



CIVL2201

Soil Mechanics

Session 1, In person-scheduled-weekday, North Ryde 2024

School of Engineering

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General Information

Unit convenor and teaching staff

Steven Hansen

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Credit points

10

Prerequisites

CIVL1001 or MECH1001

Corequisites

Co-badged status

Unit description

This unit provides students with an introduction to engineering geology and soil mechanics. The unit presents and discusses specialised knowledge of soil mechanics that helps students undertake a variety of soil mechanics analyses through lectures and laboratory testing.

The first section on engineering geology will include an introduction to geology (minerals, rock types, rock structures), geological maps, rock evaluation and geophysical methods, and geohazards and adverse geological conditions case studies relevant to engineering applications. The second section on soil mechanics includes composition and particle sizes of the soil, physical soil states and soil classification, flow of water through soils, stresses, strains, and elastic deformation of soils, soil compaction, and soil settlement.

The main aim of this unit is to prepare students to develop fundamental knowledge required for more advanced units such as Geotechnical Engineering and Transport Engineering.

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at <https://www.mq.edu.au/study/calendar-of-dates>

Learning Outcomes

On successful completion of this unit, you will be able to:

ULO1: Demonstrate a fundamental knowledge of solid Earth materials and their formation

ULO2: Identify different geohazards and describe their potential effect on construction projects

ULO3: Describe and classify various soils using standard laboratory techniques and relate these physical characteristics to their engineering behaviour

ULO4: Describe the behaviour and effects of both static and flowing water in soil masses

ULO5: Assess the role of effective stress in soil mechanics and describe the strength of soils based on basic failure theory

General Assessment Information

Requirements to Pass this Unit

To pass this unit you must:

- Achieve a total mark equal to or greater than 50%, and
- Participate in at least 9 of the 12 weekly practical classes

Hurdle Assessments

Assessment 1: Practical participation (0%)

Development of knowledge and skills requires continual practice at authentic problems in a laboratory-based setting. This unit has weekly laboratory classes, and you must demonstrate your progress in developing and communicating knowledge and skills in a minimum of **9 of the 12 classes**. This is a hurdle assessment meaning that failure to meet this requirement may result in a **fail** grade for the unit. Students are permitted up to three absences: **additional absences will require a Special Consideration to be applied for** (see below).

Assessments where Late Submissions will be accepted

Practical Reports – YES, Standard Late Penalty applies

Tests and quizzes – NO, unless [Special Consideration](#) is Granted

Late Assessment Submission Penalty

Unless a Special Consideration request has been submitted and approved, a 5% penalty (of the total possible mark of the task) will be applied for each day a report is not submitted, up until the 7th day (including weekends). After the 7th day, a grade of '0' will be awarded even if the assessment is submitted. The submission time for all uploaded assessments is **10:55 pm**. A 1-hour grace period will be provided to students who experience a technical concern.

For late submission of time-sensitive tasks, such as scheduled tests/exams and/or weekly quizzes, please apply for [Special Consideration](#).

Special Consideration

The [Special Consideration Policy](#) aims to support students who have been impacted by short-term circumstances or events that are serious, unavoidable and significantly disruptive, and which may affect their performance in assessment.

Weekly practical: To pass the unit you need to demonstrate ongoing development of skills and application of knowledge in **9 out of 12** of the weekly practical classes. If you miss a weekly practical class due to a serious, unavoidable and significant disruption, [contact your convenor ASAP](#) as you may be able to attend another class that week.

If it is not possible to attend another class, you should still contact your convenor to schedule a make-up practical. Note that a Special Consideration should **only be applied for** if you miss more than three of the weekly practical classes.

If you receive [special consideration](#) for the final exam, a supplementary exam will be scheduled by the faculty during a supplementary exam period, typically about 3 to 4 weeks after the normal exam period. By making a special consideration application for the final exam you are declaring yourself available for a resit during the supplementary examination period and will not be eligible for a second special consideration approval based on pre-existing commitments. Please ensure you are familiar with the policy prior to submitting an application. Approved applicants will receive an individual notification one week prior to the exam with the exact date and time of their supplementary examination.

Assessment Tasks

Assignments will usually be submitted and marked on iLearn. Weekly lab reports (practical class) will be submitted via dedicated Tunitin links and weekly problem sets are handled using iLearn quizzes. Feedback for your lab group members is conducted using SparkPlus. Grades are reported through Gradebook. Please do not submit your assessments via email or in hard copy unless requested.

Quiz results are released automatically after the submission deadline. We aim to return grades and feedback for lab reports (and tests) within two weeks of the date that you submitted it. We appreciate your patience and will advise you through iLearn or in lecture when your marked assessments and feedback are available for viewing.

