UNSW Course Outline

CVEN3202 Soil Mechanics - 2024

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General Course Information

Course Code : CVEN3202
Year : 2024
Term : Term 3
Teaching Period : T3
Is a multi-term course? : No
Faculty : Faculty of Engineering
Academic Unit : School of Civil and Environmental Engineering
Delivery Mode : In Person
Delivery Format : Standard
Delivery Location : Kensington
Campus : Sydney
Study Level : Undergraduate
Units of Credit : 6

Useful Links

Handbook Class Timetable

Course Details & Outcomes

Course Description

An introductory course to fundamentals of soil mechanics. Topics include: description of soil, basic phase relationships, clay mineralogy, confined and unconfined seepage, principle of effective stress, consolidation theory, compaction, stress distribution and settlement, Mohr circle, failure criterion, strength of soils, soil testing, stress-strain behaviour of soils and slope

stability.

Course Aims

The objective of the course is to understand the basic principles of soil mechanics and to study the behaviour of soil as an engineering material, both theoretically (through lectures) and practically (through laboratory classes).

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Describe the fundamentals of soil behaviour as an engineering material
CLO2 : Identify those aspects of soil behaviour that have a significant environmental impact
CLO3 : Solve a range of soil related problems especially those involving water flow, soil settlement and soil strength
CLO4 : Apply soil mechanics principles to a range of geotechnical engineering problems

Course Learning Outcomes	Assessment Item
CLO1 : Describe the fundamentals of soil behaviour as an engineering material	• Lab Reports • Final Exam
CLO2 : Identify those aspects of soil behaviour that have a significant environmental impact	• Quiz 1 • Lab Reports • Final Exam
CLO3 : Solve a range of soil related problems especially those involving water flow, soil settlement and soil strength	• Quiz 2 • Quiz 3 • Quiz 1 • Lab Reports • Final Exam
CLO4 : Apply soil mechanics principles to a range of geotechnical engineering problems	• Quiz 2 • Quiz 3 • Quiz 1 • Lab Reports • Final Exam

Learning and Teaching Technologies

Moodle - Learning Management System | Blackboard Collaborate | Echo 360

Other Professional Outcomes

https://www.unsw.edu.au/engineering/student-life/student-resources/program-design

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Quiz 1 Assessment Format: Individual	10%	Start Date: In week 3 (exact time will be communicated closer to the assessment) Due Date: In week 3 (exact time will be communicated closer to the assessment)
Quiz 2 Assessment Format: Individual	10%	Start Date: In week 7 (exact time will be communicated closer to the assessment) Due Date: In week 7 (exact time will be communicated closer to the assessment)
Quiz 3 Assessment Format: Individual	10%	Start Date: In week 10 (exact time will be communicated closer to the assessment) Due Date: In week 10 (exact time will be communicated closer to the assessment)
Lab Reports Assessment Format: Individual	10%	Start Date: Refer to Assessment Details/General Assessment Information Due Date: Refer to Assessment Details/General Assessment Information
Final Exam Assessment Format: Individual	60%	Start Date: During the final exam period Due Date: During the final exam period

Assessment Details

Quiz 1

Assessment Overview

Quiz from the first 3 weeks of the lecture.

Course Learning Outcomes

- CLO2 : Identify those aspects of soil behaviour that have a significant environmental impact
- CLO3 : Solve a range of soil related problems especially those involving water flow, soil settlement and soil strength
- CLO4 : Apply soil mechanics principles to a range of geotechnical engineering problems

Detailed Assessment Description

The quiz is online and covers materials from week 1 only.

Assessment Length

15 to 30 minutes.

Assignment submission Turnitin type

Not Applicable

Generative AI Permission Level

Not Applicable

Generative AI is not considered to be of assistance to you in completing this assessment. If you do use generative AI in completing this assessment, you should attribute its use.
For more information on Generative AI and permitted use please see here.

Quiz 2

Assessment Overview

Quiz from the week 4 to week 6 of the lecture.

Course Learning Outcomes

- CLO3 : Solve a range of soil related problems especially those involving water flow, soil settlement and soil strength
- CLO4 : Apply soil mechanics principles to a range of geotechnical engineering problems

Detailed Assessment Description

The quiz is online and covers materials from weeks 2 to 4 (inclusive)

Assessment Length

15 to 30 min

Assignment submission Turnitin type

Not Applicable

Generative AI Permission Level

Not Applicable

Generative AI is not considered to be of assistance to you in completing this assessment. If you do use generative AI in completing this assessment, you should attribute its use.
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Quiz 3

Course Learning Outcomes

- CLO3 : Solve a range of soil related problems especially those involving water flow, soil settlement and soil strength
- CLO4 : Apply soil mechanics principles to a range of geotechnical engineering problems

Detailed Assessment Description

The quiz is online and covers materials from weeks 5 to 8 (inclusive)

Assessment Length

15 to 30 min

Assignment submission Turnitin type

Not Applicable

Generative AI Permission Level

Not Applicable

Generative AI is not considered to be of assistance to you in completing this assessment. If you do use generative AI in completing this assessment, you should attribute its use.
For more information on Generative AI and permitted use please see here.

