
FACULTY OF ENGINEERING SCIENCE AND THE BUILT ENVIRONMENT

Unit title:	Soil Mechanics	
Unit number:	BCE/2/122	
Unit level:	2	
Unit value:	1.0	
Unit co-ordinator:	M. Gunn	
Contact time:	Lectures	20 hours
	Tutorials	10 hours
	Laboratories	5 hours
Private study time:	115 hours	
Total study time:	150 hours	
Unit pre-requisites:	None	

SHORT DESCRIPTION

This unit introduces a number of simple models which are used to describe soil and its mechanical behaviour. Standard laboratory tests carried out and soil properties derived from the results.

AIMS

To develop an appreciation and understanding of the fundamentals of Soil Mechanics.

LEARNING OUTCOMES

The student should be able to:

- convert one measure of soil density to another
- calculate the permeability of soil from the results of a permeameter experiment
- calculate pore water pressure in soil for hydrostatic or steady seepage conditions
- calculate effective stresses in soil layers
- calculate stresses acting on inclined planes in soil using the Mohr's circle construction
- predict the strength of soil in triaxial tests using Critical State theory
- describe the main laboratory tests on soils
- use standard terminology to describe soils
- calculate quantities describing the composition of a soil sample from laboratory data
- determine the strength properties of soils from the data of shear box and triaxial tests
- determine the consolidation properties of soils from oedometer test results

TEACHING AND LEARNING PATTERN

Lectures, tutorials and laboratory classes.

INDICATIVE CONTENT

Soil description and effective stress principle

Definitions of water content, void ratio, specific volume, saturation ratio, mass densities, unit weights. Effective stress principle and calculation of effective stresses in soil layers subject to surface loading and water table changes.

Laboratory Tests

Sieving. Atterburg limit tests for clays. Compaction. Shear box, oedometer and triaxial tests.

Soil shear strength theories

Mohr's circle. Mohr Coulomb. Stress-dilatancy for sands. Critical State Soil Mechanics

Consolidation

Terzaghi's one dimensional consolidation theory.

ASSESSMENT METHOD

The unit is assessed by a combination of examination and coursework with the proportion of marks allocated to each component given below:

Examination : 70%

Coursework: 30%

INDICATIVE SOURCES

Atkinson, J.H., An Introduction to the Mechanics of Soils and Foundations, Mc-Graw-Hill, London, 1993.

Budhu, M., Soil Mechanics and Foundations, Wiley, 2000.

Craig, R.F., Soil Mechanics, Chapman Hall, London, 2004 (7th ed).

Powrie, W., Soil Mechanics: Concepts and Applications, Spon, 2004 (2nd ed).

Whitlow, R., Basic Soil Mechanics, Longman, 2001 (4th ed).