

University of the West of Scotland

Module Descriptor

Session: 2024/2025

Title of Module: Ground and Highway Engineering			
Code: ENGG10014	SCQF Level: 10 (Scottish Credit and Qualifications Framework)	Credit Points: 20	ECTS: 10 (European Credit Transfer Scheme)
School:	School of Computing Engineering & Physical Sciences		
Module Co-ordinator:	Djamalddine Boumezerane		
Summary of Module			
<p>This module will support students to develop their UWS graduate attributes, namely: Academic (critical and analytical thinking, inquiring, knowledgeable, innovation, and problem solving); Personal (effective communicator, creative, imaginative); Professional (Collaborative, research-minded, and socially responsible).</p> <p>Ground Engineering</p> <p>Students will develop design expertise in sheet pile retaining walls, soil and rock slope cuttings, and soil reinforcement. They are required to consider geotechnical risk registers and methods of reducing risk associated with the ground.</p> <p>The course will also cover topical issues in ground engineering such as slope stability problems. There will be significant discussion of geotechnical risk in both a project and society context. Sustainability is considered as a vital element that should be considered at the design phase.</p> <p>Highway Engineering</p> <p>Students are introduced to the basics of highway design. There is a review of horizontal and vertical alignments of roads and the main aspects of pavement design and construction. Roads' drainage together with the drainage of slopes will be considered. Methods of pavement assessment and major techniques of road maintenance will be covered. An overview of the highway design process will be given. The environmental aspects of highway development are considered along with sustainable development. Roundabout and junction design are introduced.</p> <ul style="list-style-type: none"> • Design of retaining walls, rock slopes and soil reinforcement are covered. • Horizontal and vertical alignment of highways based on the recommendations of the Design Manual for Roads and Bridges (DMRB). • Introduction to soil laboratory testing for pavement design parameters • Roundabout and junction design in accordance with current practice. • Ageing and defects of transport infrastructure. • Integrated Approaches for Highway Rehabilitation & Assessment for Pavement Design Alternatives. 			
Module Delivery Method			

Face-To-Face	Blended	Fully Online	HybridC	Hybrid 0	Work-Based Learning
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
See Guidance Note for details.					

Campus(es) for Module Delivery						
The module will normally be offered on the following campuses / or by Distance/Online Learning: (Provided viable student numbers permit) (tick as appropriate)						
Paisley:	Ayr:	Dumfries:	Lanarkshire:	London:	Distance/Online Learning:	Other:
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Add name

Term(s) for Module Delivery					
(Provided viable student numbers permit).					
Term 1		Term 2		Term 3	
	<input checked="" type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>

Learning Outcomes: (maximum of 5 statements) These should take cognisance of the SCQF level descriptors and be at the appropriate level for the module. At the end of this module the student will be able to:	
L1	To be able to design rock slopes, reinforced soil slopes and sheet pile retaining walls.
L2	To be able to assess geotechnical risk as it applies to projects and to society.
L3	To be able to do the basic design of highway alignments and pavements and identify suitable techniques of pavement assessment and maintenance.
L4	To be able to understand basic soil laboratory tests for pavement design parameters.
Employability Skills and Personal Development Planning (PDP) Skills	
SCQF Headings	During completion of this module, there will be an opportunity to achieve core skills in:
Knowledge and Understanding (K and U)	<p>SCQF Level 10</p> <ul style="list-style-type: none"> Students will be able to integrate knowledge of ground engineering processes and theory with practical design. Develop a critical K & U of essential facts, concepts, theories, and principles in highway engineering.

Practice: Applied Knowledge and Understanding	SCQF Level 10 <ul style="list-style-type: none"> • Students will have developed in depth skills in the design of certain ground engineering and highway engineering works. 	
Generic Cognitive skills	SCQF Level 10 <ul style="list-style-type: none"> • Students will undertake design where the data is limited and comes from a range of sources. 	
Communication, ICT and Numeracy Skills	SCQF Level 10 <ul style="list-style-type: none"> • Make a formal presentation concerning project risk. 	
Autonomy, Accountability and Working with others	SCQF Level 10 <ul style="list-style-type: none"> • Work in a team environment to determine and make and give a presentation. 	
Pre-requisites:	Before undertaking this module the student should have undertaken the following:	
	Module Code: ENGG09016	Module Title: Applied Soil Mechanics
	Other:	
Co-requisites	Module Code:	Module Title:

*Indicates that module descriptor is not published.

Learning and Teaching	
In line with current learning and teaching principles, a 20-credit module includes 200 learning hours, normally including a minimum of 36 contact hours and maximum of 48 contact hours.	
Learning Activities During completion of this module, the learning activities undertaken to achieve the module learning outcomes are stated below:	Student Learning Hours (Normally totalling 200 hours): (Note: Learning hours include both contact hours and hours spent on other learning activities)
Lecture/Core Content Delivery	24
Tutorial/Synchronous Support Activity	12
Laboratory/Practical Demonstration/Workshop	12
Independent Study	152
	200 Hours Total

****Indicative Resources: (eg. Core text, journals, internet access)**

The following materials form essential underpinning for the module content and ultimately for the learning outcomes:

Various handout material for ground engineering and the University's VLE.

