School of Civil and Environmental Engineering

UNSW Engineering

CVEN9512

Geomechanics

Term 1, 2022

Course Overview

Staff Contact Details

Convenors

Name	Email	Availability	Location	Phone
Nasser Khalili	n.khalili@unsw.edu.au	Open door policy	Room 513 - Civil Engineering Building	(02) 9385 5074

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

Fundamentals of the effective stress concept, seepage analysis and Laplace Equation, basic and advanced theories of consolidation, nonlinearity and Biots theorem, soil liquefaction, seismic analysis of embankment dams, critical state soil mechanics, fundamentals of continuum mechanics, theory of elasticity, constitutive relationships and failure criteria for real soils, soil plasticity and Cam-clay model, fundamentals of unsaturated soils mechanics

Course Aims

To study the basic principles of soil mechanics as well as the advanced theories of the continuum mechanics.

Course Learning Outcomes

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

Learning Outcome	EA Stage 1 Competencies
1. Understand principles of soil mechanics and perform complex deformation, seepage and stability analyses	PE1.1, PE1.2, PE1.3, PE1.5, PE2.1, PE2.2, PE3.1, PE3.4
2. Conduct regional and site specific liquefaction analysis	PE1.1, PE1.2, PE1.3, PE1.4, PE1.5, PE2.1, PE2.2, PE2.3, PE3.1, PE3.4
3. Understand factors underlying seismic stability of embankment dams, and perform earthquake induced deformation and post liquefaction stability analyses	PE1.1, PE1.2, PE1.3, PE1.4, PE1.5, PE2.1, PE2.2, PE2.3, PE3.1, PE3.3
4. Be familiar with basic principles of plasticity and perform analysis using the Cam-Clay Model	PE1.1, PE1.3, PE1.5, PE1.6, PE2.3
5. Understand unsaturated soil mechanics and perform shear strength and deformation calculations including wetting induced collapse	PE1.1, PE1.2, PE1.3, PE1.4, PE1.5, PE2.1, PE2.3
6. Perform a literature review, plan and carry out a small project	PE1.1, PE1.2, PE1.3, PE1.4, PE1.5, PE1.6, PE2.1, PE2.2, PE2.3, PE3.1, PE3.2, PE3.3, PE3.4, PE3.5

Teaching Strategies

The course will involve formal lectures and workshops delivered in a short course mode.

Lecturers and Private Study	• Review lecture material and textbook

	• Do set problems and assignments • Join discussions in the class • Reflect on class problems and assignments • Review material covered in each day on the same night.
Workshops	• Be guided by Lecturer • Review worked problems • Ask questions
Assessments (Final exam and hand-in assignments)	• Demonstrate your knowledge and skills • Demonstrate higher understanding and problem solving

Additional Course Information

Assumed Knowledge: Undergraduate soil mechanics

Assessment

Assessment task	Weight	Due Date	Course Learning Outcomes Assessed
1. Final Exam	50%	Not Applicable	1, 2, 3, 4, 5
2. Tutorials	50%	Two weeks before the scheduled date for the final exam.	1, 2, 3, 4, 5, 6

Assessment 1: Final Exam

Assessment length: 2 hrs
Submission notes: The final exam is OPEN BOOK.

The final examination is included as the course leaning outcomes include a significant level of technical learning that can be effectively and objectively assessed in an exam environment. The examination is designed to align with the learning outcomes and competencies derived from the course. The final examination is open book and is of two-hour duration.

Assessment criteria

The exam will be assessed on the basis of technical accuracy of calculations and evidence of good understanding of fundamental concepts with assumptions and problem simplification. The exam will cover all aspects of the material covered in the course.

Assessment 2: Tutorials

Submission notes: The hand-in tutorials are due two weeks before the scheduled date for the final exam. A penalty of 5% will apply for each day of late submission. Tutorials handed in more than 5 days late will not be considered in the assessment.
Due date: Two weeks before the scheduled date for the final exam.
Marks returned: The hand-in tutorial marks will be returned one week before the scheduled date for the final exam.

There will be a total of eight (8) assignments. All hand-in assignments will be marked and returned to students. The aim is to provide feedback on the correctness of the approaches and the solutions presented, and re-enforce independent learning.

Assessment criteria

The hand-in tutorials are a core component of the course and represent individual work. They will be assessed on the basis of technical accuracy of calculations and evidence of good engineering judgment with assumptions and problem simplification. The assignments will cover all aspects of the material covered in the course.

Attendance Requirements

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

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 T1 2022 will be held online between 29th April - 12th May inclusive, and supplementary exams between 23rd - 27th May inclusive. You are required to be available on these dates. Please do not to make any personal or travel arrangements during this period.

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
- 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

Image Credit

Mike Gal.

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	