



Faculty of Engineering

School of Minerals and Energy Resources Engineering

Postgraduate Course Outline

MINE8760

Mine Geology and Geophysics

Dr Hamed Lamei Ramandi

CONTENTS

1. INFORMATION ABOUT THE COURSE	3
2. AIMS, LEARNING OUTCOMES AND GRADUATE ATTRIBUTES.....	5
3. REFERENCE RESOURCES	5
4. COURSE CONTENT AND LEARNING ACTIVITIES.....	7
5. COURSE ASSESSMENT	10
6. ASSESSMENT CRITERIA	12
7. STUDYING A PG COURSE IN UNSW MINERALS AND ENERGY RESOURCES ENGINEERING	13

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1. INFORMATION ABOUT THE COURSE

Course Code:	MINE8760	Term:	T1, 2020	Level:	PG	Units/Credits	6 UOC
Course Name:	Mine Geology and Geophysics						

Course Convenor:	Dr Hamed Lamei Ramandi						
Contact Details	School of Minerals and Energy Resources Engineering Old Main Building, Rm 156	EMAIL:	h.lameiramandi@unsw.edu.au				
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Contact times	Lecture time schedule Day, time, venue						

1.1. Course Description

This course will focus on the essential interaction between the disciplines of geology and mining engineering, embracing engineering geology, structural geology, the geotechnical field, applied geophysics and hydrogeology within the constraints of ongoing mining operations – the need to operate safely, the need to maintain production and the need to control costs. The impact of engineering geological rock mass properties and structural features on mining operations is evaluated. The likely variability of these parameters and the degree of confidence with which they can be predicted and projected ahead of open pit and underground mining processes and hence used in ongoing mine planning and scheduling will be discussed. Techniques of determining and monitoring the stress regime of the mine will be reviewed.

In this context, a major task of the mine geologist is to continually update the technical data base, originally based on exploration data, with new data gathered as mining proceeds and by logging of strategically placed drill holes in advance of mining. Results of and lessons learnt from mining operations must also be incorporated in the data base to assist in reinterpretation of the data and improve prediction of future mining conditions. Modern geophysical techniques are essential aids in this process. These techniques, including 2D and 3D seismic, microseismics, tomography, electromagnetic imaging techniques, radar and downhole geophysical survey methods, will be reviewed in the context of their ability to provide reliable information to assist with mine planning and operational decision making. Fundamentals of hydrogeology are considered for mine operations, focusing on groundwater hydraulics and drainage.

This course will enable students to gain knowledge and skills needed for effective communication between disciplines at the geological-engineering interface. Effective exchange of data is of benefit to both. Case histories of mining operations, illustrating particular examples of mining operational problems and solutions, will be presented. As well, case studies of various mining situations will be presented for class and syndicate evaluation and identification of operational strategies.

The course is offered as a distance course over 7 weeks. There are no face to face classes at the campus. It is recommended that approximately 150 hours is required for satisfactory performance in this course, 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, plus time for assessments. Some weeks may require 20 to 50 hours.

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.
- course participation as per the course assessment summary

MINE8760 Mine Geology and Geophysics, T1 2020

1.3. 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 physics is required.

2. AIMS, LEARNING OUTCOMES AND GRADUATE ATTRIBUTES

2.1. Course Aims

This course aims to provide mine geologists and mining engineers an understanding of the essential interaction between the two disciplines in ongoing mining operations. The mine geologist must understand enough of the mining process to appreciate what data mining engineering needs and why it is needed. The mining engineer must understand enough about the mine geologist role to appreciate what support the mine geologist can provide and the data that must be gathered and interpreted to make that support possible.

2.2. Learning Outcomes

At the conclusion of this course the student will be able to:

1. Demonstrate knowledge of mine geology practices and modern geophysical techniques.
2. Identify and assess short and long term information requirements - for mine feasibility, planning, construction and mine operations.
3. Undertake presentations that develop essential communication skills.
4. Apply this knowledge to critically review mine geology & geophysics practices at a mine.