Design Manual for Roads and Bridges, handout material extracted from CD 116, CD 122, CS 228, CS 459, CS 641, various dates.

Extension Resources: Consultation of the undernoted resources is recommended and material from these resources may be of benefit to the student in the assessment process:

Environmental Management of Highways, 2001, Institution of Highways and Transportation

Transport in the Urban Environment, 1997, Institution of Highways and Transportation

Soil Mechanics: Principles and Practice (2nd edition), 2000, G.E. Barnes, Palgrave Macmillan Publishing

Reliability-Based Design in Soil and Rock Engineering, 2022, Bak Kong Low, CRC Press.

TRAFFIC FLOW THEORY Characteristics, Experimental Methods, and Numerical Techniques, 2016, DAIHENG NI, Butterworth Heinemann.

Value and Risk Management: A Guide to Best Practice, 2006, M F Dallas, Blackwell Publishing

Managing Geotechnical Risk: Improving Productivity in UK Building and Construction, 2001, C.R.I. Clayton, Thomas Telford Publishing

A Short Course in Soil and Rock Slope Engineering, 2001, N. Simons, B. Menzies, and M. Matthews, Thomas Telford Publishing.

Designer's Guide to En 1997-1 Eurocode 7: Geotechnical design – General Rules, Frank et al, 2004,

Smith, I. M. (2014) Smith's elements of soil mechanics. 1st edn. John Wiley & Sons Ltd.

(**N.B. Although reading lists should include current publications, students are advised (particularly for material marked with an asterisk*) to wait until the start of session for confirmation of the most up-to-date material)

Attendance and Engagement Requirements

In line with the [Student Attendance and Engagement Procedure](#): Students are academically engaged if they are regularly attending and participating in timetabled on-campus and online teaching sessions, asynchronous online learning activities, course-related learning resources, and complete assessments and submit these on time.

For the purposes of this module, academic engagement equates to the following:

- Attending the lectures, tutorials, and lab sessions.
- Engaging, participating, and delivering coursework, assignments in due time.

Equality and Diversity
<p>The University's Equality, Diversity and Human Rights Procedure can be accessed at the following link: UWS Equality, Diversity and Human Rights Code.</p> <p>Please ensure any specific requirements are detailed in this section. Module Co-ordinators should consider the accessibility of their module for groups with protected characteristics..</p>
(N.B. Every effort will be made by the University to accommodate any equality and diversity issues brought to the attention of the School)

Supplemental Information

Divisional Programme Board	Engineering
Assessment Results (Pass/Fail)	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
School Assessment Board	Civil Engineering and Quality Management
Moderator	Shakun Paudel
External Examiner	J Oti
Accreditation Details	This module is accredited by the Joint Board of Moderators as part of BEng (Hons) Civil Engineering and GA-BEng (Hons) Civil Engineering.
Changes/Version Number	<p>v4.1 April 2024:</p> <ul style="list-style-type: none"> - "Transportation" coursework component added to Assessment 1 as suggested by JBM. - "Laboratory" coursework component added to Assessment 1. - Summary of module updated. - List of essential resources updated. - Added L4: Learning Outcome 4. - Added learning activity: Laboratory. - Added learning hours for Laboratory. - Assessment outcome grid updated.

Assessment: (also refer to Assessment Outcomes Grids below)
Assessment 1 - Coursework 40%

Assessment 2 - Examination 60%. Unseen open book examination.

(N.B. (i) **Assessment Outcomes Grids** for the module (one for each component) can be found below which clearly demonstrate how the learning outcomes of the module will be assessed.

(ii) An **indicative schedule** listing approximate times within the academic calendar when assessment is likely to feature will be provided within the Student Module Handbook.)

Assessment Outcome Grids (See Guidance Note)

Component 1						
Assessment Type (Footnote B.)	Learning Outcome (1)	Learning Outcome (2)	Learning Outcome (3)	Learning Outcome (4)	Weighting (%) of Assessment Element	Timetabled Contact Hours
Design/ Diagram/ Drawing/ Photograph/ Sketch	X	X	X		20	8
Presentation	X				4	1
Transportation component			X		8	1
Laboratory				X	8	2

Component 2						
Assessment Type (Footnote B.)	Learning Outcome (1)	Learning Outcome (2)	Learning Outcome (3)	Learning Outcome (4)	Weighting (%) of Assessment Element	Timetabled Contact Hours
Unseen open book examination	X	X	X	X	60	2
Combined Total for All Components					100%	14 hours