

<b>Module Code</b>	CEU33A05
<b>Module Name</b>	3A5 SOIL MECHANICS
<b>ECTS Weighting<sup>1</sup></b>	5 ECTS
<b>Semester taught</b>	Semester 1
<b>Module Coordinator/s</b>	Dr. Brendan O'Kelly (BOK) Lecture delivery shared with Dr. David Igoe (DI)
<b><u>Module Learning Outcomes</u> with reference to the <u>Graduate Attributes</u> and how they are developed in discipline</b>	<p>On successful completion of this module, students should be able to:</p> <p>LO1. Explain the significant aspects considered when describing and classifying soils (BOK).</p> <p>LO2. Analyse the compaction characteristics of a soil to assess its suitability as engineering fill (BOK).</p> <p>LO3. Explain the methods of permeability measurement for soils (BOK).</p> <p>LO4. Explain the concept of effective stress and its relationship with shear strength (BOK).</p> <p>LO5. Develop a site investigation strategy pertinent to a range of ground engineering works (BOK).</p> <p>LO6. Estimate the total head, pore-water pressures and discharges expected in a variety of engineering design situations (DI).</p> <p>LO7. Estimate the capacity of soil deposits to support shallow foundations (DI).</p> <p>LO8. Estimate the stresses induced in the ground and resulting settlements based on elastic analysis (DI).</p> <p>LO9. Estimate the stability of earth slopes (undrained condition) (DI).</p> <p><b>Graduate Attributes: levels of attainment</b></p> <p>To act responsibly - Enhanced</p> <p>To think independently - Enhanced</p> <p>To develop continuously - Enhanced</p> <p>To communicate effectively - Enhanced</p>

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## Module Content

Soil Mechanics provides students with a basic knowledge of fundamental concepts of soil behaviour and gives an introduction into general geotechnical engineering. The module describes the relationship between soils and their geological origins, and demonstrates the significance of the soil's particle-size distribution and mineralogy on its engineering behaviour. Soil description and classification methods are covered. The effects of the compaction process on the engineering properties of soil are discussed, and methods are developed to allow students to design fills. The module explains the principles involved in the flow of water through soils, including methods of analyses and measurement. The important concept of effective stress is described, and examples of its significance in geotechnical engineering are developed. The module discusses the shear strength of soils, its measurement, and presents methods for applying this knowledge in the analysis of short- and long-term bearing capacities for shallow foundations. The module presents elastic methods of analyses for predicting the in-situ stresses induced by surface loading, and the resulting settlements. Methods for analysing the short-term stability of soil slopes are presented. Ground investigation and in-situ testing techniques are described for the development of ground models, and the determination/interpretation of design parameter values.

### Module content

- Description and classification of soils
- Seepage
- Compaction technology
- Effective-stress concept and calculation
- Ground investigation and in-situ testing
- Shear strength
- Bearing capacity of shallow foundations
- Elastic settlements
- Slope stability (undrained condition)

## Teaching and Learning Methods

Lectures, and three laboratory practical experiments

<b>Assessment Details<sup>2</sup></b> Please include the following: <ul style="list-style-type: none"> <li>• <b>Assessment Component</b></li> <li>• <b>Assessment description</b></li> <li>• <b>Learning Outcome(s) addressed</b></li> <li>• <b>% of total</b></li> <li>• <b>Assessment due date</b></li> </ul>	Assessment Component	Assessment Description	LO Addressed	% of total	Week due
	Annual examination	2-hour written examination	LO1–LO9	80%	
	Laboratory practicals (3 of)	Attend laboratory practical session and produce report		(3 of =) 20%	

**Reassessment Requirements** 100% written examination

<b>Contact Hours and Indicative Student Workload<sup>2</sup></b>	<b>Contact hours:</b> 33 scheduled lectures, 3 Laboratory Practical Sessions
	<b>Independent Study (preparation for course and review of materials):</b>
	<b>Independent Study (preparation for assessment, incl. completion of assessment):</b>

**Recommended Reading List** Craig’s Soil Mechanics, 2020, Ninth Edition. Jonathan Knappett and R.F. Craig. CRC Press.

**Module Pre-requisite** Mechanics of Solids

**Module Co-requisite**

**Module Website**

**Are other Schools/Departments involved in the delivery of this module? If yes, please provide details.** No

**Module Approval Date**

**Approved by**

**Academic Start Year** September 2022

**Academic Year of Date** 2022-23

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