

# MINE8850

Mine Design and Feasibility

Term 1, 2023



## Course Overview

### Staff Contact Details

#### Convenors

Name	Email	Availability	Location	Phone
Serkan Saydam	<a href="mailto:s.saydam@unsw.edu.au">s.saydam@unsw.edu.au</a>	During the course sessions	Kensington	93854525

### 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](#)

[Faculty Transitional Arrangements for COVID-19](#)

## Course Details

### Units of Credit 6

### Summary of the Course

This course provides the non-mining engineer with the tools to plan, design and carry out a feasibility study at a mine site. It includes the feasibility study process, mine planning methodologies and scheduling techniques, mine cost structures and cost estimation. Underground mine design principles and practice. Development and production scheduling. Financial analysis. Review of mine planning and design packages. Review of open pit mine design principles and practice. Pit slope design. Cost estimation in practice. Pit shell optimisation and practice. Pit and haul ramp design. In-pit grade and tonnage calculations. Waste dump location and design.

The active based learning approach provides the opportunity to get involved in the planning process for real mining projects.

### Course Aims

The active based learning approach provides the opportunity to get involved in the planning process for real mining projects.

### Course Learning Outcomes

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

Learning Outcome	EA Stage 1 Competencies
1. A well rounded understanding of both the theoretical principles and practical methodologies associated with mine design in a real feasibility project.	PE1.2, PE1.3, PE1.5, PE1.6, PE2.1, PE2.2, PE2.3, PE2.4
2. Understanding of project evaluation and financial analysis techniques.	PE1.2, PE2.2
3. A capability to work on a project within a self-managed team environment and to provide quality communication (written and oral) of progress and final outcomes.	PE3.1, PE3.2, PE3.4, PE3.5, PE3.6

### Teaching Strategies

The course will be delivered in a series of lectures/tutorials covering the content modules described above in a 5 day, short course delivery mode. This course uses a number of different teaching and learning approaches including:

- Generally short lectures
- Student presentations
- Group discussions
- Syndicated work groups
- Software demonstrations

- Self-directed activities.

## Assessment

Assessment task	Weight	Due Date	Course Learning Outcomes Assessed
1. Project Evaluation Assignment	10%	16/03/2022 08:00 AM	2
2. Block Value Calculation	10%	Not Applicable	1, 3
3. Group Project	30%	17/02/2023 11:00 AM	1, 2, 3
4. Major Assignment	50%	18/04/2022 05:00 PM	1, 2, 3

### Assessment 1: Project Evaluation Assignment

**Start date:** 15/03/2022 08:00 AM

**Submission notes:** Submit through Moodle

**Due date:** 16/03/2022 08:00 AM

In-session Assessment: Students will be given financial and technical modelling data to perform a project evaluation analysis in MS Excel.

#### Assessment criteria

Even though the assignment requires extensive calculations, the methodology applied will be more important for marking. The assignment is divided to 6 sections:

1. Input Parameters 5%
2. Production Values 10%
3. Revenue Calculations 20%
4. Cost Calculations 20%
5. Margin/Profit Calculations 30%
6. NPV Calculation 15%

### Assessment 2: Block Value Calculation

**Assessment length:** 2 hours

**Submission notes:** Individual Submission paper based

This is a block value calculation and scheduling exercise. Students will work individually to complete the work.

This is not a Turnitin assignment

### **Assessment criteria**

1. Determine open pit economic block values 20%
2. Determine the optimum pit limit 40%
3. Calculating SR and BEC 20%
4. Determining the Scheduling 20%

### **Assessment 3: Group Project**

**Start date:** 13/02/2023 12:00 PM

**Due date:** 17/02/2023 11:00 AM

In-session Assessment: Students will work on a project in groups and perform a scoping study level of work.

Groups are responsible for equally sharing the tasks amongst the group members.

Each group will need to prepare a presentation which each group member will present.

The group will be assessed on the content, and the presenters will be assessed on the quality of the presentation.

Each group will have 20-30 minutes for the presentations.

### **Assessment criteria**

This is based on the project provided/selected by the group.

The main parts of the assignment are the followings:

1. Resource and Reserve Estimation and Reporting
2. Mining Method Selection
3. Mine Layout and Design
4. Mine Optimisation and Scheduling
5. Equipment Selection
6. ESG Considerations
7. Project Evaluation

Note: The marking criteria may be different based on the nature of the project used.

