Liverpool John Moores University

Title:	GEOLOGY AND SOIL MECHANICS
Status:	Definitive
Code:	**4506ICBTCE** (126965)
Version Start Date:	01-08-2021
Owning School/Faculty:	Civil Engineering and Built Environment
Teaching School/Faculty:	ICBT, Colombo

Team	Leader
Alison Cotgrave	Y

Academic Level:	FHEQ4	**Credit Value:**	15	**Total Delivered Hours:**	77
Total Learning Hours:	150	**Private Study:**	73		

Delivery Options
Course typically offered: Semester 2

Component	Contact Hours
Lecture	36
Tutorial	9
Workshop	30

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Portfolio	AS1	Portfolio – Laboratory Reports (Equivalent to 1500 words)	50	
Exam	AS2	Written Examination (Closed Book)	50	2

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 & describe the common rock types, their mode of formation and uses within construction
2	Classify soil types from the determination of their basic soil properties
3	Identify the primary design parameters for soils
4	Relate the results from common soil tests to engineering design work

Learning Outcomes of Assessments

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

Portfolio – Laboratory Reports	1	2	3	4
Written Examination	1	2	3	4

Outline Syllabus

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: Soil description and classification: differences between description and classification, index properties, particle size distribution, soil properties and phase relationships, Fundamental soil properties: particulate nature of soils, three-phase and two-phase states, calculations for soil density, moisture content, void ratio and degree of saturation, characteristics of fine grained soil responsible for development of apparent cohesion
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, influence on the strength and deformation of soil, drained and undrain behavior, influence of seepage on effective stress
Classification of common rocks: engineering description of rocks to current codes of practice
Mode of formation: petrographic classification of igneous rocks, common stable and unstable minerals, diverse nature of sedimentary rocks, grades of metamorphism
Calculations and graphs: total stress, pore water pressure and effective stress for soil sequence under hydrostatic conditions

Geotechnical design parameters: common methods for the determination of shear strength, compressibility and permeability to current codes of practice, potential limitations associated with the methods
Ground investigation and in-situ sampling: current techniques for the acquisition of soil samples for laboratory testing, impact of sample quality on measured parameters, common methods of in-situ testing
Laboratory measurements: e.g. density, moisture content, void ratio, degree of saturation, permeability, porosity, shear strength, liquid limit, chemical nature
Laboratory data: shear box tests, volumetric response to shear, unconsolidated undrained and conso lidated undrained with
Pore pressure measurement triaxial tests, triaxial shear strength parameters by Mohr's Stress Circles and stress path methods
Permeability tests: constant head and falling head permeameters, process results from field pumping tests (in terms of coefficient of permeability and radius of the cone of depression)
One-dimensional consolidation test: oedometer tests for coefficient of volume compressibility

Learning Activities

Students will be supported in their learning, to achieve the above learning outcomes, in the following ways:

By a series of lectures and tutorials and through participation within practical sessions for problem solving.
Self-managed investigative study to analyse cases related to the industry
In-class participation and case studies are key features of this module.
A recommended resource list - indicating key reading, internet support and physical learning assistance, is provided to help enable students to undertake self-directed study Formative feedback will be directly linked to the form of assessment which enables learners to revise and/or improve learning, also by providing opportunity for learners to develop academic, personal and professional development.
Summative feedback will be linked to the predetermined assessment criteria which will be made available within the Module Handbook /assignment brief.
Learners will receive individual feedback upon their assessed work - together with a generic feedback upon the performance of the group as a whole (in order that they can "benchmark" their own performance).

Notes

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