MINE8680

Geotechnical Data Collection and Analysis

Term 2, 2023

Course Overview

Staff Contact Details

Convenors

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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

Course Details

Units of Credit 6

Summary of the Course

The course is designed to cover a broad range of geotechnical data from instrumentation, testing and rock mass characterisation including stress measurement data. Emphasis is placed on data interpretation and the role of statistics in geomechanics for design, study and operational management. Throughout the course, practical examples of the use and misuse of data, including empirical databases will be emphasised to demonstrate the importance of understanding data before its application in design and numerical modelling. Assessment in the course will consist of a series of assignments outside lectures and an in-class examination for proof of practical competence and understanding in all of the above areas. The course content will include the following components:

1. Instrumentation in geotechnical engineering
2. Statistics for scientists and engineers
3. Data collection and interpretation for rock mass characterisation and classification
4. Data collection practices in coal mines
5. Remote monitoring applications: Pit slope monitoring
6. Empirical design databases
7. Seismic and microseismic data acquisition, processing and applications
8. Data interpretation
9. Geomechanics data uncertainty and management

Course Aims

This course aims to equip the student with the importance of instrumentation and monitoring, the importance of understanding empirical databases in geotechnical design and the benefits and limitations of statistics in geoengineering. Use of sound engineering judgement and critical thinking in geomechanics is emphasised.

Course Learning Outcomes

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

Learning Outcome	EA Stage 1 Competencies
1. Understand the importance of data in geo-engineering as input in numerical models and for their validation.	PE1.1, PE1.3, PE1.4, PE2.1, PE1.2, PE1.6
2. Appreciate the importance of data in the development of empirical design procedures and as a means of monitoring design performance.	PE1.1, PE1.3, PE1.5
3. Understand the difference between theoretical statistics and its pitfalls in geomechanics when used without sound engineering judgement.	PE1.1, PE1.2, PE1.3, PE1.5
4. Develop an ability to communicate with mine geologists to create geotechnical models for mines with complex geologies.	PE1.5, PE2.1, PE3.6, PE3.1, PE3.2

Learning Outcome	EA Stage 1 Competencies
5. Recognise, assess and interpret the geological data collected by different means and relate them with geotechnical challenges	PE1.1, PE1.5, PE2.1, PE2.2, PE2.3
6. Analyse and evaluate the data with respect to geotechnical problems to produce outputs that can be used as a basis for engineering design	PE1.1, PE1.3, PE1.5, PE2.1, PE2.2, PE3.4

Teaching Strategies

The content of this course will be delivered in different formats:

- Lectures
- Tutorials for software applications
- Private study and self-directed activities
- Moodle

Lectures: The lectures discuss the fundamentals and principles of geological data collection and analysis. Important geological features relevant to rockmass characterisations will be visualised using real cases, schematics and animations. Different methods for collecting geological data (seismic, instrumentation, visual, etc.) are presented. Common practical rockmass characterisations and classification techniques are discussed. The role of statistics in data analysis is highlighted.

Tutorials for software applications: R programming language together with R studio environment for statistical computing relevant to geotechnical data are taught. Students are expected to use R to analyse the geological data provided in the assignments. Seismic monitoring technologies will also be demonstrated, which are required in the seismic monitoring assignment.

Private study and self-directed activities: The course is delivered in block mode. Therefore, after the lectures, students are expected to do their private study and begin the assignments and review the delivered materials.

Moodle: The lecture and tutorial materials, together with additional learning resources, are provided in moodle.

Additional Course Information

You will need to bring a notebook computer, with Wi-Fi connection to be able to participate in the In-class activities.

Assumed Knowledge

This course assumes that a student:

- • has completed MINE8140 Mining Geomechanics or equivalent. Consideration will be given to candidates with significant underground mining experience for which case permission should be sought.; and
- • has a sound knowledge of mining terms and systems and has had previous exposure to mining operations through industry employment and/or field trips.

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 assessment 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.

Assessment

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.

Assessment Requirements

- 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

When

- As indicated above.
- Early submission is required in cases where the student will otherwise be absent on the due date of submission.
- Prior to submission, students should read the School Policy on *Assignment Submissions*.
- In particular, the student should make sure they have read and understood the:

- Declaration of Academic Integrity;

- Assignment Submission requirements detailed in the *University Policies* section of the Course Outline; and

- School Policy on *Assignment Submission* available on the School's website (the web address is given in the Course Outline). In particular note the requirement that only PDF documents should be uploaded and the required file naming convention.

Where

- *Submissions must be made electronically* through Turnitin in Moodle unless otherwise stated. Turnitin is a plagiarism checking service that will retain a copy of the assessment item on its database for the purpose of future plagiarism checking.

