School of Civil and Environmental Engineering

Term 1, 2020

CVEN9511 GEOTECHNICAL MODELS AND SITE INVESTIGATIONS

COURSE DETAILS

Units of Credit	6UOC
Contact hours	Five day short course Wednesday 26th Feb - Tuesday 3rd March plus external work
Class	8:30 – 5:00 (9am start Tuesday) CivEng 109
Long Reef Fieldtrip	Monday 2nd March: 7:30am – 6:30pm Coach departs Gate 14, Barker Street
Course Coordinator and Lecturer	Dr Kurt Douglas email: k.douglas@unsw.edu.au office: CE 506
Lecturers	Mark Eggers, Felicia Weir, Tim Nash, Steven Pells Pells Sullivan Meynink

INFORMATION ABOUT THE COURSE

The course will consist of a five day internal short course followed by external assignments and study. There will be a full day fieldtrip to Long Reef on the Monday of the course.

The fieldtrip will be discussed in class. Students are required to be at Gate 14 Barker St at 7:15am Monday for a 7:30am departure. The coach is expected to return at about 6:30pm.

In previous surveys of geotechnical employers, engineering geology was seen as a critical element of a MEngSc education. Thus, the focus of the course is to enable students to develop appropriate geological models for engineering design. Site investigation concepts considering these models are also covered. The first four days focus solely on the models component with the final day introducing site investigation concepts and some site investigation methods.

Although students can do the course at any stage of their degree, it is recommended that it be done early as it is essentially assumed knowledge for the other Masters courses (i.e. effective design requires the development of an effective geotechnical model).

As the course is substantially about engineering geology and its application in developing geotechnical models, you are expected to come with some understanding of geology. Engineers in particular can find the course challenging and demanding. It is recommended that you refresh your geological knowledge by reading some of the suggested texts prior to attending the course. You can also expect to have to do significant reading and open ended assignments after the course and should timetable this into your schedule.

HANDBOOK DESCRIPTION

See: **http://www.handbook.unsw.edu.au/postgraduate/courses/2020/CVEN9511.html**

OBJECTIVES

To introduce students to engineering geology, the development of geotechnical engineering models, geotechnical mapping skills and basic site investigation techniques in Geotechnical Engineering. The course is specialised, and designed for those who will work in Geotechnical Engineering and Engineering Geology. It will also be useful for those who are majoring in other areas and will be expected to brief and communicate with geotechnical specialists as part of their role.

Some of the program outcome attributes are listed in the table below together with how you may expect to achieve them.

An in-depth engagement with the relevant disciplinary knowledge in its inter-disciplinary context	This course develops the process for bringing together an understanding of site geology and engineering requirements to create effective and useful geological/geotechnical models.
Capacity for analytical and critical thinking and for creative problem solving	Most of the assignments require you to consider a quantity of information and supplement it with your own investigations and research to solve open ended questions.
Ability to engage independent and reflective learning	You are expected to do pre and post course reading and study. Much of the notes provide references for further independent study to increase the depth and breadth of your knowledge.
The skills to locate, evaluate and use relevant information (Information literacy)	In practice, you are expected to use publications (journals/conferences/reports/books) to keep abreast of recent advances and understand site geology and history. This course will often use these types of references in addition to lecture notes to improve your information literacy.
Skills for collaborative and multi-disciplinary work	Parts of the Long Reef assignment will be performed in groups (although individual independent assignments are required). This is particularly the case for the collection of data on site at Long Reef. From previous experience, groups that receive high marks generally have good collaboration between members and seek assistance from demonstrators/lecturers when required.
Skills for effective communication	Assignments are expected to be presented in a professional 'report style' manner (unless stated otherwise).

TEACHING STRATEGIES

The contents of this subject will be presented to you in a number of formats. Each of these formats are explained below together with our expectations of you.

