Module Descriptor

Title	Structural Engineering 3		
Session	2025/26	**Status**	Published
Code	ENGG10013	**SCQF Level**	10
Credit Points	20	**ECTS (European Credit Transfer Scheme)**	10 (European Credit Transfer Scheme)
School	**Computing, Engineering and Physical Sciences**		
Module Co-ordinator	A Wrzesien		

Summary of Module

Indeterminate Structural Analysis

Moment Distribution Method: settlement of supports, frames with general sway, Naylor's Method for symmetrical frames with sway, elements with varying second moment of area, Slope-Deflection Equations.

Plastic Design and Analysis

Member cross-sections – stages from elastic to plastic, plastic properties, fully-plastic moment of resistance.

Single-span beams and continuous (multi-span) beams by the graphical method.

Frames with sway by the virtual work method.

Members with different relative values of Mp.

Composite Structural Members

Composite bars and beams (timber/steel).

Composite beams (steel) and slabs (concrete); shear studs, metal decking, propped construction.

Reinforced Concrete Design to BS EN1992-1-1

Flanged beams.

Two-way spanning slabs.

Introduction to wind loading as per BS EN1991-1-4.

Structural Monolothic Concrete Design of multi-storey buildings

Basic conceptual design, including the choice of structural material and means of stability provision.

Calculations for main structural elements; preparation of structural layout and detail drawings.

Single-storey buildings: portal frames, loading types. Erection of single-storey building structures.

Temporary Works Design

Temporary works design: falsework structures, foundations, and safety.

Loads on falsework: imposed, dead and wind.

Design of falsework systems using scaffolding tube and timber formwork.

General

Sustainability with reference to material selection and structural design.

This Module aims at supporting students in developing their UWS graduate attributes, namely: Academic (critical and analytical thinking, inquiring, knowledgeable, innovative, and problem-solving); Personal (effective communicator, creative, imaginative); Professional (Collaborative, research-minded, and socially responsible).

Module Delivery Method	**On-Campus**[1] ☒	**Hybrid**[2] ☐	**Online**[3] ☐	**Work -Based Learning**[4] ☐
Campuses for Module Delivery	☐ Ayr ☐ Dumfries	☐ Lanarkshire ☐ London ☒ Paisley	☐ Online / Distance Learning ☐ Other (specify)	

Terms for Module Delivery	Term 1	☒	Term 2	☐	Term 3	☐
Long-thin Delivery over more than one Term	Term 1 – Term 2	☐	Term 2 – Term 3	☐	Term 3 – Term 1	☐

Learning Outcomes	
L1	Analyse structural beams, frames and slabs by a range of methods; design reinforced-concrete beams, slabs and walls by a range of methods; and carry out the analysis and design of temporary works used on construction sites.
L2	Plan and carry out the integrated design of a building, including the production of justification calculations and drawings, using computer programmes to facilitate the processes of design and analysis and the production of design drawings.
L3	N/A
L4	N/A
L5	N/A

[1] Where contact hours are synchronous/ live and take place fully on campus. Campus-based learning is focused on providing an interactive learning experience supported by a range of digitally-enabled asynchronous learning opportunities including learning materials, resources, and opportunities provided via the virtual learning environment. On-campus contact hours will be clearly articulated to students.

[2] The module includes a combination of synchronous/ live on-campus and online learning events. These will be supported by a range of digitally-enabled asynchronous learning opportunities including learning materials, resources, and opportunities provided via the virtual learning environment. On-campus and online contact hours will be clearly articulated to students.

[3] Where all learning is solely delivered by web-based or internet-based technologies and the participants can engage in all learning activities through these means. All required contact hours will be clearly articulated to students.