What

- The submission must be:
    - a single document in PDF format; and
    - prepared in the form of a formal report that includes a list of reference sources cited in the report, prepared in accordance with the report writing standards of the School as contained in the ***MEA Report Writing Guide for Mining Engineers***. A copy can be obtained from the UNSW Bookshop or downloaded from the School webpage.

How

- The submitted document must be consistent with the following file naming convention: **FamilyNameInitials_CourseCode_AssignmentNumber.pdf .**
- A typical complaint filename would take the following form SmithPD_MINE8680_A01.pdf, which

elements correspond to:

- Family name of student: Smith
- Initial(s) of student: PD
- Course Code: MINE8680
- Assignment number: A01...as defined in the Course Outline for the assessment task
- File format: PDF document.

Assessment task	Weight	Due Date	Course Learning Outcomes Assessed
1. Individual report – instrumentation and data analysis for mine design	30%	11/07/2023 11:59 PM	2, 4, 6
2. Individual report – seismic monitoring and data analysis	40%	25/07/2023 11:59 PM	5, 6
3. Individual report – rock characterisation	30%	03/08/2023 11:59 PM	3, 4, 5, 6

Assessment 1: Individual report – instrumentation and data analysis for mine design

Due date: 11/07/2023 11:59 PM

Provided in the assignment task description on moodle.

This assignment is submitted through Turnitin and students can see Turnitin similarity reports.

Assessment 2: Individual report – seismic monitoring and data analysis

Due date: 25/07/2023 11:59 PM

Provided in the assignment task description on moodle.

This assignment is submitted through Turnitin and students can see Turnitin similarity reports.

Assessment 3: Individual report – rock characterisation

Due date: 03/08/2023 11:59 PM

Provided in the assignment task description on moodle.

Attendance Requirements

Students are strongly encouraged to attend all classes and review lecture recordings.

Resources

Prescribed Resources

Reference Materials

1. 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)
2. Guide to Authors. (Australasian Institute of Mining and Metallurgy: Melbourne) (Available for download from the AusIMM website)
3. Harr, M.E. 1987. *Reliability-based design in civil engineering*. New York: McGraw-Hill.
4. Pine. R.J. 1992. Risk analysis design applications in mining geomechanics. *Trans. Instn Min. Metall. (Sect.A)* 101, pp. 149-158.
5. Rosenbleuth, E. 1981. Two-point estimates in probabilities. *J. Appl. Math. Modelling* 5, pp. 329-335.
6. Hadjigeorgiou, J. 2012. Where do the data come from? *Trans. Instn Min. Metall. (Sect.A) Mining Technology*, Vol. 121(4), pp. 236 – 247.
7. Suorineni, F.T., Kaiser, P.K. and Tannant, D.D. 2001. Likelihood statistic for interpretation of the stability graph for open stope design. *International Journal of Rock Mechanics & Mining Sciences* 38, pp. 735–744.)
8. Suorineni, F.T. 2010. The stability graph after three decades in use: Experiences and the way forward. *International Journal of Mining, Reclamation and Environment*, Vol. 24, No. 4, pp. 307–339.
9. Baecher, G. B. and Christian, J. T. 2005. Reliability and Statistics in Geotechnical Engineering. John Wiley & Sons, Ltd., 619 p.
10. Wiles, T. 2006. Reliability of numerical modelling predictions. *International Journal of Rock Mechanics & Mining Sciences* 43, 454–472.
11. William, N. 2010. *Statistics for engineers and scientists*. 3rd Edition, McGraw-Hill Science, 928 p.
12. Hudyma, M.R., Frenette, P. and Leslie, I. 2010. Monitoring open stope caving at Goldex Mine. *Trans. Instn Min. Metall. (Sect.A) Mining Technology*, VOL 119 NO 3, pp. 142 – 150.
13. Potvin, Y., Jarufe. J. and Wesseloo, J. 2010. Interpretation of seismic data and numerical modelling of fault reactivation at El Teniente, Reservas Norte sector. *Trans. Instn Min. Metall. (Sect.A) Mining Technology*, VOL 119 NO 3, pp. 175 – 181.
14. Kaiser, Pk., Vasak, P., Suorineni, F.T. and Thibodeau, D. 2006. New dimensions in seismic data interpretation with 3D virtual reality visualisation for burst-prone mines. Keynote Address, RAiSM6.
15. Trifu, C. and Suorineni, F.T. 2010. Use of microseismic monitoring for rockburst management at Vale Inco Mines. *In Controlling Seismic Hazard and Sustainable Development of Deep Mines*, C. Tang (ed.), 1105-1114, Rinton Press, New York.
16. Hoek, E. 1998. Reliability of Hoek-Brown Estimates of Rock Mass Properties and their Impact on Design. Technical Note, *In. J. Rock Mech. Min. Sci.* Vol. 35, No I, pp. 63-68.
17. Hoek, E. 1999. Putting numbers to geology – an engineer's viewpoint. *Quarterly Journal of Engineering Geology*, Vol. 32, No. 1, pp. 1 – 19.

