

Liverpool John Moores University

Title: GEOTECHNICS 1
Status: Definitive
Code: **4022BEUG** (102744)
Version Start Date: 01-08-2016

Owning School/Faculty: Civil Engineering
Teaching School/Faculty: Civil Engineering

Team	Leader
William Atherton	Y

Academic Level: FHEQ4 **Credit Value:** 12 **Total Delivered Hours:** 58
Total Learning Hours: 120 **Private Study:** 62

Delivery Options

Course typically offered: Semester 2

Component	Contact Hours
Lecture	24
Off Site	8
Practical	12
Tutorial	12

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS1	4 from 6 questions (unseen)	70	2
Report	AS2	(written report)	30	

Aims

To study the physical and mechanical properties of engineering soils and their application, particularly in relation to short-term conditions in homogeneous isotropic ground.

Learning Outcomes

After completing the module the student should be able to:

- 1 Identify the various prerequisites involved in ground and site investigation.
- 2 Describe the common rock and soil types, their mode of formation, geographical and geological distribution.
- 3 Assess the engineering performance of rock materials and the results obtained from standard laboratory tests.
- 4 Evaluate the significance of water in soils, its movement and effects upon soil properties and strength parameters.
- 5 Explain the establishment of the primary design parameters for soils.
- 6 Identify the principles involved in assessing the stability of slopes, foundations and earth retaining structures.

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

EXAM	1	2	3	4	5	6
REPORT	1	3				

Outline Syllabus

Site investigation: purpose and benefits; types of site; ground investigation techniques; sampling methods; in-situ testing; the use of geophysical prospecting methods; safety and supervision; site investigation reports.

Geology: structure of the Earth; Earth history; geochemical cycle - processes and products; introduction to petrology - broad classification of rocks; structural geology - stratification, bedding, faults, folds and unconformities; geological maps.

Engineering classification of soils: index properties, particle size distribution, soil properties and phase relationships.

The effects of water in soils: measurement of soil permeability using laboratory and in-situ testing.

Earth-fill: compaction theory, standard laboratory testing and field compaction techniques.

Introduction to the relationship between total stresses: effective stress and pore water pressure.

Shear strength of soils: shear strength theory, laboratory testing and in-situ determination of shear strength parameters.

Earth pressure and retaining structures: Principles of active and passive earth pressure; the derivation of Rankine's and Bell's equations; Coulomb wedge theory;

the stability analysis of simple gravity and embedded earth retaining structures.

Stability of slopes above the water table: analysis of failure modes in various soil conditions; methods of stabilisation.

Stress analysis; the measurement of pressure distributions in a soil mass from loads applied to a homogeneous isotropic material.

Stability of shallow foundations; methods of determining bearing capacity from in-situ testing; design of foundations.

Learning Activities

Lectures, tutorials, practicals and field visits.

Notes

The module provides an introduction through practical work in the laboratory and field to the composition, deposition and behaviour of engineering soil. This is supported by lectures, case studies, tutorials and analytical exercises.