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

- *A Short Course in Geology for Civil Engineers*, M. C. Matthews , Bruce Keith Menzies, Bruce Keith; N. E Simons, N. E. London Thomas Telford 2008. [Available in full on-line text to UNSW students through UNSW library.](#)
- *Ore geology and industrial minerals: An introduction*, Evans A.M. , Anthony M Evans, 3rd ed.Oxford: Blackwell Scientific Publications, Boston: 1993, [Available at Level 7, Main UNSW Library \(553/36 P\) or to purchase at Amazon.](#)
- *Coal geology*, Thomas, Larry, 2nd ed.. Chichester, West Sussex ; Hoboken, N.J: John Wiley & Sons 2013. [Available in full on-line text to UNSW students through UNSW library.](#)
- *Applied Geophysics (2nd Edition)*, William Murray Telford , Robert E Sheriff, Robert E., P Geldart, L. P.1990. [Available in full on-line text to UNSW students through UNSW library.](#)

- *An Introduction to Geophysical Exploration*, Kearey, Philip , Brooks, Michael ; Hill, Ian, 3rd ed Oxford: John Wiley & Sons, Ltd. 2009. Available in full on-line text to UNSW students through UNSW library.

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/>.

3.2. Other Resources (if applicable)

- *Report Writing Guide for Mining Engineers*, 2011. P Hagan & P Mort (Mining Education Australia (MEA) ISBN 978 0 7334 3032 9.
- *Guide to Authors*, 2008. (Australasian Institute of Mining and Metallurgy; Melbourne).
- *Style Manual for authors, editors and printers*. 6th edition, (John Wiley & Sons)

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>)

3.3. 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) can be found on UNSW library web.
- UNSW Library services for Postgraduate students <http://library.unsw.edu.au/servicesfor/PGandH.html>

3.4. Report Writing Guide

The School has a report writing guide (RWG) available. A copy of this is available on the course moodle site.

4. COURSE CONTENT AND LEARNING ACTIVITIES

4.1 Learning Activities Summary

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.

A link to webinars is provided in Moodle for MINE8760. Please check your setup including webcam and microphone at least one day before the first webinar. Check webinars times for your time zone here: <http://www.timeanddate.com/worldclock/meeting.html>

***Note that Sydney is on Australian Eastern Daylight Saving Time (AEDT) until 1st April, when times switch back to Australian Eastern Standard Time (AEST).**

If you are unable to join the live webinar or would like to view part of it again, webinars are generally recorded, and are automatically available from the same Moodle link, usually within about 24 hours of the webinar.

Presentations are provided by Dr Hamed Lamei Ramandi (HR). Guest presentations are also provided thanks to experts from industry and research:

Professor Bruce Hebblewhite (BH), Dr Hossein Masoumi (HM), Dr Wendy Timms, Dr Peter Hatherly (PH), Dr Vladimir David (VD), Ed Malone (EM), Dr Laurent Ameglio (LA), Dr James Tibbett (JT).

Week	2018 dates	Activity	Hours	Content
1	16 March	Presentations, readings, discussions forum, assessment, quiz Webinar 1. Mon 16/3, 5.30-6.30pm AEDT (HLR)	8+	Overview geo information & uncertainty Overviews of mining info requirements, types of geo info , geological materials and structures, mine geology, coal geology. Overview of assessments, Q&A, mine geology & uncertainty
2	23 March	Presentations, readings, discussion forum on Week 1 assignment, quiz Webinar 2. Mon 23/3, 5.30-6.30pm AEDT (HLR)	8+	Geophysical & geological investigation I Geophysical investigations (indirect), petrophysics, geophysical bore logs, quantitative logs, drilling and coring (direct investigations). <i>Optional – signal processing</i> Geophysical logs, Q&A
3	30 March	Videos, presentations, readings, discussion forum, assessment, quiz Webinar 4, Mon 30/3, 5.30-6.30pm AEST* (HLR)	8+	Geophysical & geological investigation 2 Geological mapping and stereographic projection techniques , geophysical strata rating, airborne geophysics, seismic surveying, micro-seismic methods. <i>Optional – 3D seismic reflection</i>
4	6 April	Videos, readings, discussion forum, assessment, quiz Webinar 4, Mon 6/4, 5.30-6.30pm AEST* (HLR)	8+	Geotechnical information Seismicity and stresses, coal mining geomechanics case studies of geotechnical failures: <ul style="list-style-type: none"> • Kenneth-Finlay memorial lecture by Prof Horst Wagner “More to safety” • Hebblewhite lecture on Northparkes, <i>Optional - van der Merwe lecture on Coalbrook</i>
5	13 April	Presentations, readings, discussion forum, assessment, quiz Webinar 5, Mon 20/4, 5.30-6.30pm AEST* (HLR)	8+	Hydrogeology, ore geology Hydrogeology – flow & dewatering, ore geology and iron ore, geology of gold, metalliferous deposits , Case study: Cadia – geology, geophysics and geomechanics <i>Optional – groundwater flow in fractured and tight rock mass</i>