Lectures: Formal lectures will be presented to discuss the basic principles of geology and its use in forming effective geotechnical models. An introduction to site investigation concepts will also be presented. Lectures will vary from standard PowerPoint and overhead projector lectures to more hands on demonstrations of various engineering techniques. You are expected to attend all the lectures as they will greatly assist in understanding what is presented in the lecture notes. The lectures will also be a primary point of communication between the class and the lecturers. Further communication will be via your student email and Moodle. It is very important that you frequently check your messages.

Demonstrations/workshops: The demonstrations/workshops in this subject are used to teach you 'hands on' methods for assessing the engineering geology of a site. They will also contain opportunities for you to work on example problems, to do pre-work on the fieldtrip and to complete components of the assignment. You will be expected to be present and participate at all demonstrations/workshops, as they will contain material not covered in lectures. It is strongly recommended that you take advantage of the face-to-face opportunity to ask your lecturers questions.

Fieldtrip: The field trip is compulsory as it gives you a practical understanding of the content of the course and a chance to practice field mapping techniques. The major assignment will be based on the fieldwork location and the information you collect there. We understand that some of you will have limited field mapping skills and we will try and deliberately mix students of different abilities into groups to assist with this. If you are struggling it is very important that you seek out a demonstrator or lecturer for assistance early. We are there to help you. Do not just wander behind the class as you will then struggle in the later assignment tasks.

Assignment: The Long Reef assignment will be divided into 3 parts. The first part will be done prior to the fieldtrip and will require development of a preliminary model that you will use on site. The second, major component will require you to incorporate the information collected on site and in the literature into your geotechnical model. The third component will be to suggest a site investigation program that could address uncertainties in the geology or engineering properties of the materials related to the engineering project. These assignments will provide a practical application of the material learnt through the course.

Private study: The lectures and workshops are presented in a very condensed form. Therefore your private study post the course is very important and you should commence the assignment and review and reflection of lecture material immediately after the on-campus component. Your private study should also include: workshop and assignment problems; accessing provided links and supplementary material on Moodle and performing your own literature research. For each hour of contact it is expected that you will put in at least 1.5 hours of private study.

EXPECTED LEARNING OUTCOMES

This course is designed to address the learning outcomes below and the corresponding Engineers Australia Stage 1 Competency Standards for Professional Engineers as shown. The full list of Stage 1 Competency Standards may be found in Appendix A.

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

	Learning Outcome	EA Stage 1 Competencies
1.	*To create a preliminary geological model using your understanding of geology, site history and observations that can be used as an input to a proposed development for developing site investigations and geotechnical design.*	PE1.1, PE1.3, PE1.4, PE2.1, PE2.4, PE3.2, PE3.4, PE3.6
2.	*Describe, record and present features of soil and rock masses that can be used as an input to geotechnical design.*	PE1.1, PE1.3, PE1.4, PE2.1, PE2.4, PE3.2, PE3.4, PE3.6
3.	*Assess the limitation of your model findings and to suggest appropriate investigations that may reduce model uncertainty.*	PE1.3, PE1.4,

ASSESSMENT

The final grade for this course will normally be based on the sum of the scores from each of the assessment tasks. The Final Examination is worth 40% of the Final Mark if class work is included and 100% if class work is not included. The class work is worth 60% of the Final Mark if included. A mark of at least 40% in the final examination is required before the class work is included in the final mark. The formal exam scripts will not be returned. Students who perform poorly in the assessment tasks and workshops are recommended to discuss progress with the lecturer during the semester. Note: The lecturer reserves the right to adjust the final scores by scaling if agreed by the Head of School.

Details of each assessment component, the marks assigned to it, and the dates of submission are provided below.

Please ensure that you use an assignment cover sheet for all submissions (attached) and keep a complete copy of your assignment.

SUBMITTING ASSIGNMENTS

Digital submission of assignments will be facilitated via Moodle.

If required, assignment 'hard copies' (in addition, you should email/upload a copy to ensure delivery) can be placed in the submission box at the Eastern end of the Level 5 Civil Engineering corridor or mailed to:

Dr Kurt Douglas

School of Civil & Environmental Engineering

The University of New South Wales

UNSW SYDNEY NSW 2052.

