Faculty of Engineering

School of Minerals and Energy Resources Engineering

Undergraduate Course Outline

MINE4260

Coal Mine Design and Feasibility Project

Professor Serkan Saydam

CONTENTS

1. INFORMATION ABOUT THE COURSE

Course Code:	MINE8850	Term:	T2, 2020	Level:	UG	Units/Credits	6 UOC
Course Name:	**Mine Design and Feasibility**						

Course Convenor:	***Professor Serkan Saydam***		
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	**This course will be delivered online in T2.** Mon 14:00-17:00, Location: Online, Weeks: 1-5,7-10 Tue 12:00-14:00, Location: Online, Weeks: 1-5,7-10		

1.1. Course Description

In this course a potential coal project will be evaluated from the prospective of open cut and underground mining. The course will integrate the technical, economic, and management content presented earlier in the mining engineering program in the design and evaluation of a new mining project while taking account of industry standards, community expectations and government requirements. Technical design, project evaluation and assessment of the socio-political impacts of the project are a core focus of the course. Due to the scope of work involved, the project is undertaken by teams of students. The teams are required to prepare and present a feasibility study of a mining project. Teamwork, project management and presentations skills are assessed in addition to the technical analysis and content of the final feasibility study.

On completion of the course, the student should be capable of demonstrating an understanding of:

- methodologies to evaluate the viability and risks associated with metalliferous mining projects;
- range of software tools to assist in design, scheduling, modelling and evaluation of a metalliferous mining project;
- the theoretical principles and practical methodologies associated with mine planning and feasibility study projects;
- appreciation of the sustainability aspects of mining;
- technical writing and oral communication skills; and
- management of project work by teams.

1.2. Course Completion

Course completion requires submission of all assessment items; failure to submit all assessment items can result in the award of an Unsatisfactory Failure (UF) grade for the Course.

1.3. Assumed Knowledge

Students should have sufficient knowledge to apply the principles of resource geology, mine planning and design, surface and underground coal mining methods minerals economics, equipment selection, mine ventilation, geomechanics to a real mine project. It is advantageous if they are familiar with at least one mine design software tool.

Prerequisite: MINE 3230

2. AIMS, LEARNING OUTCOMES AND GRADUATE ATTRIBUTES

2.1. Course Aims

The aim of this course is to assist students carry out a pre-feasibility study on a coal deposit incorporating:

- Reserve estimation,
- Mining method selection,
- Mine design and optimisation,
- Development and production planning/scheduling,
- Equipment selection,
- Geomechanics,
- Ventilation,
- Cost analysis,
- Economic evaluation.

In addition, there may be a number of topics of special focus for a given project such as environmental factors, environmental impact/design and social responsibility. The project will be undertaken in the spirit of a pre-feasibility study to determine its economical viability using standard engineering economic methods of project evaluation.

2.2. Learning Outcomes

At the conclusion of this course, it is intended that students will be able to:

1. Assess the feasibility of a mining project with consideration to:
    i. Data analysis and interpretation
    ii. Mine layout
    iii. Development and production planning/scheduling/Staffing,
    iv. Equipment selection,
    v. Geotechnical, technical, environmental and economic factors
    vi. Ventilation
    vii. Economic factors including mining costs, commodity market, etc.
    viii. Social and environmental impact
    ix. Project risk analysis
    x. Mine closure/rehabilitation
2. Demonstrate team skills in the management of a project work
3. Demonstrate advanced written and oral communication skills

3. REFERENCE RESOURCES

3.1. Reference Materials

Support material for this course including, whenever available, copies of lecture notes, recommended readings, assignments and results for assignments etc can be found on Moodle. All correspondence with students and any information regarding changes in the lecture schedule and assignment dates will be done through Moodle. All assignments must be submitted through Moodle. It is important that students regularly check Moodle for changes in calendar events and for messages.

The lecture note may be viewed and downloaded from the UNSW-Moodle http://moodle.telt.unsw.edu.au/.

3.2. Recommended Materials

Followings are the recommended books for this course.

- Darling, P (ed.), 2011. Mining Engineers Handbook, 3rd edition, SME, Littleton, USA
- Hartman, HL, 2002. Introductory Mining Engineering, 2nd edition. Wiley, New York.
- 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.
- Kennedy, BA., Editor, 1990. Surface Mining, 2nd edition, Society for Mining, Metallurgy, and Exploration, Littleton, Colorado. ISBN 0–87335–102–9
- *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)

3.3. Other Resources

- Learning Guide: Mining Research Project
- Student Resource Book: Mining Research Project
- EndNote, software package available to UNSW students
- ELISE, the on-line study skills tutorial and ELISE Plus. Both tutorials will be useful to students when preparing the Annotated Bibliography and Project Progress Report assignment submissions. The latter in particular includes a tutorial on EndNote and Refworks. The tutorials can be accessed at www.subjectguides.library.unsw.edu.au/elise
- The Learning Centre. A number of resources are available at the UNSW Learning Centre website to assist students in preparing the various assessment tasks including:
- Guide for Writing Thesis Proposals, available at www.student.unsw.edu.au/thesis-proposals
- Honours Thesis Writing for Engineering and Science Students, available at www.student.unsw.edu.au/honours-thesis-writing-engineering-and-science-students

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)

3.4. Online Resources

- Selected readings as well as other supporting material (e.g. course outline and lecture material etc) will be made available on LTMS.
- UNSW Mining and Petroleum subject guide (including a link to ACARP and how to find the reports in the catalogue) http://subjectguides.library.unsw.edu.au/content.php?pid=7632&sid=52212
- UNSW Library services for Postgraduate students http://library.unsw.edu.au/servicesfor/PGandH.html

New postgraduate course students are strongly advised to visit the above website and complete the ELISE and ELISE Plus tutorials. These will help develop skills in finding, using and evaluating scholarly information.

