

Module Title:	Geotechnical Engineering II	
Language of Instruction:	English	
Credits:	10	
NFQ Level:	8	
Module Delivered In	2 programme(s)	
Teaching & Learning Strategies:	Lectures Demonstrations Project work Practicals Presentation Private study	
Module Aim:	(a) To understand the physical and mechanical properties of soils; (b) To develop a general appreciation of environmental issues and their vulnerability to engineering development projects; (c) To develop a general appreciation of sustainable construction principles as it relates to Civil & Geotechnical Engineering; (d) To be able to determine parameters from soil testing to characterize soil properties, (d) soil strength and soil deformations, (e) to be able to apply the principles of soil mechanics to analyze and design simple geotechnical systems; (f) To increase the understanding of the effects of construction on groundwater and the effects of groundwater on construction; (g) To develop the skills required to evaluate factual Geotechnical Engineering reports; (h) To develop the skills required to assist in writing an interpretative Geotechnical engineering reports; (i) To recognise when simple geotechnical analysis and design are insufficient to safely or cost effectively evaluate/design a project; (j) To equip the student to operate as a Civil Engineer with a good understanding of Geotechnical Engineering; (k) To equip the student with the skills and information necessary to undertake post-graduated study	
Learning Outcomes		
On successful completion of this module the learner should be able to:		
LO1	Assess the information contained in factual geotechnical reports including laboratory test results	
LO2	Prepare well presented interpretative geotechnical calculations and carry out simple geotechnical design and analysis	
LO3	Assess ground conditions to evaluate SI requirements for field work, sampling and testing	
LO4	Understand the value of desk study information and its role in preparation of factual and interpretative reports	
Pre-requisite learning		
Module Recommendations		
This is prior learning (or a practical skill) that is recommended before enrolment in this module.		
6566	ENGR H3503	Geotechnical Engineering I
6801	ENGR H3504	Earthworks Analysis
Incompatible Modules		
These are modules which have learning outcomes that are too similar to the learning outcomes of this module.		
No incompatible modules listed		
Co-requisite Modules		
No Co-requisite modules listed		
Requirements		
This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed.		
Engineering Geology		

Module Content & Assessment

Indicative Content

Site Investigation

(a) Contents of GI report, (b) Determination of appropriate site investigation techniques, (c) Sample selection, in-situ testing, (d) laboratory testing on a site specific basis,

Groundwaterflow through soils

Flow through soils; (a) Permeability, (b) Head and head tests, (c) Flow nets, (d) Hydraulic gradient, (e) Uplift, seepage and piping forces (f) Filter design and geotextiles

Stresses, Strains and Elastic Deformation of Soils

(a) Stress-strain, (b) Stresses from surface loads, (c) Settlements,

One-dimensional consolidation settlement of fine-grained soils

Primary and secondary consolidation, (a) Drainage path, (b) Rate of consolidation, (c) Over-consolidation ratio (d) Field vs. laboratory consolidation (e) Surcharging (f) Use of vertical drains, (f) Derivation, use and understanding of Continuity and Effective Stress equations

Shear strength of Soils

(a) Undrained and drained shear strength, (b) Laboratory determination of shear strength using shear box, Triaxial (drained and undrained), (b) In-situ determination, (c) Introduction to Piezocone and pressure meter

Bearing capacity of soils and settlement of shallow foundations

(a) Collapse and failure loads - Ultimate and service loads, (b) Settlement, (c) In-situ testing (d) Design to EC 7, (e) Comparison of European vs other International Design Principles

Pile Foundations

(a) Piling - types, (b) Effects of installation, (c) Design parameters and pile design, (d) Pile settlement analysis, ULS vs SLS - Load capacity, (e) Testing and Specification; (f) Allowable settlement; (g) Negative skin friction, (H) Single piles vs. pile groups, (i) EC 7 vs other International Codes

Stability of earth retaining structures

(a) Types, (b) Lateral earth pressure theory (b) Analyses and design, (c) Introduction to computer based analysis

Slope stability

(a) Types of slopes, (b) Types of failures, (c) Methods of analysis; (d) Computer analysis, (e) Probabilistic vs deterministic analysis (f) Slope remediation and stability

Soil stabilization

(a) Lime, cement, pfa, stabilization on mineral soils and peat - chemical reactions within soil mass

Assessment Breakdown	%
Continuous Assessment	10.00%
Project	20.00%
Practical	10.00%
End of Module Formal Examination	60.00%

Continuous Assessment

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Examination	Term 1 Exam	1,3	10.00	n/a

Project

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Project	Project	1,2,3,4	20.00	Sem 1 End

Practical

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Practical/Skills Evaluation	Practical	1,2,3,4	10.00	Sem 1 End

End of Module Formal Examination

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Formal Exam	Exam	1,2,3,4	60.00	End-of-Semester

Module Workload

Workload: Full Time		
<i>Workload Type</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>
Lecture	30 Weeks per Stage	3.00
Estimated Learner Hours	30 Weeks per Stage	3.00
Total Hours		180.00

Module Delivered In

Programme Code	Programme	Semester	Delivery
CW_CMHCE_B	Bachelor of Engineering (Honours) in Civil Engineering - Ab Initio	7	Mandatory
CW_CMCEN_B	Bachelor of Engineering (Honours) in Civil Engineering - Add On	3	Mandatory