MINE3310
Mining Geomechanics
Session One, 2016

Dr Hossein Masoumi
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1. INFORMATION ABOUT THE COURSE

<table>
<thead>
<tr>
<th>Course Code:</th>
<th>MINE3310</th>
<th>Semester:</th>
<th>S1, 2016</th>
<th>Level:</th>
<th>UG</th>
<th>Units/Credits</th>
<th>6 UOC</th>
</tr>
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<tbody>
<tr>
<td>Course Name:</td>
<td>Mining Geomechanics</td>
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<table>
<thead>
<tr>
<th>Course Convenor:</th>
<th>Hossein Masoumi</th>
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<tbody>
<tr>
<td>Contact Details</td>
<td>School of Mining Engineering</td>
</tr>
<tr>
<td></td>
<td>Old Main Building, Rm 159J</td>
</tr>
<tr>
<td>EMAIL:</td>
<td><a href="mailto:hossein.masoumi@unsw.edu.au">hossein.masoumi@unsw.edu.au</a></td>
</tr>
<tr>
<td>Phone:</td>
<td>+61 2 9385 4035</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Contact times</th>
<th>Contact times are scheduled for:</th>
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<tbody>
<tr>
<td></td>
<td>• Tuesday 9:00am – 12:00pm, Red Centre M032</td>
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<tr>
<td></td>
<td>• Thursday 2:00pm – 4:00pm, Rupert Myers Theatre</td>
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1.1. Course Description

The course provides students with the fundamental knowledge required to undertake geomechanical investigations and design tasks. This course consists of Soil and Rock Mechanics Modules including the basics of rock and soil behaviours. Soil Mechanics Module comprises of basic soil mechanics, soil classification, phase relationships, effective stress, seepage and flow, compaction and shallow foundations. Rock Mechanics Module consists of rock material and rock mass behaviours, rock mass strength and deformability, strength of discontinuities, basic rock testing, rock mass classification systems, response of rock mass to underground excavation, stress measurement, time dependant and dynamic behaviour of rocks and rock slope stability (optional).

1.2. Course Completion

Course completion requires:

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

1.3. Assumed Knowledge

CVEN2301 – Mechanics of Solids or equivalent
2. AIMS, LEARNING OUTCOMES AND GRADUATE ATTRIBUTES

2.1. Course Aims

The purpose of the course is to introduce the student to methods of testing, analysis and design appropriate to structures which consist of soil and rock, rather than steel and concrete.

2.2. Learning Outcomes

It is anticipated that on completion of the course the students will:

1. have a working knowledge of the engineering properties of soil and rock,
2. be able to select and use appropriate methods for the design of soil slopes, retaining walls and simple foundations on soil,
3. have the necessary grounding in rock mechanics to embark upon a study of the principles of rock engineering,
4. recognise the evolving nature of the discipline and develop skills to access, evaluate and integrate new knowledge and processes.

2.3. BE (Hons) Program Learning Outcomes

1. Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline.
2. Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline.
3. In-depth understanding of specialist bodies of knowledge within the engineering discipline.
4. Discernment of knowledge development and research directions within the engineering discipline.
5. Knowledge of engineering design practice and contextual factors impacting the engineering discipline.
6. Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline.
7. Application of established engineering methods to complex engineering problem solving.
8. Fluent application of engineering techniques, tools and resources.
10. Application of systematic approaches to the conduct and management of engineering projects.
11. Ethical conduct and professional accountability.
12. Effective oral and written communication in professional and lay domains.
13. Creative, innovative and pro-active demeanour.
14. Professional use and management of information.
15. Orderly management of self, and professional conduct.
16. Effective team membership and team leadership.

2.4. Graduate Attributes

The course will contribute to the development of the following attributes.

1. Appropriate technical knowledge
2. Skills of analysis, synthesis and problem solution, and ability to tolerate ambiguity
3. Lifelong ability to learn
3. REFERENCE RESOURCES
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.

3.1. Reference Materials

The recommended textbooks are

- R D Holtz, WD Kovacs and T C Sheahan, *An Introduction to Geotechnical Engineering*, Pearson

Soil and rock mechanics are not exact sciences and the student will find that there are wide variations of style and content from one textbook to another. Very often, basic principles are expressed with greater clarity and accuracy in the original journal article or other research publication than in textbooks.

3.2. Other resources Materials

- *Guide to Authors*, 2013. (Australasian Institute of Mining and Metallurgy; Melbourne). (Available for download from the AusIMM website)

3.3. Online Resources

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

3.4. Software and Hardware

- Rocscience software
## 4.1. Learning Activities Summary

<table>
<thead>
<tr>
<th>Week #</th>
<th>Week starting</th>
<th>Hours/Lecturer</th>
<th>Area</th>
<th>Content</th>
</tr>
</thead>
</table>
| 1      | 29/02         | 5/JO           | Course Introduction/Soil Mechanics | 1. Introduction to Mining Geomechanics – Soil Mechanics  
|        |               |                | Soil Mechanics | 2. Soil Classification |
| 2      | 7/03          | 5/JO           | Soil Mechanics | 3. Soil Phase Relationships and Compaction |
| 3      | 14/03         | 5/JO           | Soil Mechanics | 4. Effective Stresses and Flow of Water through Soils |
| 4      | 21/03         | 5/JO           | Soil Mechanics | 5. Shear Strength and Testing of Soils |
|        | 28/03 – 1/04  |                |                  | MID-SESSION BREAK |
|        | 4/04 – 8/04   |                |                  | NON-TEACHING WEEK |
| 5      | 11/04         | 5/JO           | Soil Mechanics | 6. Foundation Design on Soils |
| 8      | 2/05          | 5/HM           | Rock Mechanics | 4. Rock Mass Strength  
|        |               |                | Rock Mechanics | 5. Rock Mass Classification |
| 9      | 9/05          | 5/HM           | Rock Mechanics | 6. Rock Testing and In-situ Stress Measurement |
| 11     | 23/05         | 5/HM           | Rock Mechanics | 8. Time Dependant and Dynamic Behaviour of Rock |
| 12     | 30/05         | 5/HM           | Rock Mechanics | 9. Intro to constitutive modelling, scale effects & numerical methods |

Notes:
- The **Course Week** may not always align with the **Semester Week**.
- The above schedule is a guide only and the indicated dates when each theme and course content is discussed is subject to change without notice.
- Assessment submission dates are listed in **Course Assessment** section.

