



# CIVL2201

## Soil Mechanics

Session 1, In person-scheduled-weekday, North Ryde 2022

*School of Engineering*

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#### **Disclaimer**

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## General Information

Unit convenor and teaching staff

Lecturer

Steven Hansen

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12 Wally's Walk, Office 107

Wed 4pm-5pm (or by appointment)

Credit points

10

Prerequisites

CIVL1001

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

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

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

**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

Assessment at Macquarie University is standards-based, as outlined in the [Assessment Policy](#). This means that your work will be assessed against clear criteria, and these criteria (e.g. in a rubric) will be made available when the assessment tasks are released to you on iLearn.

In order to pass this unit a student must obtain a mark of 50 or more for the unit (i.e. obtain a passing grade P/ CR/ D/ HD). For further details about grading, please refer below in the policies and procedures section.

### Hurdle Requirements

In this unit **practical participation** is a hurdle requirement. You must attend and participate in all the practical classes which occur in the Soil Mechanics lab (weeks 4 through 12).

A hurdle requirement is an activity for which a minimum level of performance or participation is a condition of passing the unit (see the [Assessment Policy](#)). Failure to meet the hurdle requirement will result in failure of the unit.

### Submission of Assessments

All assessments must be submitted online through links available in [iLearn](#) unless otherwise indicated. Written lab reports for each team will be submitted via [Turnitin](#).

You should always check that you have uploaded the correct file. If you have a problem, please email the Unit Convenor with your correct file. You must also keep a copy of your assessments until the end of semester in case there is a problem with your submission. It is your responsibility to ensure that you can provide a copy of your assessment if requested.

### Marking of Assessments

Assignments will usually be marked through Turnitin with grades provided through Gradebook on iLearn. Please do not submit your assessments via email or in hard copy unless requested.

One lab report will be submitted for each team for each laboratory exercise. Each individual is responsible for writing a section of the report and will receive a mark on their contribution, as well as a portion of the total report mark. Each team member is responsible for ensuring that the report is finished on time and to the standard.

We aim to return your assessment grades and feedback 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.

### Penalties for Late Assessments

Online quizzes, in-class activities, or scheduled tests and exam must be undertaken at the time indicated in the unit guide. Should these activities be missed due to illness or misadventure, students may apply for Special Consideration.

All other assessments must be submitted by 5:00 pm on their due date.

Should these assessments be missed due to illness or misadventure, students should apply for Special Consideration.

Assessments not submitted by the due date will receive a mark in accordance with the late submission policy as follows:

A 12-hour grace period will be given after which the following deductions will be applied to the awarded assessment mark: 12 to 24 hours late = 10% deduction; for each day thereafter, an additional 10% per day or part thereof will be applied until five days beyond the due date. After this time, a mark of zero (0) will be given. For example, an assessment worth 20% is due 5 pm on 1 January. Student A submits the assessment at 1 pm, 3 January. The assessment received a mark of 15/20. A 20% deduction is then applied to the mark of 15, resulting in the loss of three (3) marks. Student A is then awarded a final mark of 12/20.

### Extensions for Assessments

To obtain an extension for an assessment task, you will need to follow the formal process as outlined in the [Special Consideration Policy](#), and you must provide appropriate supporting evidence (e.g. medical certificate - see advice for [Special Consideration](#) requests). The final decision regarding the granting of an extension lies with the unit convenor. Permission for extensions must be sought **before the due date** unless there are exceptional circumstances. Please let us know of problems in advance or as soon as possible, not after the event. We are likely to be much more sympathetic and able to accommodate your circumstance if you follow this advice.

### Exams

This unit has two exams, a final and a mid-term. These examinations are based on lectures, reading material, practicals and tutorial exercises. This is information you should have absorbed through completing assignments and any other material presented during classes.

The mid-term exam will be conducted during the tutorial slots in week 7. The final will occur during the normal exam period following week 13 and will be scheduled by the university. students are required to be present for both exams.