Recommended Resources

Extra resources are available on the moodle.

Course Evaluation and Development

The 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 presentation of your written assignment as they review the framework. Rubrics, wherever applicable, will be provided at the time of the assignment release.

The following assessment criteria provide a framework for students when preparing assignments in the course as well as a guideline for assessors when marking an assignment. The student is advised to review the relevant framework before undertaking their assignment.

The criteria listed for each item of assessment and the descriptions contained therein are not intended to be prescriptive nor is it an exhaustive list. Rather it should be viewed as a framework to guide the student as to the type of information and depth of coverage that is expected to be evident in a submission for assessment; the framework illustrates for example what would distinguish an excellent achievement from a poor achievement.

The student should be cognisant that a range of factors is often being assessed in any one assignment; not just whether the final results are numerically correct. Consideration is given to other relevant elements that contribute to the *Learning Outcomes* of the course as well as the *Graduate Attributes* of the overall degree program.

The student is cautioned against merely using the assessment criteria as a checklist. When assessing an assignment, elements in the framework will be examined in terms of quality and creativity. Hence ensuring all the listed elements are merely covered in an assignment is often not sufficient in itself and will not automatically lead to full marks being awarded. Other factors such as how the student went about presenting information, how an argument was structured and/or the elements supporting a particular recommendation or outcome are also important.

Finally, the framework can also be used to provide feedback to a student on their performance in an assignment.

Assignment assessment criteria

Criteria	***Excellent***	***Good***	***Satisfactory***	***Unsatisfactory***	***Poor***	***nil***
Executive summary	Executive summary is well written and accurately yet concisely captures all the essential aspects of the project objective, methodology, outcomes and issues	Executive summary is reasonably well written and captures most of the essential elements of the project	Executive summary is adequately written and captures most elements though missing some information	Executive summary is poorly written and does not clearly convey information concerning project topic, method, issues and/or outcomes	Executive summary is badly written and/or does not summarise the project topic and its outcomes	Executive summary is missing and/or largely incomplete
	10 9	8 7	6 5	4 3	2 1	0
Introduction	Introduction provides a clear definition of the aims and objectives and, scope of project clearly identifies the	Introduction provides a good definition of the aims and objectives and scope of project identifies the relevance and	Introduction satisfactorily outlines the aims and objectives and/or provides a reasonable discussion of	Incomplete and/or unclear definition of project scope	Project topic and scope are very unclear and/or confused	Introduction is missing and/or largely incomplete

Criteria	*Excellent*	*Good*	*Satisfactory*	*Unsatisfactory*	*Poor*	*nil*
	relevance and significance of the project to the industry	significance to industry	relevance and significance to industry			
	5	4	3	2	1	0
Experimental procedures	presented an excellent description of the study methodology and/or experimental procedure that was used to obtain data	presented a good description of the study methodology and/or experimental procedure that was used to obtain data	presented an acceptable description of the study methodology and/or experimental procedure that was used to obtain data	presented a limited description of the study methodology and/or experimental procedure that was used to obtain data	poor description of the study methodology and/or experimental procedure that was used to obtain data	methodology and/or experimental procedures missing
	10 9	8 7	6 5	4 3	2 1	0
Results and analysis	all relevant results are presented in a manner from which meaningful analyses and interpretations are drawn good and creative approach to analysis of results interpreted against the stated objectives of the study	most results are presented in a manner from which meaningful analyses and interpretations are drawn results are interpreted based on established approach relevant to stated objectives of the study	many results are presented in a manner from which meaningful analyses and interpretations are drawn results are not interpreted against the stated objectives of the study.	some results are presented and some analysis and interpretations of these results are given not aligned to the stated objectives of the study.	poorly presented some results and/or some results missing little or no analysis or interpretation of results	no results presented and/or analysed
	30 26	25 20	19 15	14 8	7 1	0
Quality of study and innovation in study process	approach highlights creativity and innovation, while working to an organised plan actual execution of the work showed the application of knowledge gained from background study through relevant analysis of data.	approach is systematic and showed some innovation actual execution of the work showed the application of knowledge gained from background study through analysis of data.	approach is reasonably systematic. actual execution of work showed some understanding via application of prior knowledge and some background study to produce limited analysis of data	approach is not well considered and does not flow logically from the background study presented actual execution of work shows flawed understanding and little application of either background study or prior knowledge	approach is haphazard and has no logical basis actual execution of the work shows very little understanding and little application of either background study or prior knowledge	little/no evidence of quality of study and innovation
	20 19	18 15	14 10	9 5	4 1	0
Conclusions and recommendations	excellent, clear and concise summary of the outcomes of the study that demonstrates sound comprehension and insight into the significance of the results excellent and appropriate recommendations for continuation and improvement of the study were discussed	good summary of the outcomes of the study that demonstrates comprehension and some insight into the significance of the results some recommendations for continuation and improvement of the study were discussed	reasonable summary of the outcomes of the study that demonstrates some comprehension but limited insight into the significance of the results limited recommendations for continuation and improvement of the study were discussed	summary of the outcomes of the study that demonstrates limited comprehension few, inappropriate and/or irrelevant recommendations	fails to explain what was achieved with no real comprehension demonstrated	no conclusions and/or recommendations
	10 9	8 7	6 5	4 3	2 1	0
Referencing	**all in-text citations were correct** as per the RWG; and	majority of in-text citations were correct with only a few minor errors; and	most in-text citations were correct though there were several minor errors; and/or some information was	many errors with in-text citations; and/or limited/poor range of	most in-text citations had errors; and/or too few references	there was no References section and/or