Assessment Tasks

Name	Weighting	Hurdle	Due
problem sets/quiz	10%	No	weekly
Practical participation	0%	Yes	weekly
Final Examination	30%	No	TBD
Mid-session test	20%	No	Week 7

Name	Weighting	Hurdle	Due
Practical Report	40%	No	weekly

problem sets/quiz

Assessment Type ¹: Problem set

Indicative Time on Task ²: 12 hours

Due: **weekly**

Weighting: **10%**

weekly problem sets

On successful completion you will be able to:

- Demonstrate a fundamental knowledge of solid Earth materials and their formation
- Identify different geohazards and describe their potential effect on construction projects
- Describe the behaviour and effects of both static and flowing water in soil masses
- Assess the role of effective stress in soil mechanics and describe the strength of soils based on basic failure theory

Practical participation

Assessment Type ¹: Practice-based task

Indicative Time on Task ²: 0 hours

Due: **weekly**

Weighting: **0%**

This is a hurdle assessment task (see [assessment policy](#) for more information on hurdle assessment tasks)

Development of knowledge and skills requires continual practice at authentic tasks. In each weekly practical class, you will undertake a range of activities and complete various worksheets. To pass this hurdle assessment, you must be able to demonstrate your progress in developing and communicating knowledge and skills in a minimum of 80% of practical classes.

On successful completion you will be able to:

- Describe and classify various soils using standard laboratory techniques and relate these physical characteristics to their engineering behaviour

Final Examination

Assessment Type ¹: Examination

Indicative Time on Task ²: 16 hours

Due: **TBD**

Weighting: **30%**

Final examination

On successful completion you will be able to:

- Demonstrate a fundamental knowledge of solid Earth materials and their formation
- Identify different geohazards and describe their potential effect on construction projects
- Describe and classify various soils using standard laboratory techniques and relate these physical characteristics to their engineering behaviour
- Describe the behaviour and effects of both static and flowing water in soil masses
- Assess the role of effective stress in soil mechanics and describe the strength of soils based on basic failure theory

Mid-session test

Assessment Type ¹: Quiz/Test

Indicative Time on Task ²: 8 hours

Due: **Week 7**

Weighting: **20%**

Mid-session test

On successful completion you will be able to:

- Demonstrate a fundamental knowledge of solid Earth materials and their formation
- Identify different geohazards and describe their potential effect on construction projects
- Describe and classify various soils using standard laboratory techniques and relate these physical characteristics to their engineering behaviour

Practical Report

Assessment Type ¹: Lab report

Indicative Time on Task ²: 24 hours

Due: **weekly**

Weighting: **40%**

Practical reports based on weekly experiments in the soils lab

On successful completion you will be able to:

- Describe and classify various soils using standard laboratory techniques and relate these physical characteristics to their engineering behaviour
- Describe the behaviour and effects of both static and flowing water in soil masses
- Assess the role of effective stress in soil mechanics and describe the strength of soils based on basic failure theory

¹ If you need help with your assignment, please contact:

- the academic teaching staff in your unit for guidance in understanding or completing this type of assessment
- the [Writing Centre](#) for academic skills support.

² Indicative time-on-task is an estimate of the time required for completion of the assessment task and is subject to individual variation

Delivery and Resources

The first week of class will include lecture, tutorial (STGA) and practical classes. So, make sure you have enrolled in one of the practical classes and one the tutorials. More information will be given in the first lecture.

We recommend students have a scientific calculator and a lab notebook. You will also need closed toed shoes and appropriate clothing for practical classes in the soil mechanics lab. You will also need access to a computer with excel to perform some data reduction tasks. A laptop or tablet is useful but not required.

Communication

Outside of class, we will communicate with students primarily through iLearn announcements and occasionally using your university email. Queries to convenors can either be placed on the iLearn discussion board or sent to CIVL2201@mq.edu.au from your university email address.

COVID Information

The pandemic continues and new strains continue to evolve and spread in waves. Mask wearing is strongly encouraged during all practical classes in 13RPD. Students are also strongly encouraged to wear masks in all other indoor gatherings and to obtain their vaccine boosters

where appropriate.