* **Lab sessions** will be held on 13th and 20th of May. Students will be split into two large groups and kept informed of the details in advance.
5. COURSE ASSESSMENT

5.1. Assessment Summary

The following assessment tasks have been devised to ensure the student can demonstrate that they have satisfactorily attained the minimum requirements of the course as defined in the Learning Outcomes of the course and the Graduate Attributes of the program. The student is advised to review the respective Assessment Criteria prior to commencing each assessment item.

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Start</th>
<th>Due</th>
<th>Weighting</th>
<th>Method of Assessment</th>
<th>Learning Outcomes Assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil Mechanics Group Assignment (no more than 2000 words)</td>
<td>28/03</td>
<td>2/05</td>
<td>15%</td>
<td></td>
<td>1, 2 &amp; 4</td>
</tr>
<tr>
<td>Soil Mechanics Mid-Term Exam</td>
<td>21/04 (2 PM)</td>
<td>30%</td>
<td>Mid-term exam covering the Soil Mechanics module</td>
<td>1, 2 &amp; 4</td>
<td></td>
</tr>
<tr>
<td>Rock Mechanics Group Assignment (no more than 2000 words)</td>
<td>9/05</td>
<td>13/06</td>
<td>15%</td>
<td></td>
<td>1, 3 &amp; 4</td>
</tr>
<tr>
<td>Laboratories (G1) (no more than 1000 words)</td>
<td>13/05</td>
<td>30/05</td>
<td>10%</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Laboratories (G2) (no more than 1000 words)</td>
<td>20/05</td>
<td>6/06</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Rock Mechanics Final Exam</td>
<td>June 24, 2016 (2 PM)</td>
<td>30%</td>
<td>End of the semester exam covering the Rock Mechanics module</td>
<td>1, 3 &amp; 4</td>
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</table>

NOTE: Course completion requires that all assessment items be completed.

6. ASSESSMENT CRITERIA

Assignments and examination
Answers may be numerical, graphical or descriptive.

*Answer is correct and substantiated* by complete mathematical working 100%

*Deduct for incorrect or unspecified units* 20%
*Deduct for excessive roundoff error* 10%

*Answer is correct but not substantiated* by complete, correct working up to 30% depending upon how much of the correct working is given

*Answer is incorrect but principles of mathematical working are correct* 60%

*Add if the answer is of reasonable Magnitude* 20%

*Add if incorrect only because of an error of transcription of numerical data* 10%

*Mathematical working is incomplete or incorrect* up to 50% depending upon how much of the correct working is given

Graphical answers

*Accuracy with which the data are presented* 60%
*Layout* 20%
*Tidiness* 20%

Descriptive answers
Note: there would be 40% hurdle for the final exam which means that students MUST achieve minimum 40 out of 100 in the final exam to be able to pass the course. Failure in that will lead to course failure regardless of the marks from other assessments.

7. STUDYING A UG COURSE IN MINING ENGINEERING AT UNSW

7.1 How We Contact You

At times, the School or your lecturers may need to contact you about your course or your enrolment. Your lecturers will use the email function through 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: www.it.unsw.edu.au/students/zmail/redirect_external.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: mining@unsw.edu.au
Course inquiries: these should be directed to the course convenor.

7.3 Computing Resources and Internet Access Requirements

UNSW Mining 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 smartphones 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.

You can access the School’s computer laboratory in-line with the School laboratory access guidelines and Class bookings.

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 The Box 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 and support materials are uploaded on a Learning Management System (LMS) - Moodle. All enrolled students are automatically included on the Moodle for each course. To access these documents, please visit: www.moodle.telt.unsw.edu.au

7.5 Group Work – Peer Assessment

Group work is a key Graduate Attribute in the Mining Engineering program and is integrated into the
assessment activities of many courses. This type of assessment will determine if you have satisfactorily attained one or more of the course learning outcomes.

An important factor of your performance and of your group contribution, is included in the results of the peer review system. Your Course Convenor uses these results and other factors in their determination of your result for the group assignment.

For further details please visit this page: http://www.engineering.unsw.edu.au/mining-engineering/peer-assessment.

7.6 Assignment Submissions

The School has developed a guideline to help you when submitting a course assignment. Please take a closer look at all these details on our website: www.engineering.unsw.edu.au/mining-engineering/assignment-submission-policy

We encourage you to retain a copy of every assignment submitted for assessment for your own record either in hardcopy or electronic form. On a rare occasion, assignments may be mislaid and we may contact you to re-submit your assignment.

7.7 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: http://www.engineering.unsw.edu.au/mining-engineering/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 as soon as possible: https://student.unsw.edu.au/special-consideration

7.8 Course Results

For details on UNSW assessment policy, please visit: https://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 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: https://www.student.unsw.edu.au/special-consideration

7.10 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: http://www.studentequity.unsw.edu.au/

7.11 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 https://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: 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.

7.12 Report Writing Guide for Mining Engineers


7.13 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.

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.