All assignments should be submitted with a signed Assessment Cover Sheet (see attached)

Short Course/Distance Course Exams – IMPORTANT INFORMATION

All Distance/Short course mode students are expected to sit their final examination on Kensington campus (Sydney). If you reside further than 40km from the Kensington campus, and you wish to sit your exam externally (by distance), **you must register for an external exam** by the UNIVERSITY CENSUS DATE (*Term 1: 15th March; Term 2: 28th June, Term 3: 11th October*) more information found here:

https://www.engineering.unsw.edu.au/civil-engineering/student-resources/policies-procedures-and-forms/exam

Supplementary Examinations for Term 1 2020 will be held on Monday 25th May – Friday 29th May (inclusive) should you be required to sit one. You are required to be available during these dates. Please do not to make any personal or travel arrangements during this period.

Details of each assessment component, the marks assigned to it, the criteria by which marks will be assigned, and the dates of submission are set out below.

ASSIGNMENTS

Assignment	Assignment Details	Dates to be confirmed in class	Value
Long Reef Assignment	This assignment requires you to develop a geotechnical model for Long Reef for a specific engineering project. Activities will be carried out on campus during workshops and on site at Long Reef. You will then be required to complete the assignments at home. It is strongly recommended that you complete this as early as possible whilst the information is still fresh in your mind. The first part of the assignment will assess how well you synthesise preliminary information from papers, maps, aerial photographs etc. into a preliminary geological model that can be used for the basis of your information collecting on the fieldtrip. (Learning Outcome 1) The second, more substantial part of the assignment will assess your ability to collect and interpret appropriate site information and incorporate this with your preliminary model and further research findings into a geological model. (Learning Outcome 1, 2, 3) From previous feedback, some have found this very challenging due to the self-guided and open ended nature of the process. This year, we have agreed to review draft submissions submitted by Monday 23rd March. General comments will be provided as to whether you are on the right track and what you can do to improve your work. No marks will be awarded and this is not compulsory. The site investigation component of the assignment will assess your ability to identify uncertainties in the geological model and parameters required for design. Once complete, you will then be required to develop a site investigation to address questions raised from the model and the engineering project. (Learning Outcome 3)	Geotechnical Model – includes all submission components. First component due **during short course** Draft submission for review (not compulsory, no marks) Due: **Monday 23rd March**. Final submission due **Tuesday 21st April.** Site Investigation component due: **Thursday 23rd April**	 15% N/A 35% 10%
Exam	The exam will assess all the elements of the course. Process is important when building models and you will need to show that process at work in your exam answers. The course covers global tectonic settings, geomorphology and geotechnical characteristics in different geological terrains. These broad overviews then lead into taking site-specific information, following a process of sifting and collation to arrive at a model. Your ability to follow this process will be assessed. (LO 1-3)	**UNSW Exam period** *See important info in Assessment Section.*	40%

Note: Late work will be penalised at the rate of 10% per day after the due time and date have expired.

COURSE PROGRAM

TERM 1, 2020 (Indicative only, subject to change)

Day	Topics covered
Wednesday 26/2	Engineering Geology and Geotechnical Models; Geotechnical Mapping. Details in class and on Moodle.
Thursday 27/2	Engineering Geology and Geotechnical Models; Geotechnical Mapping. Details in class and on Moodle.
Friday 28/2	Engineering Geology and Geotechnical Models; Geotechnical Mapping. Details in class and on Moodle.
Monday 2/3	**Fieldwork – IMPORTANT**: You will need to bring appropriate clothing and footwear suitable for field work. You should also bring any field mapping equipment that you have. NOTE: COACH LEAVES Gate 14 Barker St, UNSW AT 7:30am SHARP AND RETURNS AT APPROX. 6:30pm
Tuesday 3/3	Fieldwork review; Lab Visit; Site Investigation Concepts

RELEVANT RESOURCES

* Basic geology texts should be reviewed prior to the course if you are concerned about your knowledge. There are many available as E-books through the UNSW library (you will need to log in with your ZID to access).