6	20 April	Videos, readings, discussion forum, assessment, quiz	8+	Resource estimation, JORC Techniques for resource estimation, JORC resource/reserve estimation code, Case study study: Chatree & Scuddles/Golden Grove – resource estimation <i>Optional – uranium geology</i> Q&A on resource estimation
7	27 April	Major project work Webinar 6, Mon 27/4, 4-5pm AEST* (HLR)	50+	Complete major project Q & A on major project and JORC Course wrapup

Total student effort hours:

Approx. 150 hours

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

Assessment of the research project is based on the submissions made at various project milestones over the course of the year. Specific details of the requirements of the project milestones related to each item of assessment are contained in the *Learning Guide: Mining Research Project*. All assessments are due **10:00 am Sydney time on Monday of the week**, unless otherwise indicated in the table below.

Assessment task	Release	Due	Weight	Assessment	Learning outcomes assessed
1		Weeks 1 to 7	20%	Participation in webinars, on-line quizzes and general discussion forums	1, 2, 3
2	Week 1	Week 3 3 April	10%	Geo information requirements for mining - active Moodle discussion posts & commenting within the group	1, 2, 4
3	Week 3	Week 5 17 April	20%	Geophysics exercise – data analysis (Excel) & brief report (PDF) Individual work.	1, 2
4	Week 2	11 May	50%	Major project , choice of 2 topics - 10,000 words plus figures/tables/maps, Individual work.	1, 2, 3, 4

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.

Webinar participation

Your participation in live webinars is preferable for learning outcomes, or you may miss opportunities for interactive queries and demonstrations of technical examples. However, if you are unable to join the live webinar or would like to view part of it again, webinars are generally recorded, and are automatically available from the same online link, usually within about 24 hours of the webinar.

Full participation will be awarded to students by either Option 1 or 2 criteria that follow:

- Option 1
 - Active participate in live webinar with a microphone and webcam
 - And post a brief comment (<50 words) in the post webinar blog.
- Option 2

- View the recorded webinar or view a live webinar without active participation
- And post a comment and/or reply (<200 words) in the post webinar blog.

6. ASSESSMENT CRITERIA FOR POSTGRADUATE PROGRAMS

The assessment criteria provide a framework for you to assess your own work before formally submitting major assignments to your facilitator. Your facilitator 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. All students are encouraged to take a closer look at this framework before, during and after completing an assignment.

The descriptions in the framework will help you and your facilitator to identify where your assignment is ranked – from excellent to poor achievement. We ask that you don't use the guidelines as a checklist, but as a tool to assess the quality of your work. Your facilitator will also be looking at the quality, creativity and the presentation of your written assignment as they review the framework.

7. STUDYING A PG 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)
- Chrome browser or FireFox
- 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

For distance courses it is also considered essential that you

- Upload a profile picture in Moodle LMS that can be used to verify your identity with your student ID photograph.
- Use a webcam and microphone to actively participate in webinar discussion. Voice participation is essential in webinars, so if you are restricted to text participation only it will not be possible to score full participation grading.

If you have concerns about your web access for a course presented in distance mode, we would encourage you to contact the course convenor before the course commences, to discuss whether it will be possible for you to complete a distance course.

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.

In fairness to those students who do meet the assignment due date and time, deductions will apply to submissions made after this time. Details on deductions that are automatically applied to late submissions are available on our webpage:

<https://www.engineering.unsw.edu.au/minerals-energy-resources/late-submissions>

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.

MINE8760 Mine Geology and Geophysics, T1 2020

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.

MINE8760 Mine Geology and Geophysics, T1 2020