



Faculty of Engineering

**School of Minerals and Energy Resources Engineering**

Undergraduate Course Outline

MINE8850

Mine Design and Feasibility

Professor Serkan Saydam

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## 1. INFORMATION ABOUT THE COURSE

Course Code:	MINE8850	Term:	T2, 2020	Level:	PG	Units/Credits	6 UOC
Course Name:	<b>Mine Design and Feasibility</b>						

Course Convenor:	<b>Professor Serkan Saydam</b>						
Contact Details	School of Minerals and Energy Resources Engineering Old Main Building, Rm 159H	EMAIL:	s.saydam@unsw.edu.au				
		Phone:	+61 2 9385 4525				
Contact times	<b>This course will be delivered online in T2 (25-29 May 2020). Please see Moodle for presentation times and requirements.</b>						

### • Course Description

This course will focus fundamental steps of preparing feasibility studies for non-mining engineers. It will focus on development of a feasibility study for a mining project including the process, assessment of reserves, mine planning methodologies and scheduling techniques, mine 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, cost estimation in practice, pit shell optimisation and practice, pit and haul ramp design, in-pit grade and tonnage calculations, and practical waste dump location and design.

### • 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.

### • Assumed Knowledge

This course assumes a student has knowledge of:

- basic mining and geological terms and descriptions;
- as this is a technical course in a postgraduate program, a fundamental understanding of mathematics and economics are required.

### • Attendance

To pass this course it is expected that you will attend at least 80% of tutorials and lectures. Attendance will be recorded when applicable. Normally, there is no make-up work for poor attendance. If you have misadventure or ill-health, please contact your course coordinator 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.

## 1. AIMS, LEARNING OUTCOMES AND GRADUATE ATTRIBUTES

### • Course Aims

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, cost estimation in practice, pit shell optimisation and practice, pit and haul ramp design, in-pit grade and tonnage calculations, and practical waste dump location and design.

### • **Learning Outcomes**

On completion of this course the student should be able to demonstrate:

- A well-rounded understanding of both the theoretical principles and practical methodologies associated with mine design in a real feasibility project.
- Understanding of project evaluation and financial analysis techniques.
- 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.

### 3. REFERENCE RESOURCES

#### • **Reference Materials**

Support material for this course including, whenever available, copies of lecture notes, recommended readings, etc. can be found on Moodle.

The lecture note may be viewed and downloaded from the UNSW-Moodle

<http://moodle.telt.unsw.edu.au/>.

#### • **Recommended Materials**

Followings are the recommended books for this course.

- 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.

#### • **Software and Hardware**

- MS Excel

#### • **Other Resources**

Links to websites etc.

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

- UNSW Learning Centre (<http://www.lc.unsw.edu.au>)
- Counselling support - <http://www.counselling.unsw.edu.au>
- Library training and support services - <http://www.library.unsw.edu.au/>
- OnePetro – (<http://www.onepetro.org>)

#### • **Online Resources**

There are numerous articles / information sources on reservoir engineering on the web. Many of them are sound, but many are either very lightweight or contain errors. Be very careful in your choice of web sources. Remember, UNSW librarians are usually happy to help you locate articles or make suggestions regarding possible material to help you in your academic work. You can also access basic online help at <http://www.library.unsw.edu.au/>

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

## 4. **COURSE CONTENT AND LEARNING ACTIVITIES**

#### • **Course content**

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,
- Audio/video podcasts,
- Self-directed activities.