Lab Reports

Assessment Overview

4 laboratory attendance and the subsequent report submission.

Course Learning Outcomes

- CLO1 : Describe the fundamentals of soil behaviour as an engineering material
- CLO2 : Identify those aspects of soil behaviour that have a significant environmental impact
- CLO3 : Solve a range of soil related problems especially those involving water flow, soil settlement and soil strength
- CLO4 : Apply soil mechanics principles to a range of geotechnical engineering problems

Detailed Assessment Description

Details will be discussed during the first lecture.

Assignment submission Turnitin type

Not Applicable

Generative AI Permission Level

Not Applicable

Generative AI is not considered to be of assistance to you in completing this assessment. If you do use generative AI in completing this assessment, you should attribute its use.
For more information on Generative AI and permitted use please see here.

Final Exam

Assessment Overview

a comprehensive final exam covering all the topics taught in the course.

Course Learning Outcomes

- CLO1 : Describe the fundamentals of soil behaviour as an engineering material
- CLO2 : Identify those aspects of soil behaviour that have a significant environmental impact
- CLO3 : Solve a range of soil related problems especially those involving water flow, soil settlement and soil strength
- CLO4 : Apply soil mechanics principles to a range of geotechnical engineering problems

Assessment Length

2 hours

Assessment information

Further details on all assessments and assessment criteria will be provided in the first Lecture and on Moodle during the term.

Assignment submission Turnitin type

Not Applicable

Hurdle rules

A minimum mark of 30% on the final exam is required before marks from other assessments are considered in the final grade.

Generative AI Permission Level

Not Applicable

Generative AI is not considered to be of assistance to you in completing this assessment. If you do use generative AI in completing this assessment, you should attribute its use.
For more information on Generative AI and permitted use please see here.

General Assessment Information

The quizzes will be assessed on the basis of technical accuracy of calculations and evidence of understanding the main concepts taught in the course.

All quizzes are in **online format and open book**.

Quizzes will be held in the **first half an hour of Tuesday lectures** on weeks 3, 7 and 10 (on those

weeks, Tuesday Lectures will be from 14:30 to 16:00).

There are four lab modules that need to be completed after you have attended each lab. Each lab module is worth **2.5%**. You have **two weeks and three attempts** to complete each lab module. The highest mark will be considered for your mark. The lab mark is only considered if you attend the corresponding lab, otherwise an absent penalty of -2.5 mark is applied for each missed lab.

The final exam will cover the entire course. It will be assessed against the learning outcomes of the course. The final exam is also **open** book.

Grading Basis

Standard

Requirements to pass course

A minimum of 30% on the final exam and a minimum of 50% in the overall course are required.

Course Schedule

Teaching Week/Module	Activity Type	Content
Week 1 : 9 September - 15 September	Lecture	Introduction, Phase relationship, Classification of soils No Laboratory No Workshop Release of learning module 1 (phase relationship)
Week 2 : 16 September - 22 September	Lecture	Clay mineralogy, Compaction Laboratory 1 Workshop 1 Laboratory 1 module will be released.
Week 3 : 23 September - 29 September	Lecture	Stress and Mohr circle, Stress in soils Quiz 1 (week 1 materials) Laboratory 1 Workshop 2 Release of learning module 2 (Stress and Mohr circle)
Week 4 : 30 September - 6 October	Lecture	Stress in soils (cont.), One-dimensional seepage Laboratory 2 Workshop 3 Laboratory 2 module will be released. Release of learning module 3 (One-dimensional seepage)
Week 5 : 7 October - 13 October	Lecture	Two-dimensional seepage, Consolidation theory Laboratory 2 Workshop 4 Release of learning module 4 (Two-dimensional seepage)
Week 6 : 14 October - 20 October	Other	Recharge week No Lecture No Laboratory No Workshop
Week 7 : 21 October - 27 October	Lecture	Rate of consolidation, Shear strength of soils Quiz 2 (weeks 2 to 4 materials) Laboratory 3 Workshop 5 Laboratory 3 module will be released. Release of learning module 5 (Rate of consolidation)
Week 8 : 28 October - 3 November	Lecture	Shear strength in soils (cont.), Direct shear test Laboratory 3 Workshop 6 Release of learning module 6 (Mohr-Coulomb failure criterion)
Week 9 : 4 November - 10 November	Lecture	Triaxial test, Stress path technique Laboratory 4 Workshop 7 Laboratory 4 module will be released Release of learning module 7 (Triaxial test)
Week 10 : 11 November - 17 November	Lecture	Slope stability Quiz 3 (weeks 5 to 8 materials) Laboratory 4 Workshops 8 and 9 Release of learning module 8 (Slope stability)

Attendance Requirements

Undergraduate students must attend at least all the lab sessions in which they are enrolled for the duration of the session.

