Module Descriptor

Title	Structural Engineering 1		
Session	2025/26	**Status**	Published
Code	ENGG09013	**SCQF Level**	9
Credit Points	20	**ECTS (European Credit Transfer Scheme)**	10 (European Credit Transfer Scheme)
School	**Computing, Engineering and Physical Sciences**		
Module Co-ordinator	A Earij		

Summary of Module

Structural Analysis: Qualitative

• Pin-jointed trusses subject to two-point loads.

• Beams: single-span and continuous (multi-span).

• Frames with no sway.

Structural Analysis: Quantitative

• Statically-determinate structures with both continuous and pin-jointed elements.

• Method of Sections for pin-jointed trusses.

• Varying-distributed loads on single-span beams.

• The Moment Distribution (MD) Method:

• Theory of indeterminate analysis.

• Basic elements of the MD Method.

• Continuous (multi-span) beams, frames with no sway, pinned supports, cantilevered elements, conditions of symmetry and anti-symmetry.

Reinforced Concrete Design to BS EN1992-1-1: 2004 + A1: 2014

• Design of one-way spanning slabs: bending, shear, deflection and reinforcement detailing.

• Analysis of concrete structures; elastic methods, no-sway and sway frames, max-min load combinations, use of coefficients and approximations for bending moments and shear forces.

• Design of continuous beams with moment redistribution; moment-rotation behaviour of a cross-section.

• Design of columns: braced and unbraced, short and slender, carrying axial forces and moment.

• Design of pad foundations: axially-loaded, bending, shear and punching shear, other types of foundation.

• Introduction to reinforced concrete detailing.

General Design

• Methods of ensuring structural stability: bracing, shear walls, rigid joints; robustness of structures. • Flooring systems: timber, steel, and reinforced concrete systems.

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 and frames using a range of qualitative and quantitative methods.
L2	Design a range of elements of a reinforced-concrete building by a range of methods in accordance with Eurocode Standard BS EN1992-1-1: 2004 + A1: 2014.
L3	N/A
L4	N/A
L5	N/A

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 9** Demonstrate a broad and integrated knowledge and understanding of the scope, main areas and boundaries of the topics covered in these key component areas of structural analysis and design.

[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

	• Demonstrate further knowledge and understanding of essential facts, concepts, theories and principles of the topics of this module and detailed knowledge in some of these areas. • Demonstrate detailed knowledge in some of these areas. • Further develop knowledge and understanding of characteristics of reinforced concrete as a structural material. • Further develop knowledge and understanding of the characteristics of the structural design process, and specifically those of reinforced concrete in the contexts of using the Eurocode standard BS EN1992-1-1.
Practice: Applied Knowledge and Understanding	**SCQF 9** Use some routine skills and practices within the area of engineering mechanics. • Develop knowledge, understanding and practical engineering skills acquired through work carried out in problem-based learning. • Select and critically evaluate technical literature and other sources of information to solve complex problems. • Use practical laboratory and workshop skills to investigate complex problems.
Generic Cognitive skills	**SCQF 9** Identify and analyse routine professional problems and issues. • Use a range of approaches to formulate evidence-based solutions to design problems, which invokes skills including critical analysis and evaluation and some synthesis. • Further develop the ability to apply appropriate quantitative mathematical, scientific and engineering tools to the analysis of basic problems. • Progress the ability to use appropriate design codes of practice and industry standards, which in this degree programme are the appropriate Eurocode standards.
Communication, ICT and Numeracy Skills	**SCQF 9** Interpret, use and evaluate numerical and graphical data to achieve goals/targets. • Further develop numeracy skills in structural analysis and design. • Further develop graphical communication skills through drawings prepared as a component of the series of design coursework.
Autonomy, Accountability and Working with Others	**SCQF 9** Exercise some autonomy and initiative in selecting and justifying structural design solutions. • Work under the guidance of the academic staff, who are professionally-qualified practitioners. • Further develop skills in planning self-learning and improving performance, as the foundation for lifelong learning/CPD. • Further develop organisational skills of learning and practice in structural analysis and design.

Prerequisites	**Module Code** ENGG08011	**Module Title** Design of Structural Elements
	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.

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).

• Reynolds, C.E., and Steedman, J.C. (1997), “Reinforced Concrete Designer’s Handbook”, Spon.

• IStructE, “Standard Method of Detailing Structural Concrete - a Manual for Best Practice”.

• Steel Construction Institute, Davison, B. and Owens G.W., "Steel Designers Manual", Wiley-Blackwell.

• Montague, P. and Taylor, R. (1989), "Structural Engineering", McGraw Hill.

• Westbrook, R. (1996), "Structural Engineering Design in Practice", Longman.

(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	Andrzej Wrzesien
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, and BEng GA (Hons) in Civil Engineering.
Module Appears in CPD catalogue	☐ **Yes** ☒ **No**
Changes / Version Number	V3.08: Updated the statement for 'Attendance and Engagement Requirments' to reflect the expectations from students as per CEPS policy. Updated the statement for 'Eqaulity and Diversity' in line with the UWS EDHRs Code.

Assessment (also refer to Assessment Outcomes Grids below)
Assessment 1
Closed-Book Class Test - 60%
Assessment 2
Assignment - 40%
Assessment 3
(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**
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**
	☐	☐	☐	☐	☐		
Combined total for all components						100%	2 hours

Change Control

What	When	Who
Updated Attendance and Engagement Requirements	March 2025	A Earij
Updated Equality and Diversity	March 2025	A Earij