• **Learning Activities Summary**

**Mine 8850 - MINE DESIGN AND FEASIBILITY**  
25-29 May 2020

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
8.30 – 9.00 <b>Introduction of the Course &amp; Group Projects</b> <b>Mine Planning Process</b> <i>Serkan Saydam</i> WEBINAR_ MOODLE	9.00 – 10.00 <b>Mine Layout and Design &amp; Equipment Selection</b> <i>Serkan Saydam</i> WEBINAR_ MOODLE	9.00 – 10.30 <b>Mine Optimisation</b> <i>Serkan Saydam</i> WEBINAR_ MOODLE	9.00 – 10.30 <b>Feasibility Studies – Process and Problems</b> <i>Serkan Saydam</i> WEBINAR_ MOODLE	9.00 – 11.00 <b>Syndicated Work Groups</b> TEAMS
9.00 – 10.30 <b>Mining in Economic Environment</b> <i>Serkan Saydam</i> WEBINAR_ MOODLE	10.30 – 11:00 Morning Tea	10.30 – 11:00 Morning Tea	10.30 – 11.00 Morning Tea	11.00 – 15.00 <b>Work Group Presentations &amp; Discussions</b> TEAMS
10.30 – 11.00 Morning Tea	11.00 – 12.00 <b>Project Evaluation Principals</b> <i>Serkan Saydam</i> WEBINAR_ MOODLE	11.00 – 12.30 <b>Mine Scheduling</b> <i>Serkan Saydam</i> WEBINAR_ MOODLE	11.00 – 12.30 <b>Project Financing</b> <i>Robert Campese</i> TEAMS	15.00 Major Assignment <b>Discussions and Course Close</b> TEAMS
11.00 – 12.00 <b>Resource Estimation</b> <i>Serkan Saydam</i> WEBINAR_ MOODLE	12.00 – 13.00 Lunch	12.30 – 13.30 Lunch	12.30 – 13.30 Lunch	
12.00 – 13.00 Lunch	13.00 – 15.00 <b>Financial Analysis &amp; Project Evaluation (Case Studies)</b> <i>Kate McCutcheon</i> TEAMS	13.00 – 14.30 <b>Cost Estimation</b> <i>Serkan Saydam</i> WEBINAR_ MOODLE	13.30 – 14.30 <b>Geotechnical Considerations in Coal Mine Design</b> <i>Chengguo Zhang</i> TEAMS	
13.00 – 14.30 <b>JORC</b> <i>Jon Barber</i> TEAMS	15.00 – 15.30 Afternoon Tea	14.30 – 15.00 Afternoon Tea	14.30 – 15.30 Sustainable <b>Development in Mining - Mine Rehabilitation &amp; Closure</b> <i>Carlito Tabelin</i> TEAMS	
14.30 – 15.00 Afternoon Tea	15.30 – 16.30 <b>Project Evaluation Tutorials</b> <i>Serkan Saydam</i> WEBINAR_ MOODLE	15:30 – 16.30 <b>Block Value Calculation (Individual Assignment)</b>	15.30 – 16.30 <b>Syndicated Work Groups</b> TEAMS	
15.00 – 15.30 <b>Mining Method Selection</b> <i>Serkan Saydam</i> WEBINAR_ MOODLE	16.30 – 17.30 <b>Cost Estimation</b>	16.30 – ... <b>Syndicated Work Groups</b> TEAMS		
15.30 – ... <b>Syndicated Work Groups</b> TEAMS	17.30 – ... <b>Project Evaluation Assignment (Individual Homework)</b>			

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

## 5. COURSE ASSESSMENT

### • Assessment Summary

Assessment of the research project is based on the submissions made at various project milestones over the course of the year.

Assessment number	Due	Weight	Assessment	Learning outcomes assessed	Comments
<b>A1</b>	27 May 8 AM AEST	10%	<b>In-Session Assessment</b> Project Evaluation – MS Excel File Homework	1, 2, 4	Individual Work MS Excel File
<b>A2</b>	28 May 8 AM AEST	10%	<b>In-Session Assessment</b> Block Value Calculation Homework	1, 2, 3, 4	Individual Work Q&A
<b>A3</b>	29 May TBD	30%	<b>In-Session Assessment</b> Project Based	1, 2, 3, 4	Group Work Presentation
<b>A4</b>	<b>29 June</b> <b>5 PM</b> AEST	50%	<b>Major Assignment</b> 10,000 words excluding figures/tables and appendix MS Excel FTM	<b>1, 2, 3</b>	<b>Individual Project Report</b>

Assignments related details/submission-box will be available online through Moodle. Access to the Moodle site is via the Moodle icon on the MyUNSW homepage.

## 6. ASSESSMENT CRITERIA

The assessment criteria provide 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.

## 7. STUDYING A PG COURSE IN UNSW MINERALS AND ENERGY RESOURCES ENGINEERING

### • 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>

### • 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.

### • 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

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)

#### • **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 an assessment cover sheet attached.

#### • **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.

Late submission will not be accepted and will be considered as no submission.

#### • **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](http://www.student.unsw.edu.au/special-consideration)

## • 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:

- 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.

## • Students Needing Additional Support

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 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/](http://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.

## • 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.



# 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.**