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

Module Content	The Soil Mechanics module 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 origin, 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 engineering 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 the short- and long-term bearing capacities for shallow foundations. The module presents methods of elastic analyses for predicting the in-situ stresses induced by applied 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 use in the development of ground models, and the determination/interpretation of relevant soil parameter values for geotechnical design. **Module content** • Description and classification of soils • Compaction fundamentals and technology • Effective-stress concept and calculation examples • Seepage theory and measurement • Shear strength fundamentals and measurement • Bearing capacity of shallow foundations • In-situ stress and settlement calculation using elastic theory • Slope stability for the undrained condition • Ground investigation and in-situ testing
Teaching and Learning Methods	Lectures, and three laboratory practical experiments

Assessment Details[2]
Please include the following:

- **Assessment Component**
- **Assessment description**
- **Learning Outcome(s) addressed**
- **% of total**
- **Assessment due date**

Assessment component	Assessment Description	LO Addressed	% of total	Week due
Annual examination	Two-hour written examination	LO1–LO9	80%	
Laboratory practicals (3 of)	Attend laboratory practical sessions and produce reports		(3 of =) 20%	

Reassessment Requirements	100% written examination
Contact Hours and Indicative Student Workload[2]	**Contact hours:** 33 scheduled lectures, 3 Laboratory Practical Sessions **Independent Study (preparation for course and review of materials):** **Independent Study (preparation for assessment, incl. completion of assessment):**
Recommended Reading List	Craig's Soil Mechanics. Jonathan Knappett and R.F. Craig. CRC Press.
Module Pre-requisite	Mechanics of Materials
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	
Academic Year of Date	2024–25