CVEN9521

Slope Instability and Stabilisation

Term 2, 2023

Course Overview

Staff Contact Details

Convenors

Name	Email	Availability	Location	Phone
Rohit Tiwari	r.tiwari@unsw.edu.au	Email to to make appointment	Civil Engineering Building (H20) Level 6, Room CE604	+61 (2) 9348 0182

School Contact Information

Engineering Student Support Services – The Nucleus - enrolment, progression checks, clash requests, course issues or program-related queries

Engineering Industrial Training – Industrial training questions

UNSW Study Abroad – study abroad student enquiries (for inbound students)

UNSW Exchange – student exchange enquiries (for inbound students)

UNSW Future Students – potential student enquiries e.g. admissions, fees, programs, credit transfer

Phone

(+61 2) 9385 8500 – Nucleus Student Hub

(+61 2) 9385 7661 – Engineering Industrial Training

(+61 2) 9385 3179 – UNSW Study Abroad and UNSW Exchange (for inbound students)

Course Details

Units of Credit 6

Summary of the Course

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 (QRA), including assessment of the probability of failure, travel distance, risk estimation and risk acceptance criteria.

Course Aims

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.

Course Learning Outcomes

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

Teaching Strategies

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

Additional Course Information

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.

Assessment

Assessment task	Weight	Due Date	Course Learning Outcomes Assessed
1. Online Moodle Quiz	10%	24/06/2023 05:00 PM	1
2. Assignment 2	10%	11/07/2023 09:00 AM	1, 2
3. Assignment 3	40%	01/08/2023 05:00 PM	1, 2
4. Final Exam	40%	Not Applicable	1, 2, 3

Assessment 1: Online Moodle Quiz

Start date: 21/06/2023 06:00 PM
Assessment length: 1 Day
Due date: 24/06/2023 05:00 PM
Deadline for absolute fail: 1 weeks after due date unless an extension is granted
Marks returned: 24/06/2023

Detailed on assignment question, located on Moodle

Assessment criteria

Detailed on assignment questions, located on Moodle Quiz

Assessment 2: Assignment 2

Start date: 22/06/2023 06:00 PM
Assessment length: ~2 days
Due date: 11/07/2023 09:00 AM
Deadline for absolute fail: 2 weeks after due date unless an extension is granted
Marks returned: ~1 week after submission

Detailed on assignment question, located on Moodle

Assessment criteria

Detailed on assignment question, located on Moodle

Assessment 3: Assignment 3

Start date: 23/06/2023 06:00 PM
Assessment length: ~4 weeks
Due date: 01/08/2023 05:00 PM
Deadline for absolute fail: 2 weeks after due date unless an extension is granted
Marks returned: ~1 week after submission

Detailed on assignment question, located on Moodle

Assessment criteria

Detailed on assignment question, located on Moodle

Additional details

Detailed on assignment question, located on Moodle

Assessment 4: Final Exam

Assessment length: 2 Hours

Two hour open-book online Inspera exam.

Hurdle requirement

A mark of at least 40% in the final examination is required before the class work is included in the final mark.

Attendance Requirements

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

Course Schedule

Week 4 Wednesday 09:00-12:30 Wednesday 13:30-17:30 Thursday 09:00 – 12:30 Thursday 13:30-17:30 Friday 09:00 – 12:30 Friday 13:30-17:30	**Week 5** Monday 09:00-12:30 Monday 13:30-17:30 Tuesday 09:00 – 12:30 Tuesday 13:30-17:30

View class timetable

Timetable

Date/Module	Type	Content
21/06/2023	Lecture	• Classification, geology, hydrogeology, topography • Site investigations, mapping, pitting, drilling, instrumentation, model development, the observational method (Lecture and workshop)
22/06/2023	Lecture	• Limit equilibrium methods of stability analyses (Lecture and workshop)
23/06/2023	Lecture	• Introduction to unsaturated soil mechanics • Analysis of slopes involving unsaturated soils (Lecture and workshop and SlopeW software demonstration) • Laboratory testing, selection of parameters
26/06/20223	Lecture	• Stabilisation techniques • Mechanics of rapid failure and estimation of travel distance (Lecture and workshop)

27/06/2023	Lecture	• Quantitative Risk Assessment (QRA), principles and system framework • Revision, case studies and example problems (Workshop and demonstrations)

Resources

Prescribed 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.

Laboratory Workshop Information

A two-hour workshop for demonstration of SlopeW software will be carried out during the live lectures. Students can also access the SlopeW software remotely.

Submission of Assessment Tasks

Please refer to the Moodle page of the course for further guidance on assessment submission.

UNSW has a standard late submission penalty of:

- 5% per day, for all assessments where a penalty applies, capped at five days (120 hours), after which a student cannot submit an assessment, and no permitted variation.

Academic Honesty and 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 Information

Final Examinations:

Final Exams in T2 2023 will be held on campus between Friday 11th and Thursday 24th August (inclusive), and Supplementary Exams between Monday 4th and Friday 8th September (inclusive). You are required to be available on these dates. Please do not to make any personal or travel arrangements during this period.

For students enrolled in the distance offering of a postgraduate course, and who reside further than 100km from UNSW Kensington campus, will be contacted regarding sitting an external exam. The school's External Exam Policy can be found on the Intranet.

ACADEMIC ADVICE

- Key Staff to Contact for Academic Advice (log in with your zID and password): https://intranet.civeng.unsw.edu.au/key-staff-to-contact-during-your-studies-at-unsw
- Key UNSW Dates - eg. Census Date, exam dates, last day to drop a course without academic/financial liability etc.
- CVEN Student Intranet (log in with your zID and password): https://intranet.civeng.unsw.edu.au/student-intranet
- Student Life at CVEN, including Student Societies: https://www.unsw.edu.au/engineering/civil-and-environmental-engineering/student-life
- Special Consideration: https://student.unsw.edu.au/special-consideration
- General and Program-Specific Questions: The Nucleus: Student Hub
- Book an Academic Advising session: https://unswengacademicadvising.as.me/schedule.php

Disclaimer

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.

Image Credit

Mike Gal.

CRICOS

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Acknowledgement of Country

We acknowledge the Bedegal people who are the traditional custodians of the lands on which UNSW Kensington campus is located.