FACULTY OF ENGINEERING, SCIENCE AND THE BUILT ENVIRONMENT

Unit title:	Geotechnical Design	
Unit number:	BCE/3/203	-
Unit Level:	3	
Unit value:	1.0	
Unit co-ordinator:	M Gunn	
Contact time:	Lectures	36 hours
	Tutorials	14 hours
	Assessment	3 hours
Private study time:	97 hours	
Total study time:	150 hours	
Unit pre-requisites:	BCE/2/221 or equivalent	

SHORT DESCRIPTION

This unit is intended to provide an understanding to the application of theory to the analysis and design of geotechnical structures.

AIMS

To introduce students to the application of soil mechanics to the solution of geotechnical design problems.

To introduce a range of design methods in geotechnical engineering.

To promote group and individual problem solving skills.

LEARNING OUTCOMES

The student should be able to:

- choose soil properties and parameters relevant to design,
- identify boundary conditions and draw a flow net, consider the interaction between soil and water in the analysis and design of geotechnical structures,
- calculate rates of consolidation and perform simple vertical drainage design
- carry out simple design calculations for shallow and deep foundations, slopes, excavations and retaining walls.

TEACHING AND LEARNING PATTERN

Lectures supplemented by class handouts and tutorial work.

INDICATIVE CONTENT

<u>Groundwater and Seepage</u> Seepage analysis by flow netsor. Relevance of groundwater pressures to geotechnical design. Terzaghi's one dimensional consolidation theory and applications. <u>Foundations</u> Strength of deep and shallow foundations. Estimation of settlement for shallow foundations in sand and clays.

<u>Retaining Walls and Slope Stability</u> Infinite slope and simple circular slip analysis. Gravity retaining structures.

Deep Excavations

Construction techniques. Stability. Design of embedded cantilevered and anchored/propped walls.

ASSESSMENT METHOD

- 70% 3 hour end of unit examination
- 30% Coursework (Two design exercises)

INDICATIVE SOURCES

<u>Core</u>

Budhu, M., Soil Mechanics and Foundations, Wiley, 2000. Craig, R.F., Soil Mechanics Chapman and Hall, 2004 (7th ed).Powrie, W., Soil Mechanics: Concepts and Applications, Spon, 1992

Liu C. & Evett, J.B., Soils and Foundations, Prentice Hall, 2001 (6th ed).

McCarthy D.F., Essentials of Soil Mechanics and Foundations: Basic Geotechnics, Prentice Hall, 1998 (5th ed).

R Basic Soil Mechanics, Prentice Hall, 2001 (4th ed)

Background:

Simons, N. E. and Menzies, B. K., A Short Course in Foundation Engineering, IPC Press, 2000 (2nd ed).

Reddi, Seepage in Soils, Wiley, 2003