Course Resources

Prescribed Resources

The textbook for the course, on which most of the course PowerPoint slides are based and

contains thorough explanations and dozens of worked examples, is sold in the UNSW bookshop:

Holtz, R.D., Kovacs, W.D. and Sheahan, T.C. (2011), “An Introduction to Geotechnical Engineering”, Second Edition. International Edition. Pearson.

The following reference books may also be useful for additional reading, many of them can be found in the UNSW library:

- Indraratna, Heitor, and Vinod, “Geotechnical Problems and Solutions - A Practical Perspective”, CRC press, 2020
- Craig, R. F. "Soil Mechanics", CRC press, 2012
- Das, B. M., “Principles of Geotechnical Engineering”, PWS publishing, 1998-2006
- Lambe and Whitman, "Soil Mechanics", Wiley, 1975
- Barnes, G., "Soil Mechanics, Principles and practice", Palgrave MacMillan; 3rd Ed, 2011
- Budhu, M., “Soil Mechanics and Foundations”, Wiley & Sons, 2007
- Smith, I, “Smith’s Element of Soil Mechanics”, Blackwell, 2006

Also, students may find the Soil Mechanics Book by Prof Verruijt in PDF from:

http://geo.verruijt.net/software/SoilMechBook2012.pdf

Course Evaluation and Development

Feedback on the course is gathered periodically using various means, including the UNSW myExperience process, and informal discussions and feedback throughout the term. Your feedback is taken seriously, and continual improvements are made to the course based, in part, on such feedback.

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	Arman KHO SHGHALB		CE503		Thursdays from 3:30 pm to 5:00 pm	No	Yes

Other Useful Information

Academic Information

I. Special consideration and supplementary assessment

If you have experienced an illness or misadventure beyond your control that will interfere with

your assessment performance, you are eligible to apply for Special Consideration prior to, or within 3 working days of, submitting an assessment or sitting an exam.

Please note that UNSW has a Fit to Sit rule, which means that if you sit an exam, you are declaring yourself fit enough to do so and cannot later apply for Special Consideration.

For details of applying for Special Consideration and conditions for the award of supplementary assessment, please see the information on UNSW's Special Consideration page.

II. Administrative matters and links

All students are expected to read and be familiar with UNSW guidelines and polices. In particular, students should be familiar with the following:

- Attendance
- UNSW Email Address
- Special Consideration
- Exams
- Approved Calculators
- Academic Honesty and Plagiarism
- Equitable Learning Services

III. Equity and diversity

Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with the course convener prior to, or at the commencement of, their course, or with the Equity Officer (Disability) in the Equitable Learning Services. Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made.

IV. Professional Outcomes and Program Design

Students are able to review the relevant professional outcomes and program designs for their streams by going to the following link: https://www.unsw.edu.au/engineering/student-life/student-resources/program-design.

Note: This course outline sets out the 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 or your primary learning management system (LMS) 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/Moodle/LMS, the description in the Course Outline/ Moodle/LMS applies.

Academic Honesty and Plagarism

UNSW has an ongoing commitment to fostering a culture of learning informed by academic integrity. All UNSW students have a responsibility to adhere to this principle of academic integrity. Plagiarism undermines academic integrity and is not tolerated at UNSW. *Plagiarism at UNSW is defined as using the words or ideas of others and passing them off 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. UNSW has produced a website with a wealth of resources to support students to understand and avoid plagiarism, visit: student.unsw.edu.au/plagiarism. The Learning Centre assists students with understanding academic integrity and how not to plagiarise. They also hold workshops and can help students one-on-one.

You are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting and the proper referencing of sources in preparing all assessment tasks.

Repeated plagiarism (even in first year), plagiarism after first year, or serious instances, may also be investigated under the Student Misconduct Procedures. The penalties under the procedures can include a reduction in marks, failing a course or for the most serious matters (like plagiarism in an honours thesis or contract cheating) even suspension from the university. The Student Misconduct Procedures are available here:

www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf

Submission of Assessment Tasks

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, per calendar day.

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 clearly 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;
- Exams, peer feedback and team evaluation surveys;
- Online quizzes where answers are released to students on completion;
- Professional assessment tasks, where the intention is to create an authentic assessment that has an absolute submission date; and,
- Pass/Fail assessment tasks.

Faculty-specific 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)

School Contact Information

For assistance with enrolment, class registration, progression checks and other administrative matters, please see the Nucleus: Student Hub. They are located inside the Library – first right as you enter the main library entrance. You can also contact them via http://unsw.to/webforms or reserve a place in the face-to-face queue using the UniVerse app.

For course administration matters, please contact the Course Coordinator.

Questions about the this course should normally be asked during the scheduled class so that everyone can benefit from the answer and discussion.