**4A5 Soil Mechanics** [5 credits]

**Module co-ordinator:** Assistant Prof. David Igoe

**Lectures:** Associate Prof. Brendan O’Kelly  
Assistant Prof. David Igoe

**Module organisation**
The module runs in first semester of the academic year and comprises three lectures per week for 9 weeks, with two study weeks and one Reading week. In addition, for each student, there is a one-hour tutorial period for 7 weeks and three one-hour laboratory sessions. The tutorial exercises are collected at the end of each session, marked and returned. The laboratory reports should be submitted within two weeks of the scheduled laboratory session.

<table>
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<tr>
<th>Engineering Semester</th>
<th>Start Week</th>
<th>Hours of Associated Practical Sessions</th>
<th>End Week</th>
<th>Lectures Per Week</th>
<th>Total</th>
<th>Tutorials Per Week</th>
<th>Total</th>
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<tr>
<td>1</td>
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<td>3</td>
<td>10</td>
<td>3</td>
<td>27</td>
<td>1</td>
<td>7</td>
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Total Contact Hours: 39

**Module description, aims and contribution to programme**
The objectives of the module are to advance from the basic soil mechanics principles presented in the JS 3A5 module, so as to:

- Provide students with a good understanding of the properties of soil and how to determine them
- Enable students carry out geotechnical designs involving slope stability, bearing capacity, settlement of spread foundations and earth pressures acting on retaining structures.

**Learning outcomes**
On successful completion of the module, the student will be able to:

1. Predict the effective stresses in the ground for hydrostatic and artesian conditions
2. Assess the principal tests used to determine the strength, stiffness and compressibility parameters of soil and when they are used
3. Determine the stresses in the ground due to the loading from a foundation on the surface
4. Estimate the elastic and consolidation settlements of a foundation
5. Determine the at rest, active and passive earth pressures on retaining walls
6. Design a cantilever embedded and a gravity retaining wall
7. Calculate the bearing capacity and design a shallow foundation
8. Analysis of slope stability using slip surfaces and method of slices
Module content

- Seepage
- Soil Behaviour in Shear
- Shallow Foundations
- Consolidation
- Settlement from Consolidation Theory
- Retaining Structures
- Stability of self-supporting soil masses

Assessment

<table>
<thead>
<tr>
<th>Component</th>
<th>Weightage</th>
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<tr>
<td>Examination</td>
<td>80%</td>
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<tr>
<td>Laboratory Practicals and Tutorials</td>
<td>20%</td>
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The examination questions are designed to test the students’ ability to use the knowledge gained in lectures to solve practical problems. The laboratory experiments are used to develop knowledge of the testing procedures used in geotechnical engineering.

The student reports on the laboratory exercises must be submitted within 2 weeks of the scheduled laboratory practical session. Late entries will not be accepted unless accompanied by medical certificate or other appropriate document.

Required textbook


Further information

School of Engineering weblink.