Liverpool John Moores University

Title:	GEOTECHNICS
Status:	Definitive
Code:	**5115BEUG** (118150)
Version Start Date:	01-08-2019
Owning School/Faculty:	Civil Engineering
Teaching School/Faculty:	Civil Engineering

Team	Leader
Edward Loffill	Y
William Atherton	

Academic Level:	FHEQ5	**Credit Value:**	24	**Total Delivered Hours:**	86
Total Learning Hours:	240	**Private Study:**	154		

Delivery Options
Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	48
Practical	12
Tutorial	24

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS1	Examination	70	2
Report	AS2	Report	15	
Test	AS3	Test	15	

Aims

To study the physical and mechanical properties of engineering soils and their application, particularly in relation to short-term and long-term conditions in homogeneous isotropic ground.
To study the effects of standing and flowing groundwater on the deformation and

failure of engineering earth structures and other forms of construction.

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	Evaluate the significance of water in soils, its movement and effects upon soil properties and strength parameters.
4	Identify the principles involved in assessing the stability of slopes, foundations and earth retaining structures.
5	Explain and apply the principle of effective stress in geotechnics.
6	Interpret standing and flowing water conditions in engineering soil masses acting as a homogeneous isotropic permeable medium.
7	Relate the compression and shear failure of engineering soils to the conditions of test and field loading.
8	Analyse the stability and displacements for long-term loading of earth structures, earth retaining walls and foundations.

Learning Outcomes of Assessments

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

EXAMINATION	4	5	6	8
REPORT	1	2	7	
TEST	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.
Earth-fill: compaction theory, standard laboratory testing and field compaction techniques.
Shear strength of soils: shear strength theory, laboratory testing and in-situ determination of shear strength parameters.
Stress analysis; the measurement of pressure distributions in a soil mass from loads applied to a homogeneous isotropic material.
Ground water: Held water, equilibrium water content, soil suction, phreatic surface, permeability, seepage and flow nets, pore-water pressure, and stability and seepage forces.

Principles of Effective Stress: Compressibility and consolidation; influence of conditions on failure, stress paths, stress history and its effects.
Introduction to influence of origins and history of soils on their behaviour.
Retaining walls: Long-term lateral pressures from soil and groundwater; stability and modes of failure; Coulomb wedge method.
Embankments and Cuttings: short and long term stability of earth structures in submerged and partially drained conditions, instrumentation and long-term changes.
Shallow Foundations: Pressure distribution; consolidation of soil layers; long-term and time-dependent settlement; effect of standing water on application of bearing capacity equations; pile design.

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 module emphasises and investigates the important influence of water on ground behaviour for civil engineering applications in analysis, design and construction over short and long-term conditions. The module makes extensive use of mathematics and engineering principles, this is supported by lectures, case studies, tutorials and analytical exercises.