Videos are often provided to students as a web stream within the Moodle learning management system. Videos are not available for download by students, unless approved by the Course Convenor and either the Undergraduate or Postgraduate Coursework Director. Special consideration can be provided for students to access videos off-line (eg. working remotely). Please contact the Course Convenor for more information. Note that UNSW reserves the right to deliver videos as a web stream rather than off-line and cannot provide videos that are copyright from other providers.

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/

3.5. Software and Hardware

- Vulcan, Minex, MS Excel, Talpac: All software will be accessed through myaccess.

3.6. Report Writing Guide

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

4. COURSE CONTENT AND LEARNING ACTIVITIES

4.1. Course content

Presentations and reading material are provided to provide students with technical information and examples of how geology and geophysical information is used at various stages of mining. 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.

4.2. Learning Activities Summary

-	Course Dates	Activity	Hours	Tasks	Content
Week 1	1 June Monday	Course Introduction Project Work	3	Introduction to course	Course outline, group formation, Introduction to the project.
	2 June Tuesday	Mine Optimisation **Industry Workshop & Lecture (TBC)**	2	Data Familiarisation Resource Model **CONCEPT of the PREFEASIBILITY STUDIES**	Geological and coal properties modelling. Define cut-off stripping, reserve estimation for open cut. Determination of design parameters on the basis on given breakeven stripping ratio. COMPULSORY Industry workshop run by mine personnel from Glencore
Week 2	8 June Monday	**Software Training**	All Day	**Minex software training (all day)**	Minex Training Introduction and Open Cut Design.
	9 June Tuesday	Project Work	2	Flow Fatal Analysis & Open Cut Design	Design of strips, bench heights, angles, mine access and road design. Design of strips, bench heights, angles, mine access and road design. Underground Mine Design
	1- June Wed	**Software Training**	All Day	**Minex software training (all day)**	Minex Training Underground Design.
Week 3	15 June Monday	Project Work	3	Underground Mine Design	Design of mine development and access. Production rates and production scheduling for both open cut and underground mine. Panel and pillar design, reserve estimation. Production rates and production scheduling for both open cut and underground mine.
	16 June Tuesday	**Industry Workshop TBC**	**2**	**Open Cut Design and Layout**	COMPULSORY Industry workshop run by mine personnel
Week 4	22 June Monday	Project Work	3	Underground Mine Design (Cont'd)	Design of mine development and access. Production rates and production scheduling for both open cut and underground mine. Panel and pillar design, reserve estimation. Production rates and production scheduling

					for both open cut and underground mine.
	23 June	**Progress Interview 1**	**2**	**Progress Interview 1**	Progress Interview 1 – Open Cut and Underground Mine Design **Progress**
Week 5	29 June Monday	Project Work	3	Design Considerations	Continued work on Mine Design
	30 June Tuesday		2		
Week 6	Flexible Week				
Week 7	13 July Monday	Project Work	3	Underground design and layout. Equipment Selection and Production Scheduling.	Finalise your open pit and underground design. Production rates and production scheduling for underground mine. Equipment selection for both open pit and underground mine (Fleet size, capacity, type, etc.).
	14 July Monday	**Industry Workshop**	**2**	**Underground Mine Design and Layout**	COMPULSORY Industry workshop run by mine personnel
Week 8	20 July Monday	**Progress Interview 2 OC and UG Final Design**	**3**	**Progress Interview 2**	
	21 July Tuesday	Project Work	2	Cost estimation and Project Evaluation	Capital and operating costs, production costs, sensitivity analysis, NPV, etc.
Week 9	27 July Monday	Project Work	3	Finalising the mine design work	Project Evaluation
	28 July Tuesday	Project Work	2	Risk analysis, subsidence, environmental and social impacts, mine closure, etc.	
Week 10	3 August Monday	Project Work	3	Health, Safety, Environment and Community Finalising the work	
	4 August Tuesday		2	Dry Runs	
10 August (TBC) - Presentation Day - Max 30-minute presentation by each group with more emphasis on the feasibility study.					

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

Notes:

- **Contact Hours per Week:** Four contact hours to be utilised for Project Based Learning.
- The above schedule is a guide only and the indicated dates when each theme and course content is discussed and subject to change without notice.

5. COURSE ASSESSMENT

5.1. Assessment Summary

Assessment	Due date	Weight (%)	Learning outcomes assessed
Progress Interview 1	23 June *(Week 4)*	10	1, 2, 4
Progress Interview 2 @ OMB49	20 July *(Week 8)*	15	1, 2, 4
Final Presentation	10 August	25	1, 2, 3, 4
Final Report	17 August 11:59PM	50	1, 2, 3, 4

- **Only electronic copies (MS Word doc) will be evaluated.**
- **The Final Presentation date may change due to the availability of the Board Members in 10 August. This will be confirmed 2 weeks prior to the date.**

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.

Progress Interviews will be conducted at the Computer Laboratory in front of a computer to demonstrate the knowledge of using software package.

Final Board Presentations will be conducted at the AVIE facility. Each group will be responsible to prepare relevant files to demonstrate their design to the board using VR technology available at the school.

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.

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 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
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

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 an 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.

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

7.7. 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

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

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

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.