For the latest information on the University's response to COVID-19, please refer to the Coronavirus infection page on the Macquarie website: <https://www.mq.edu.au/about/coronavirus-faqs>

Unit Schedule

Here is a rough outline of the topics covered:

Week 1: Rocks and Minerals

Week 2: Rock Types and Weathering

Week 3: Deposition and Tectonics

Week 4: Hazards and Soil Intro

Week 5: Index Tests and Classification

Week 6: Clays and Structure

Week 7: Capillarity and Stress

Week 8: Compaction

Week 9: Water Flow

Week 10: Consolidation

Week 11: Settlement Time

Week 12: Mohr's Circle and Failure

Week 13: Shear Strength

Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central \(https://policies.mq.edu.au\)](https://policies.mq.edu.au). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- [Academic Appeals Policy](#)
- [Academic Integrity Policy](#)
- [Academic Progression Policy](#)
- [Assessment Policy](#)
- [Fitness to Practice Procedure](#)
- [Assessment Procedure](#)
- [Complaints Resolution Procedure for Students and Members of the Public](#)
- [Special Consideration Policy](#)

Students seeking more policy resources can visit [Student Policies \(https://students.mq.edu.au/support/study/policies\)](https://students.mq.edu.au/support/study/policies). It is your one-stop-shop for the key policies you need to know about

throughout your undergraduate student journey.

To find other policies relating to Teaching and Learning, visit [Policy Central \(https://policies.mq.edu.au\)](https://policies.mq.edu.au) and use the [search tool](#).

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: <https://students.mq.edu.au/admin/other-resources/student-conduct>

Results

Results published on platform other than [eStudent](#), (eg. iLearn, Coursera etc.) or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in [eStudent](#). For more information visit ask.mq.edu.au or if you are a Global MBA student contact globalmba.support@mq.edu.au

Academic Integrity

At Macquarie, we believe [academic integrity](#) – honesty, respect, trust, responsibility, fairness and courage – is at the core of learning, teaching and research. We recognise that meeting the expectations required to complete your assessments can be challenging. So, we offer you a range of resources and services to help you reach your potential, including free [online writing and maths support](#), [academic skills development](#) and [wellbeing consultations](#).

Student Support

Macquarie University provides a range of support services for students. For details, visit <http://students.mq.edu.au/support/>

The Writing Centre

[The Writing Centre](#) provides resources to develop your English language proficiency, academic writing, and communication skills.

- [Workshops](#)
- [Chat with a WriteWISE peer writing leader](#)
- [Access StudyWISE](#)
- [Upload an assignment to Studiosity](#)
- [Complete the Academic Integrity Module](#)

The Library provides online and face to face support to help you find and use relevant information resources.

- [Subject and Research Guides](#)
- [Ask a Librarian](#)

Student Services and Support

Macquarie University offers a range of [Student Support Services](#) including:

- [IT Support](#)
- [Accessibility and disability support](#) with study
- Mental health [support](#)
- [Safety support](#) to respond to bullying, harassment, sexual harassment and sexual assault
- [Social support including information about finances, tenancy and legal issues](#)
- [Student Advocacy](#) provides independent advice on MQ policies, procedures, and processes

Student Enquiries

Got a question? Ask us via [AskMQ](#), or contact [Service Connect](#).

IT Help

For help with University computer systems and technology, visit http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/.

When using the University's IT, you must adhere to the [Acceptable Use of IT Resources Policy](#). The policy applies to all who connect to the MQ network including students.

Changes from Previous Offering

Changes from 2023

- Changes to tutoring Staff
- Some modifications of class schedule
- Addressed LEU suggestions
- Minor edits to quiz questions

Engineers Australia Competency Mapping

EA Competency Standard		Unit Learning Outcomes
Knowledge and Skill Base	1.1 Comprehensive, theory-based understanding of the underpinning fundamentals applicable to the engineering discipline.	1-5
	1.2 Conceptual understanding of underpinning maths, analysis, statistics, computing.	4,5
	1.3 In-depth understanding of specialist bodies of knowledge	3-5
	1.4 Discernment of knowledge development and research directions	2

	1.5 Knowledge of engineering design practice	1,2,5
	1.6 Understanding of scope, principles, norms, accountabilities of sustainable engineering practice.	1,2,5
Engineering Application Ability	2.1 Application of established engineering methods to complex problem solving	4,5
	2.2 Fluent application of engineering techniques, tools and resources.	3-5
	2.3 Application of systematic engineering synthesis and design processes.	5
	2.4 Application of systematic approaches to the conduct and management of engineering projects.	
Professional and Personal Attributes	3.1 Ethical conduct and professional accountability.	
	3.2 Effective oral and written communication in professional and lay domains.	3-5
	3.3 Creative, innovative and pro-active demeanour.	1,2
	3.4 Professional use and management of information.	1-5
	3.5 Orderly management of self, and professional conduct.	
	3.6 Effective team membership and team leadership	3-5

Unit information based on version 2024.02 of the [Handbook](#)