School of Civil and Environmental Engineering

Term 2, 2020

CVEN9521 SLOPE STABILITY AND STABILISATION

COURSE DETAILS

Units of Credit	**6**
Contact hours	6 hours per week for four weeks and 3 hours per week for five weeks
Classes and workshops	Monday, 11:00–14:00 (wks 1, 3-5) online Wednesday, 18:00–21:00 (wks 1-5, 7-10) online No teaching week 6 or Monday week 2.
Course Coordinator and Lecturer	Professor Adrian Russell email: a.russell@unsw.edu.au office: CE504

INFORMATION ABOUT THE COURSE

Students enrolling in this course are assumed to have knowledge of soil mechanics to Bachelor of Civil Engineering standard. Students without a civil engineering degree (or equivalent) should have completed (or be currently enrolled in) CVEN9525 Fundamentals of Geomechanics.

HANDBOOK DESCRIPTION

Landslide classification and recognition; relation to topography and geology. Site investigations for landslides – the specific issues. Analysis of stability; selection of shear strengths, shear strength of fissured clays; review of limit equilibrium analysis, back-analysis; slope stabilisation, pre-failure deformations of soil slopes. Slope stabilisation techniques including geometry change, control of piezometric pressures, anchoring, retaining walls, reinforced soil. Pre- and post-failure deformations of excavated rock slopes. Stability analysis involving unsaturated soils. Quantitative Risk Analysis, including assessment of the probability of failure, travel distance, risk estimation and risk acceptance criteria.

OBJECTIVES

To introduce students to the state of the art of assessment and design of the stability of soil slopes and the Quantitative Risk Assessment of slopes. To have students understand and be able to apply the techniques of assessment, design and QRA.

The course is specialised and designed for those who will work in Geotechnical Engineering, Engineering Geology and Civil Engineering.

TEACHING STRATEGIES

The teaching strategies that will be used and their rationale. Give some suggested approaches to learning in

the course.

(An example of the approaches to learning are)

Private Study	• Review lecture material • Do set problems and assignments • Reflect on class problems and assignments • Download materials from Moodle • Keep up with notices and find out marks via Moodle
Lectures	• Find out what you must learn • Follow worked examples • Hear announcements on course changes
Assessments	• Demonstrate your knowledge and skills • Demonstrate higher understanding and problem solving
Computer Laboratory Work	• Hands-on work, to set studies in context

EXPECTED LEARNING OUTCOMES

Student-centred and self-directed learning skills to apply an advanced understanding of soil mechanics to solve fundamental problems and practical problems involving real data.

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

Learning Outcome		**EA Stage 1 Competencies**
1.	*Understand and be able to apply the techniques of assessment*	*1.1, 1.3, 2.1. 2.2. 2.3. 3.2. 3.4*
2.	*Understand and be able to apply the techniques of design*	*1.1, 1.3, 1.4, 2.1, 2.2, 3.2, 3.3, 3.4*
3.	*Understand and be able to apply the techniques of QRA*	*1.2, 2.1, 2.2, 2.3, 3.1, 3.2, 3.4*

For each hour of contact it is expected that you will put in at least 1.5 hours of private study.

COURSE PROGRAM

Date	Topic	Lecture Content
01/06/2020 and 03/06/2020 (Week 1)	Classification, geology, hydrogeology, topography Site investigations, mapping, pitting, drilling, instrumentation, model development, the observational method	Lecture and slide show Lecture and workshop
10/06/2020 (Week 2)	Limit equilibrium methods of stability analyses	Lecture and workshop
15/06/2020 and 17/06/2020 (Week 3)	Limit equilibrium methods of stability analyses	Lecture and workshop

22/06/2020 and 24/06/2020 (Week 4)	Limit equilibrium methods of stability analyses Introduction to unsaturated soil mechanics	Lecture and workshop and SlopeW software demonstration
29/06/2020 and 01/07/2020 (Week 5)	Analysis of slopes involving unsaturated soils Laboratory testing, selection of parameters	Lecture and workshop
06/07/2020 (Week 6)	***No teaching***	***Flexibility week for all courses (non-teaching)***
15/07/2020 (Week 7)	Stabilisation techniques	Lecture and workshop
22/07/2020 (Week 8)	Mechanics of rapid failure and estimation of travel distance	Lecture and workshop
29/07/2020 (Week 9)	Quantitative Risk Assessment (QRA), principles and system framework	Lecture and demonstrations
03/08/2020 (Week 10)	Revision, case studies and example problems	Workshop and demonstrations

ASSESSMENT

- Assignment 1, due beginning of Week 4 (9am 22nd June) value: 10%
- Assignment 2, due beginning of Week 7 (9am 13th July) value: 10%
- Assignment 3, due in Week 10 (5pm 5th August) value: 40%
- Two hour open-book take-home final exam, held in the formal exam period (commencing 14th August) value: 40%

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.

Supplementary Examinations for Term 2 2020 will be held on Monday 7th September – Friday 11th September (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.

PENALTIES

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

ASSESSMENT OVERVIEW

Item	Length	Weighting	Learning outcomes assessed	Assessment Criteria	Due date	Deadline for absolute fail	Marks returned
1. Assignment 1	*~2 days*	*10%*	*1.1, 1.5, 2.1. 2.2. 2.3. 2.4. 3.1 3.2, 3.4, 3.5*	*Detailed on assignment question, located on Moodle*	*9am 22nd June*	*none*	*26th June*
2. Assignment 2	*~2 days*	*10%*	*1.1, 1.3, 1.4, 2.1. 2.2. 2.3. 3.2, 3.3, 3.4*	*Detailed on assignment question, located on Moodle*	*9am 13th July*	*2 weeks after due date unless an extension is granted*	*~2 weeks after submission*
3. Assignment 3	*~4 weeks*	*40%*	*1.1, 1.3, 1.4, 2.1. 2.2. 2.3. 3.2, 3.3, 3.4*	*Detailed on assignment question, located on Moodle*	*5pm 5th August*	*2 weeks after due date unless an extension is granted*	*~3 weeks after submission*
4. Exam		40%					

RELEVANT RESOURCES

It is not necessary to buy a text book as the notes provided are extensive and sufficient. These will include references to several books and numerous articles in the technical literature. Completion of the assignments may require students to refer to these works.

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;
- Special Considerations: student.unsw.edu.au/special-consideration;
- General and Program-specific questions: The Nucleus: Student Hub
- Year Managers and Grievance Officer of Teaching and Learning Committee, and
- CEVSOC/SURVSOC/CEPCA

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

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