Liverpool John Moores University

Title:	ENGINEERING GEOLOGY AND SOIL MECHANICS
Status:	Definitive
Code:	**4301CIVH** (123236)
Version Start Date:	01-08-2021
Owning School/Faculty:	Civil Engineering and Built Environment
Teaching School/Faculty:	Civil Engineering and Built Environment

Team	Leader
Georgios Nikitas	Y

Academic Level:	FHEQ4	**Credit Value:**	20	**Total Delivered Hours:**	68
Total Learning Hours:	200	**Private Study:**	132		

Delivery Options
Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	48
Practical	9
Workshop	9

Grading Basis: BTEC

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Report	AS1	2000 WORDS REPORT	40	
Exam	AS2	EXAMINATION	60	2

Aims

To provide the student with an introduction to the engineering characteristics of geological materials and an understanding of how geological materials are classified.
To provide the student with an appreciation of the significance of site investigations, the codes of practice involved, and the various methods of sampling and in-situ testing.
To enable the student to identify the principles involved in assessing the stability of

slopes.
To enable the student to identify the principles involved in the design of foundations and earth retaining structures.
To enable the student to identify the effects that seepage and the compressibility of soil can have on structures.

Learning Outcomes

After completing the module the student should be able to:

1	Identify the various techniques involved in site investigation.
2	Describe the common rock and soil types, their mode of formation, geographical/geological distribution and their uses within the construction industry.
3	Investigate the engineering performance of rock materials and rock masses and analyse the results obtained from standard soil tests, establishing the primary design parameters for soils.
4	Analyse the significance of water in soil, its movement and effects upon properties and strength parameters and identify the effects of ground water and seepage on geotechnical design.
5	Identify the effect of imposing loads on soil and the various methods of analysing, the stress increases due to such loads, the bearing capacity of soil and the settlement caused.
6	Identify various techniques involved with the analysis of slopes and earth retaining structures and apply these principles in conjunction with their knowledge of soil properties to solve geotechnical problems.

Learning Outcomes of Assessments

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

2000 WORDS REPORT	1	2				
EXAMINATION	1	2	3	4	5	6

Outline Syllabus

Site investigation: purpose and benefits; types of site; ground investigation techniques; sampling methods; in-situ testing; 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, seepage, measurement and implications.
Earth-fill: compaction theory, standard laboratory testing and field compaction techniques.
Introduction to the relationship between total stresses: effective stress and porewater pressure.

Introduction to consolidation theory: one dimensional consolidation and the long term effects of loading soils.
Shear strength of soils: shear strength theory, laboratory testing and in-situ determination of shear strength parameters.
Stability of slopes above the water table: analysis of failure modes in various soil conditions; methods of stabilization.
Earth pressure and retaining structures: Principles of active and passive earth pressure; the stability analysis of simple gravity and embedded earth retaining structures.
Stress analysis; the measurement of pressure distributions in a soil mass from loads applied to a homogeneous isotropic material, the measurement of changes in stress.
Stability of shallow foundations; various methods of determining the bearing capacity from in-situ testing results and empirical formulae; design of foundations and settlement of soil subject to changes in loading.

Learning Activities

Lectures, problem solving workshops, laboratory work and geology site visit.

Notes

This module introduces learners to the classification of soil types and establishes primary design parameters for soils. The significance of the ground investigation element of site investigation is developed.