## Assessment 4: Major Assignment

**Start date:** 14/03/2022 12:00 PM

**Due date:** 18/04/2022 05:00 PM

The Major Assignment technical report should be presented as per the MEA Report Writing Guide which can be downloaded from the school web page:

<http://www.mining.unsw.edu.au/sites/default/files/reportwritingguide.pdf>

The assignment submission facility will be linked to Turnitin, a similarity checking system. When submitting an assignment via Turnitin, students are advised the file should contain the final edited and proof copy.

### Assessment criteria

**Choose one of the available projects** in Moodle at the end of the course.

- Review the current planning and design issues according to course outline (30%)

- What weaknesses, errors and inaccuracies do you see in the technical basis in the current design?

- Make relevant recommendations about planning and design issues (20%)

- Develop a financial evaluation (50%)

- Identify the major parameters affecting the viability of the project based on the financial model that you've developed.

- The model should be sufficiently detailed to permit sensitivity analysis of the project.

### Additional details

- The Major Assignment to be handed 4 weeks after the course week 1 completion.

- The Major Assignment should be submitted in softcopy only.

- A supporting FTM must be submitted. Remember only report will be marked.

- A summary of the FTM must be included in the report.

- A full FTM must be submitted in the appendix.

- The softcopy will be uploaded through Moodle and the students will be responsible uploading correctly.

- The submission date is the date that you submit your softcopy into Moodle.

- The Penalties

- Review the School Late Submission Policy from the School web site.

- Any work-related delay will not be accepted.

- If you have a major health or family problem, please get in touch with me.

- Resources for Students

- Support material for this course including, when available, copies of lecture notes, recommended readings, assignments and results for assignments etc can be found on Moodle

- Remember your communication email address is your UNSW student email address. Make sure you check often your UNSW emails and Moodle news/forums.



## Attendance Requirements

Students must attend all the lectures and participate to the class activities and assessments.

## Course Schedule

This course will be run in a short course format Monday to Friday

[View class timetable](#)

### Timetable

Date/Module	Type	Content
DAY 1	Lecture	Introduction of the Course and Mine Planning Process  Mining In Economic Environment  Resource Estimation  Project Introductions  JORC  Mining Method Selection  Mine Layout and Design  Equipment Selection
	Group Work	Syndicated Work Groups - Work on Group Projects
DAY 2	Lecture	Mine Optimisation  Project Evaluation Principals  Financial Analysis & Project Evaluation ( <i>Case Studies</i> )  Project Evaluation Tutorials
	Assessment	Project Evaluation (Individual)
DAY 3	Lecture	Mine Scheduling  Strategic Mine Planning and Optimisation

		Cost Estimation
		Project Financing
	Group Work	Syndicated Work Groups
	Assessment	Block Value Calculation (Group)
DAY 4	Lecture	Feasibility Studies – Process and Problems Geotechnical Considerations in Mine Design ESG Considerations in Mining
	Group Work	Syndicated Work Groups
DAY 5	Group Work	Syndicated Work Groups
	Assessment	Group Presentations
	Lecture	Course Closure

## Resources

### Prescribed Resources

MS Excel

### Recommended Resources

- Hartman, HL, 2002. Introductory Mining Engineering, 2nd edition. Wiley, New York.
- Hustrulid, W and Kuchta, M, 2006. Open Pit Mine Planning & Design, Balkema, Rotterdam.
- Kennedy, BA (ed.), 1990. Surface Mining, 2nd edition, SME, Littleton, Colorado, USA. ISBN 0-87335-102-9.
- Noakes, M and Lanz, T. 1993. Cost Estimation Handbook for the Australian Mining Industry, Monograph No: 20/ Australasian Institute of Mining and Metallurgy.
- Hustrulid, WA, and Bullock, R. (eds.), 2001. Underground Mining Methods: Engineering Fundamentals and International Case Studies, SME, Littleton, USA.
- Gertsch, RE and Bullock, RL (eds.), 1998. Techniques in Underground Mining, SME, Littleton, USA.
- Malone, E. 2011 The Cadia Valley Mines – A Mining Success Story. The AusIMM Spectrum Series 19.
- Kennedy, BA., Editor, 1990. Surface Mining, 2nd edition, Society for Mining, Metallurgy, and Exploration, Littleton, Colorado. ISBN 0-87335-102-9
- Rankin, WJ. (ed) 2013. The Sir Maurice Mawby Memorial Volume Third Edition, Vol1 & 2. The AusIMM.

