4A5(1) Geotechnical Engineering 1 [5 credits]

Module co-ordinator: Associate Prof. Brendan O’Kelly, BOKELLY@tcd.ie

Lecturer(s): Associate Prof. Brendan O’Kelly

Prerequisite Module(s): 3A5 Soil Mechanics

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 9 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.

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<tr>
<th>Semester</th>
<th>Start Week</th>
<th>End Week</th>
<th>Lectures</th>
<th>Tutorials</th>
<th>Laboratories</th>
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<td>Per Week</td>
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<td>10</td>
<td>3</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
Assessment
Examination  85%,
Laboratory Practical’s and Tutorials  15%

Reports on the laboratory exercises must be submitted in the SS box in the Museum Building 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