For unavoidable disruptions during exams, you should apply for [Special Consideration](#) as soon as possible. You will only be allowed one opportunity to sit the Supplementary Exam as outlined in the [Special Consideration Policy](#)

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

Name	Weighting	Hurdle	Due
<a href="#">Mid-session test</a>	20%	No	Week 7
<a href="#">Practical Report</a>	40%	No	Weekly
<a href="#">problem sets/quiz</a>	10%	No	Weekly
<a href="#">Lab participation</a>	0%	Yes	On-going
<a href="#">Final Examination</a>	30%	No	TBD

### Mid-session test

Assessment Type <sup>1</sup>: Quiz/Test

Indicative Time on Task <sup>2</sup>: 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
- Describe and classify various soils using standard laboratory techniques and relate these physical characteristics to their engineering behaviour
- Identify different geohazards and describe their potential effect on construction projects

### Practical Report

Assessment Type <sup>1</sup>: Lab report

Indicative Time on Task <sup>2</sup>: 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

## problem sets/quiz

Assessment Type <sup>1</sup>: Problem set

Indicative Time on Task <sup>2</sup>: 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

## Lab participation

Assessment Type <sup>1</sup>: Participatory task

Indicative Time on Task <sup>2</sup>: 0 hours

Due: **On-going**

Weighting: **0%**

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

Participation in practicals in the soils lab are compulsory

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 <sup>1</sup>: Examination

Indicative Time on Task <sup>2</sup>: 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
- Describe and classify various soils using standard laboratory techniques and relate these physical characteristics to their engineering behaviour
- 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

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<sup>1</sup> 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.

<sup>2</sup> 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

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

### Textbooks

The first four weeks of class will use the free online textbook:

- Johnson, Affolter, Inkenbrandt, and Mosher (2017). **An Introduction to Geology**. Salt Lake Community College.

Source: <https://opengeology.org/textbook/>

The following Soil Mechanics section uses the text:

- Holtz, Kovacs, & Sheahan (2011). **An Introduction to Geotechnical Engineering** (2nd Edition). Pearson Higher Ed, USA. ISBN 9780135201381

The eBook can be purchased for ~\$65 from: <https://www.pearson.com.au/9780135201381>

Hardcopies can be obtained from a variety of sources.

## Unit Schedule

Due to the current COVID19 outbreak, the first week of class (including lecture, prac and tutes) will be conducted ONLINE only. See the iLearn page for more details and a link to the zoom meeting. The first mandatory (hurdle) in person prac occurs in week 4, students should contact the convenor immediately if they are unable to attend classes in person due to unavoidable delays resulting from COVID travel restrictions.

This unit is broken up into several modules:

- Introduction to geology (weeks 1-4)
- Soil classification and clays (weeks 4-6)
- Soil and water (week 7-8)
- Soil mechanics (weeks 9-13)

See the iLearn page for more details.

## 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](http://ask.mq.edu.au) or if you are a Global MBA student contact [globalmba.support@mq.edu.au](mailto: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 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/](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.

## 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.	ULO1-5
	1.2 Conceptual understanding of underpinning maths, analysis, statistics, computing.	ULO4,5
	1.3 In-depth understanding of specialist bodies of knowledge	ULO3-5
	1.4 Discernment of knowledge development and research directions	ULO2
	1.5 Knowledge of engineering design practice	ULO1,2,5
	1.6 Understanding of scope, principles, norms, accountabilities of sustainable engineering practice.	ULO1,2,5
Engineering Application Ability	2.1 Application of established engineering methods to complex problem solving	ULO4,5
	2.2 Fluent application of engineering techniques, tools and resources.	ULO3-5
	2.3 Application of systematic engineering synthesis and design processes.	ULO5

	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.	ULO3-5
	3.3 Creative, innovative and pro-active demeanour.	ULO1,2
	3.4 Professional use and management of information.	ULO1-5
	3.5 Orderly management of self, and professional conduct.	
	3.6 Effective team membership and team leadership	ULO3-5