### Course Evaluation and Development

Students will be meeting within groups and/or individually with the course convenor during the class week. If the students require additional information after the course week, the course convenor will be meeting with them when it is required.

## Submission of Assessment Tasks

The School has developed a guideline to help you when submitting a course assignment.

We encourage you to retain a copy of every assignment submitted for assessment for your own record either in hardcopy or electronic form.

All assessments must have an assessment cover sheet attached.

## Course completion

Course completion requires submission of all assessment items. Failure to submit all assessment items may result in the award of an Unsatisfactory Failure (UF) grade for the Course unless special consideration has been submitted and approved.

## Late Submission of an Assignment

Full marks for an assessment are only possible when an assessment is received by the due date. Work submitted late without an approved extension by the course coordinator or delegated authority is subject to a late penalty of five percent (5%) of the maximum mark possible for that assessment item. The late penalty is applied per calendar day (including weekends and public holidays) that the assessment is overdue. There is no pro-rata of the late penalty for submissions made part way through a day. This is for all assessments where a penalty applies.

Work submitted after five days (120 hours) will not be accepted and a mark of zero will be awarded for that assessment item.

For some assessment items, a late penalty may not be appropriate. These will be indicated in the course outline, and such assessments will receive a mark of zero if not completed by the specified date.

Examples include:

- Weekly online tests or laboratory work worth a small proportion of the subject mark, or
- Online quizzes where answers are released to students on completion, or Professional assessment tasks, where the intention is to create an authentic assessment that has an absolute submission date, or Pass/Fail assessment tasks.

We understand that at times you may not be able to submit an assignment on time, and the School will accommodate any fair and reasonable extension. We would recommend you review the UNSW Special Consideration guidelines – see section below.

## Special Consideration

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

We ask that you please contact the Course Convenor immediately once you have completed the special consideration application, no later than one week from submission.

## Student Support

The University and the Faculty provide a wide range of support services for students, including:

- Library training and support services - [www.library.unsw.edu.au](http://www.library.unsw.edu.au)
- Academic Skills Support - <https://www.student.unsw.edu.au/skills>
- Psychology and Wellness - [www.counselling.unsw.edu.au](http://www.counselling.unsw.edu.au)

**Equitable Learning Services** aims to provide all students with a free and confidential service that provides practical support to ensure that your health condition doesn't adversely affect your studies. <https://student.unsw.edu.au/els>

## Academic Honesty and Plagiarism

Your lecturer and the University will expect your submitted assignments are truly your own work. UNSW has very clear guidelines on what plagiarism is and how to avoid it. Plagiarism is using the words or ideas of others and presenting them as your own. Plagiarism is a type of intellectual theft. It can take many forms, from deliberate cheating to accidentally copying from a source without acknowledgement. The University has adopted an educative approach to plagiarism and has developed a range of resources to support students. All the details on plagiarism, including some useful resources, can be found at [www.student.unsw.edu.au/plagiarism](http://www.student.unsw.edu.au/plagiarism).

All MERE students are required to complete a student declaration for academic integrity which is outlined in the assignment cover sheets. By signing this declaration, you agree that your work is your own original work.

If you need some additional support with your academic skills, please contact the Academic Skills Support or view some of the resources on their website: <https://www.student.unsw.edu.au/skills>. The Academic Skills Team can provide resources, support and assistance to help you improve your academic skills. Some students use the Centre services because they are finding their assignments a challenge, others because they want to improve an already successful academic performance.

## Academic Information

### Course Results

For details on UNSW assessment policy, please visit: [www.student.unsw.edu.au/assessment](http://www.student.unsw.edu.au/assessment)

In some instances your final course result may be withheld and not released on the UNSW planned date. This is indicated by a course grade result of either:

- LE – indicates you have not completed one or more items of assessment; or
- WD – indicates there is an issue with one or more assignment; or
- WC – which indicates you have applied for Special Consideration due to illness or misadventure and the course results have not been finalised.