Criteria	*Excellent*	*Good*	*Satisfactory*	*Unsatisfactory*	*Poor*	*nil*
	all sources of information were **referenced**; and **all listings in** the **References** section were **correct** and exactly in total accord with AusIMM referencing requirements as defined in the GTA and RWG; and there were **no references missing** from the References section	majority of sources of information were referenced with only a few minor exceptions; and most of listings in the References section were correct and in total accord with AusIMM referencing requirements as defined in the GTA and RWG; and there was only one reference missing from the References section	not referenced; and many listings in the References section were correct and in accord with AusIMM referencing requirements as defined in the GTA and RWG with only a few very minor exceptions; and there were only a few references missing from the References section	references and/or not relevant to study topic; and/or too little use of in-text citations and/or several instances of information not being properly referenced to identify source of information; and/or many errors in the References section and/or references were not correct and were not in accord with AusIMM referencing requirements as defined in the GTA and RWG; and/or there were several references missing from the References section	and/or most references were not relevant to study topic; and/or little use of made of in-text citations to identify source of information and/or only a few references cited in the text to identify source of information; and/or many instances of information not being properly referenced to identify source of information; and/or most of the listings in the References section were incorrect and/or were not in accord with AusIMM referencing requirements as defined in the GTA and RWG; and/or there were many references missing from the References section and/or it was largely incomplete.	no in-text citation in main body of report of information sources; and/or incorrect system of citing references was used; and/or incomplete bibliographic details provided for references; and/or incorrect system of listing references in the References section; and/or no details provided for References; and/or did not conform to AusIMM referencing requirements as defined in the GTA and RWG.
	5	4	3	2	1	0
Standard of assignment presentation	**structure of assignment contains all required sections** and follows standard order of presentation progression for a assignment in accord with *RWG* structure follows a logical progression **format** of is **completely in accord** with the report writing conventions detailed in *RWG* use of **tables, figures and equations is correct** and completely in accord with the *RWG* with no errors **writing style is appropriate** and completely in accord with a assignment	structure is complete though it has a few minor errors format is largely in accord with *RWG* with only a few minor errors use of tables, figures and equations is largely correct with only a few minor errors style is largely appropriate for a technical report with a few minor exceptions largely free of spelling and grammatical errors	structure is mostly correct and/or has some minor errors format is mostly in accord with the RWG though it has some minor errors use of tables, figures and equations is mostly correct though there are several minor errors style is appropriate in most instances with some minor errors several minor spelling and grammatical errors	several issues with structure and/or many minor errors and/or omissions many issues with format of assignment as it deviates from *RWG* some issues with use of tables, figures and/or equations writing style is inappropriate in some instances many instances of spelling and/or grammatical errors	significant issues with structure and/or many major errors and significant omissions large number of significant major issues in format use of tables, figures and/or equations is largely inconsistent with *RWG* writing style is inappropriate in many instances large number of spelling and/or grammatical errors	information not presented in a form expected in a study assignment and/or not compliant with *RWG* most essential elements of structure are missing assignment has no logical structure significant amount of information is missing format not in accord with the *RWG* standards use of tables, figures and/or equations is incorrect inappropriate writing style for a study assignment

Criteria	*Excellent*		*Good*		*Satisfactory*		*Unsatisfactory*		*Poor*		*nil*
	no spelling and grammatical errors etc										major issues /numerous spelling and/or grammar errors
	10	9	8	7	6	5	4	3	2	1	0

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

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
- Academic Skills Support - https://www.student.unsw.edu.au/skills
- Psychology and Wellness - 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.

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

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

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

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

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.microsoftcrmportals.com/web-forms/
- Course inquiries should be directed to the Course Convenor

Image Credit

Image by Hamed Lamei Ramandi.

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	✓