[4] Learning activities where the main location for the learning experience is in the workplace. All required contact hours, whether online or on campus, will be clearly articulated to students

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)	**SCQF 10** Demonstrate and work with knowledge and understanding that covers and integrates most of the principal areas, features and boundaries, terminology and conventions of these key component areas of structural analysis and design. • Further develop critical knowledge and understanding of essential facts, concepts, theories and principles in structural analysis and in the structural design areas of reinforced concrete, structural steelwork, and temporary works. • Further develop knowledge and understanding of some more advanced aspects of structural engineering. • Further develop knowledge and understanding of characteristics of reinforced concrete and steelwork as materials and of temporary works materials and design. • Further develop knowledge and understanding of the characteristics of the structural design process, specifically, those of reinforced concrete in the context of using Eurocode Standard BS EN1992-1 (reinforced concrete).
Practice: Applied Knowledge and Understanding	**SCQF 10** Use a range of the principal skills, practices and/or materials associated with these key component areas of structural analysis and design. • Use a few skills, practices and/or materials which are specialized and advanced in these areas. • Execute a defined project of structural engineering design and analysis, through a series of integrated coursework, identifying and implementing relevant design solutions and detailed outcomes, in accordance with the relevant professional codes of practice, aided by use of computer software in design and analysis. • Further develop the practice of working with, and use of, Eurocode Standard BSEN1992-1(reinforced concrete).
Generic Cognitive skills	**SCQF 10** •Critically identify, define, conceptualise and analyse complex professional-level problems and issues. •Critically review and consolidate knowledge, skills, practices and thinking in these key component areas of structural analysis and design. •Further develop the ability to comprehend the broad picture and thus work with an appropriate level of detail. •Further the development of transferable or meta-abilities to learn (knowledge & understanding) and to practice techniques and skills in these key component areas of structural engineering analysis and design; and in relation to structural design, to do so in compliance with the requirements of BS EN1992-1.
Communication, ICT and Numeracy Skills	**SCQF 10** Use a wide range of routine skills and some advanced and specialised skills in support of established practices in these key component areas of structural analysis and design, including:

	• Communication with professionally-qualified academic staff. • Ability to use a range of computer software programmes to facilitate the solution of structural engineering design and analysis problems, and to enhance design work at this level. • Interpret, use and evaluate a wide range of numerical and graphical data to set and achieve design and analysis goals/targets. • Further develop graphical communication skills.
Autonomy, Accountability and Working with Others	**SCQF 10** Further exercise autonomy and initiative in selecting and justifying structural design solutions. • Progress the ability to work effectively under guidance in a peer relationship with the academic staff members who are qualified practitioners. • Recognise the limits and limitations of theoretical methods of design and analysis, and of professional codes, and seek guidance where appropriate. • Further develop skills in planning self-learning and improving performance, as the foundation for lifelong learning/CPD.

Prerequisites	**Module Code** ENGG09013	**Module Title** Structural Engineering 1
	Other Appropriate knowledge of mathematics and fundamentals of structural mechanics; or equivalent to the above module.	
Co-requisites	**Module Code**	**Module Title**

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. Formative assessment and feedback are done mainly through (i) formal Tutorial Sessions, in which support is provided with specified Tutorial Questions, (ii) on-going Coursework Project, and (iii) any questions raised about other taught materials. This, being a Level 10 (Final Year) Module, the students are expected to work more independently and with relatively less instruction and guidance from the lecturers.	
Learning Activities During completion of this module, the learning activities undertaken to achieve the module learning outcomes are stated below:	**Student Learning 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
n/a	0
n/a	0

TOTAL	200 Hours

Indicative Resources

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

Earij, A. “Structural Analysis Notes & Tutorial Problems”, the University of the West of Scotland, available on the VLE.

• Wrzesien, A. "Structural Design Notes & Tutorials": available on the VLE.

• Selected extracts from Eurocodes 0, 1 and 2, and information on specific National Annex rules.

• SOFTWARE: Autodesk AutoCAD, Autodesk Revit, Autodesk Robot Structural Analysis, Concrete Centre Spreadsheets for Design to BS EN1992-1.

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.

• Brohn, D. (1984), “Understanding Structural Analysis”, New Paradigm.