In either event it would be your responsibility to contact the Course Convener as soon as practicable but no later than five (5) days after release of the course result. If you don't contact the convener on time, you may be required to re-submit an assignment or re-sit the final exam and may result in you failing the course. You would also have a NC (course not completed) mark on your transcript and would need to re-enroll in the course.

## Studying a course in the School of Minerals and Energy Resources Engineering at UNSW

### Student Resources

This engineering [student resources](#) section collates useful advice and information to ensure you're able to focus on your studies.

### Computing Resources and Internet Access Requirements

UNSW Minerals and Energy Resources Engineering provides blended learning using the on-line Moodle LMS (Learning Management System). Also see - Transitioning to Online Learning: [www.covid19studyonline.unsw.edu.au](http://www.covid19studyonline.unsw.edu.au)

It is essential that you have access to a PC or notebook computer. Mobile devices such as smart phones and tablets may compliment learning, but access to a PC or notebook computer is also required. Note that some specialist engineering software is not available for Mac computers.

- Mining Engineering Students: OMB G48
- Petroleum Engineering Students: TETB LG34 & LG 35

It is recommended that you have regular internet access to participate in forum discussion and group work. To run Moodle most effectively, you should have:

- broadband connection (256 kbit/sec or faster)

- ability to view streaming video (high or low definition UNSW TV options)

More information about system requirements is available at [www.student.unsw.edu.au/moodle-system-requirements](http://www.student.unsw.edu.au/moodle-system-requirements)

## Accessing Course Materials Through Moodle

Course outlines, support materials are uploaded to Moodle, the university standard Learning Management System (LMS). In addition, on-line assignment submissions are made using the assignment dropbox facility provided in Moodle. All enrolled students are automatically included in Moodle for each course. To access these documents and other course resources, please visit: [www.moodle.telt.unsw.edu.au](http://www.moodle.telt.unsw.edu.au)

*This course outline sets out description of classes at the date the Course Outline is published. The nature of classes may change during the Term after the Course Outline is published. Moodle should be consulted for the up to date class descriptions. If there is any inconsistency in the description of activities between the University timetable and the Course Outline (as updated in Moodle), the description in the Course Outline/Moodle applies.*

## How We Contact You

At times, the School or your course convenors may need to contact you about your course or your enrolment. Your course convenors will use the email function within Moodle or we will contact you on your @student.unsw.edu.au email address.

We understand that you may have an existing email account and would prefer for your UNSW emails to be redirected to your preferred account. Please see instructions on how to redirect your UNSW emails: "[How can I forward my emails to another account?](#)"

## How You Can Contact Us

We are always ready to assist you with your inquiries. To ensure your question is directed to the correct person, please use the email address below for:

- Enrolment or other admin questions regarding your program: <https://unswinsight.microsoftcrmpartals.com/web-forms/>
- Course inquiries should be directed to the Course Convenor

## Image Credit

Synergies in Sound 2016

## CRICOS

CRICOS Provider Code: 00098G



## **Acknowledgement of Country**

We acknowledge the Bedegal people who are the traditional custodians of the lands on which UNSW Kensington campus is located.

## Appendix: Engineers Australia (EA) Professional Engineer Competency Standard

Program Intended Learning Outcomes	
Knowledge and skill base	
PE1.1 Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline	
PE1.2 Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline	✓
PE1.3 In-depth understanding of specialist bodies of knowledge within the engineering discipline	✓
PE1.4 Discernment of knowledge development and research directions within the engineering discipline	
PE1.5 Knowledge of engineering design practice and contextual factors impacting the engineering discipline	✓
PE1.6 Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline	✓
Engineering application ability	
PE2.1 Application of established engineering methods to complex engineering problem solving	✓
PE2.2 Fluent application of engineering techniques, tools and resources	✓
PE2.3 Application of systematic engineering synthesis and design processes	✓
PE2.4 Application of systematic approaches to the conduct and management of engineering projects	✓
Professional and personal attributes	
PE3.1 Ethical conduct and professional accountability	✓
PE3.2 Effective oral and written communication in professional and lay domains	✓
PE3.3 Creative, innovative and pro-active demeanour	
PE3.4 Professional use and management of information	✓
PE3.5 Orderly management of self, and professional conduct	✓
PE3.6 Effective team membership and team leadership	✓