and the course materials. We are continuously improving our courses based on student feedback, and your perspective is valuable.

Feedback is given via https://student.unsw.edu.au/myexperience and you will be notified when this is available for you to complete.

We also encourage all students to share any feedback they have any time during the course – if you have a concern, please contact us immediately.

8 SCHOOL ASSESSMENT COVER SHEET

School of Minerals and Energy Resources Engineering

Assessment Cover Sheet

Course Convenor: _____

Course Code: _____ Course Title: _____

Assignment: _____

Due Date: _____

Student Name: _____ Student ID: _____

ACADEMIC REQUIREMENTS

Before submitting this assignment, the student is advised to review:

- the assessment requirements contained in the briefing document for the assignment;
- the various matters related to assessment in the relevant Course Outline; and
- the *Plagiarism and Academic Integrity* website at < http:/www.lc.unsw.edu.au/plagiarism/pintro.html > to ensure they are familiar with the requirements to provide appropriate acknowledgement of source materials.

If after reviewing this material there is any doubt about assessment requirements, then in the first instance the student should consult with the Course Convenor and then if necessary with the Director – Undergraduate Studies.

While students are generally encouraged to work with other students to enhance learning, all assignments submitted for assessment must be their entire own work and duly acknowledge the use of other person's work or material. The student may be required to explain any or all parts of the assignment to the Course Convenor or other authorised persons. *Plagiarism* is using the work of others in whole or part without appropriate acknowledgement within the assignment in the required form. *Collusion* is where another person(s) assists in the preparation of a student's assignment without the consent or knowledge of the Course Convenor.

Plagiarism and *Collusion* are considered as Academic Misconduct and will be dealt with according to University Policy.

STUDENT DECLARATION OF ACADEMIC INTEGRITY

I declare that:

- This assessment item is entirely my own original work, except where I have acknowledged use of source material [such as books, journal articles, other published material, the Internet, and the work of other student/s or any other person/s].
- This assessment item has not been submitted for assessment for academic credit in this, or any other course, at UNSW or elsewhere.

I understand that:

- The assessor of this assessment item may, for the purpose of assessing this item, reproduce this assessment item and provide a copy to another member of the University.
- The assessor may communicate a copy of this assessment item to a plagiarism checking service (which may then retain a copy of the assessment item on its database for the purpose of future plagiarism checking).

Student Signature: Date:

Students are advised to retain a copy of this assessment for their records and submission should be made in accordance to the assessment details available on the course Moodle site.