• Ghali, A., Neville, A. & Brown, T. (2017), “Structural Analysis: A Unified Classical and Matrix Approach”, Spon Press.

• MacLeod, I. A. (2005), “Modern Structural Analysis: Modelling Process and Guidance”, Thomas Telford.

• Megson, T.H.G. (1995), "Structural and Stress Analysis”, Elsevier Butterworth-Heinemann.

• IStructE, “Manual for the Design of Concrete Building Structures to Eurocode 2”

• Martin, L.H., Croxton, P.C.L., and Purkiss, J.A. (2005), "Concrete Design to EN1992-1", Edward Arnold.

• Mosley, W.H., Hulse, R, and Bungey, J.H., “Reinforced Concrete Design", Palgrave (Macmillan).

•IStructE (2021), “Standard Method of Detailing Structural Concrete” 4th Edition.

•ANDREW ORTON (1998), The Way We Build Now, E & FN Spon.

(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:

The School of Computing, Engineering and Physical Sciences considers attendance and engagement to mean a commitment to attending, and engaging in timetabled sessions. Students will scan their attendance via the attendance scanners each time they are on-campus. Students will have attendance recorded in class and they will be expected to login to the VLE several times per week. Students who are unable to attend a timetabled learning session, due to illness or other circumstance, should notify their Programme Leader. Across the School, an 80% attendance threshold is set. Students, who fall below this, will be referred to the Student Success Team to see how they can be best supported in their studies.

Equality and Diversity
The University's Equality, Diversity and Human Rights Procedure can be accessed at the following link: UWS Equality, Diversity and Human Rights Code. Aligned with the University's commitment to equality and diversity, this module supports equality of opportunity for students from all backgrounds and learning needs. Using the VLE, materials will be presented electronically in formats that allow flexible access and manipulation of content. This module complies with University regulations and guidance on inclusive learning and teaching practice. This module has lab-based teaching and as such you are advised to speak to the Module Co-ordinator to ensure that specialist assistive equipment, support provision and adjustment to assessment practice can be put in place, in accordance with the University's policies and regulations.
(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 Physical Sciences**
Overall Assessment Results	☐ **Pass / Fail** ☒ **Graded**
Module Eligible for Compensation	☐ **Yes** ☒ **No** **If this module is eligible for compensation, there may be cases where compensation is not permitted due to programme accreditation requirements. Please check the associated programme specification for details.**
School Assessment Board	Civil Engineering and Quality Management
Moderator	A Earij
External Examiner	M Bock
Accreditation Details	This module is accredited by the Joint Board of Moderators (JBM) as part of the BEng (Hons) Civil Engineering
Module Appears in CPD catalogue	☐ **Yes** ☒ **No**
Changes / Version Number	V2.16 Updated the statement for 'Attendance and Engagement Requirments' to reflect the expectations from students as per SCEPS policy. Updated the statement for 'Eqaulity and Diversity' in line with the UWS EDHRs Code. Updated 'Assessment 1' to 'Closed-Book Class Test'.

Assessment (also refer to Assessment Outcomes Grids below)
Assessment 1
Closed-Book Class Test - 60%
Assessment 2
Assignment - 40%
Assessment 3
N/A

(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.)

Component 1							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
Unseen Closed-Book Class Test	☒	☒	☐	☐	☐	60	2

Component 2							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
Design/ Diagram/Drawing/ Photograph/Sketch	☐	☒	☐	☐	☐	40	0

Component 3							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
N/A	☐	☐	☐	☐	☐		
Combined total for all components						100%	2 hours

Change Control

What	**When**	**Who**
V. 2.15 Assessment hours adjusted to reflect new delivery. EE updated to M. Bock	10/04/2024	A. Wrzesien
V. 2.16 Updated the statement for 'Attendance and Engagement Requirments' to reflect the expectations from students as per SCEPS policy. Updated the statement for 'Eqaulity and Diversity' in line with the UWS EDHRs Code. Updated ‘Assessment 1’ to ‘Closed-Book Class Test’.	21/03/2025	A. Wrzesien