Module Code | CEU33A05
--- | ---
Module Name | 3A5 SOIL MECHANICS
ECTS Weighting | 5 ECTS
Semester taught | Semester 1
Module Coordinator/s | Brendan O’Kelly / 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 that must be considered when describing and classifying soils.
- **LO2.** Analyse the compaction characteristics of a soil in order to assess its suitability as an engineering fill material.
- **LO3.** Explain the methods of measurement of the permeability of soils.
- **LO4.** Estimate the total head, porewater pressures and discharges expected in a variety of engineering design situations.
- **LO5.** Explain the concept of effective stress and its relationship with the shear strength of soils.
- **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 (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
Soil Mechanics provides students with a basic knowledge of the 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 particles-size distribution and mineralogy of the soil 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 the short- and long-term bearing capacity 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 fine-grained soil slopes are presented. Ground investigation and in-situ testing techniques are described for the development of ground model and the determination/interpretation of design parameter values.

Module content

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

Teaching and Learning Methods

Lectures, three number of laboratory Practicals, student presentations to their peers
### Assessment Details

Please include the following:

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

<table>
<thead>
<tr>
<th>Assessment Component</th>
<th>Assessment Description</th>
<th>LO Addressed</th>
<th>% of total</th>
<th>Week due</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual examination</td>
<td>2 hour written examination</td>
<td>LO1–LO9</td>
<td>80%</td>
<td></td>
</tr>
<tr>
<td>Laboratory practicals (3 of)</td>
<td>Attend laboratory practical session and produce report</td>
<td>3x5% = 15%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student presentations</td>
<td></td>
<td></td>
<td>5%</td>
<td>14</td>
</tr>
</tbody>
</table>

### Reassessment Requirements

100% written examination

### Contact Hours and Indicative Student Workload

- **Contact hours:**
  - 31 scheduled lectures, student presentation sessions (2 hours), 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


### Module Pre-requisite

Mechanics of Solids

### Module Website

No

### Are other Schools/Departments involved in the delivery of this module?

If yes, please provide details.

No

### Module Approval Date

September 2019

### Academic Year of Date

2019-20