* Examples of texts introducing engineering geology (good for civil engineers with limited training):

- Hencher, S. (2012) Practical Engineering Geology. Spon Press. [E-book available in through UNSW library]
- Bell, F.G. (2007) Engineering Geology [E-book available]
- West, T.R. (1995) Geology Applied to Engineering, Prentice Hall. 1st ed.
- Waltham, A.C. (2009) Foundations of Engineering Geology. CRC Press. 3rd ed. [E-book available]
- Johnson, R.B. and DeGraff, J.V. (1988) Principles of Engineering Geology, Wiley. 1st ed.
- Note that a geological dictionary will also assist those with limited geological knowledge.

* A very good text that covers geological issues for engineering projects (not just dams) and site investigations:

- Fell et al. (2014) Geotechnical Engineering of Dams, Taylor and Francis. 2nd ed. [E-book available]

* Further papers/book references can be found in the notes and on Moodle.

DATES TO NOTE

Refer to MyUNSW for Important Dates available at:

https://student.unsw.edu.au/dates

PLAGIARISM

Beware! An assignment that includes plagiarised material will receive a 0% Fail, and students who plagiarise may fail the course. Students who plagiarise are also liable to disciplinary action, including exclusion from enrolment.

Plagiarism is the use of another person's work or ideas as if they were your own. When it is necessary or desirable to use other people's material you should adequately acknowledge whose words or ideas they are and where you found them (giving the complete reference details, including page number(s)). The Learning Centre provides further information on what constitutes Plagiarism at:

https://student.unsw.edu.au/plagiarism

ACADEMIC ADVICE

For information about:

- Notes on assessments and plagiarism,
- School policy on Supplementary exams,
- Special Considerations,
- Solutions to Problems,
- Year Managers and Grievance Officer of Teaching and Learning Committee, and

Refer to Academic Advice on the School website available at:

https://www.engineering.unsw.edu.au/civil-engineering/student-resources/policies-procedures-and-forms/academic-advice

SPECIFIC MENGSC ADVICE

For advice on course selection and other academic matters, email: **k.douglas@unsw.edu.au**

For enrolment advice, requests for credit transfer or pre-approval of external courses or any other administrative request, please contact 'The Nucleus':

https://nucleus.unsw.edu.au/Help-and-support/visiting-the-nucleus--student-hub

Appendix A: Engineers Australia (EA) Competencies

Stage 1 Competencies for Professional Engineers

	Program Intended Learning Outcomes
PE1: Knowledge and Skill Base	PE1.1 Comprehensive, theory-based understanding of underpinning fundamentals
	PE1.2 Conceptual understanding of underpinning maths, analysis, statistics, computing
	PE1.3 In-depth understanding of specialist bodies of knowledge
	PE1.4 Discernment of knowledge development and research directions
	PE1.5 Knowledge of engineering design practice
	PE1.6 Understanding of scope, principles, norms, accountabilities of sustainable engineering practice
PE2: Engineering Application Ability	PE2.1 Application of established engineering methods to complex 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
PE3: Professional and Personal Attributes	PE3.1 Ethical conduct and professional accountability
	PE3.2 Effective oral and written communication (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

CVEN9511 Geotechnical Models & SI

Assignment Cover Sheet 2020

Assignment (please circle): Long Reef Model / Site Investigations

Name: …… **SID:** ……..

Address: ……..

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I/We declare that this assessment item is my/our own work, except where acknowledged, and has not been submitted for academic credit elsewhere, and acknowledge that the assessor of this item may, for the purpose of assessing this item:

Reproduce this assessment item and provide a copy to another member of the University; and/or,

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).

I certify that I have read and understood the University Rules in respect of Student Academic Misconduct.

Signed: .....date: ☐☐ ☐☐ ☐☐

PLEASE ENSURE THAT YOU KEEP A COPY OF YOUR ASSIGNMENT