University of the West of Scotland

Module Descriptor

Session: 2024/25

Title of Module: Design Analysis 1			
Code: ENGG08017	**SCQF Level: 8 (Scottish Credit and Qualifications Framework)**	**Credit Points: 20**	**ECTS: 10 (European Credit Transfer Scheme)**
School:	School of Computing Engineering and Physical Sciences		
Module Co-ordinator:	Dr Tony Murmu		

Summary of Module

This module will introduce students to the fundamentals of engineering mechanics that are the basis of design and analysis of engineering components and systems. The module is divided into two main topic areas of study, mechanics of materials and dynamic systems.

Mechanics of materials will consider first and second moments of area of basic sections and apply the parallel axis theorem to calculate the sectional properties of typical structural elements. Shear force and bending moment diagrams will be developed from free body diagrams as well an introduction to Macaulay's method. Basic stress and strain relationships will be developed for axial, bending, torsional and combined loading systems. The Mohr stress circle technique will be used to determine the principle stresses and maximum shear stress of complex stress systems.

Dynamics will consider the definition and identification of the basic elements and parameters of a vibrational single degree of freedom model. Definition and Application of the governing equations for Simple Harmonic Motion.

Introduction to experimental vibration testing. Define a Rigid Body. Introduction to kinetics, Newton’s laws. Fixed axis rotation calculations for velocity and acceleration including components. Definition of relative velocity and acceleration.

The module will be delivered via a blend of lectures, tutorials and laboratory experiments to exemplify the taught theory to the practical design of engineering components and systems.

During the course of this module students will develop their UWS Graduate Attributes (https://www.uws.ac.uk/current- students/your-graduate-attributes/) in the following areas-

Universal: Academic - Critical thinking, analytical & inquiring mind; Personal- Ethical; Professional- Collaborative

Work-Ready: Academic - Knowledge of strength of materials, principles of rigid body kinetics and kinematics and analysis of single degree of freedom vibration systems, Digitally Literate, Problem Solver; Personal - Motivated; Professional - Ambitious

Successful : Academic - Autonomous; Personal - Resilient; Professional- Driven

This module has been reviewed and updated, taking cognisance of the University's Curriculum Framework principles. Examples of this are found within the module such as active and engaging laboratory and tutorial activity, module assessment which reflects industry design activities, learning synergies across modules and levels of study, recorded lecture content supporting students to organise their own study time, the use of integrated group activities supporting learning communities and assessment of Continuing Professional Development allowing students to focus on and document their personal professional development utilising a PSRB template.

Module Delivery Method					
Face-To-Face	**Blended**	**Fully Online**	**HybridC**	**Hybrid 0**	**Work-Based Learning**
☒	☐	☐	☐	☐	☐
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:
☒	☐	☐	☐	☐	☐	

Term(s) for Module Delivery					
(Provided viable student numbers permit).					
Term 1	☐	Term 2	☒	Term 3	☐

Learning Outcomes: (maximum of 5 statements) At the end of this module the student will be able to:	
L1	Introduce and develop an understanding of the principles of static equilibrium applied to elementary strength of materials stress analysis systems and apply them to solve analytical solutions to axial, bending, shear and and combined loading systems.
L2	Identify, describe and analyse single degree of freedom vibration systems
L3	Introduce the principles of rigid body kinetics and kinematics and apply them to solve analytical problems.

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 Level **8** A broad knowledge and understanding of the core theories, principles and concepts of mechanics of materials and dynamic systems.
Practice: Applied Knowledge and Understanding	SCQF Level **8** Use a range of theories and solution techniques for the design and analysis of components and systems 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 Level **8** Use a range of approaches to formulate solutions to routine engineering design problems.
Communication, ICT and Numeracy Skills	SCQF Level **8** Ability to solve and present the solution and information of a solution to an engineering design scenario. Use of standard ICT software to assist in the solving and presentation of solutions and results of a design solution.
Autonomy, Accountability and Working with others	SCQF Level **8** Identify solution routes and strategies using their own initiative and informed judgments. Contribute to a collective solution of a problem or design case scenario. Function effectively as an individual, and as a member or leader of a team. Evaluate effectiveness of own and team performance. Communicate effectively on complex engineering matters with technical and non- technical audiences, evaluating the effectiveness of the methods used. Plan and record self-learning and development as the foundation for lifelong learning/CPD. Where possible this will be developed from activities undertaken in a Level 7 module with synergies to the subject content.

Pre-requisites:	Before undertaking this module the student should have undertaken the following:	
	Module Code: ENGG07001	**Module Title:** Engineering Mechanics
	Other:	Or equivalent
Co-requisites	**Module Code:**	**Module Title:**

*Indicates that module descriptor is not published.

Learning and Teaching	
This module will be delivered via a blend of online pre-recorded lectures and classroom tutorial. A range of formative video tutorials will ensure engagement on all topic areas with video recordings of the software for support out of class. Use of discussion forums will be encouraged.	
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	2
Independent Study	164
	Hours Total 200

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

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

Engineering Mechanics, VOL. II, Dynamics, Meriam and Kraige

Mechanics of Materials 1, Fourth Edition, E.j. Hearn

Mechanics of Materials Fourth SI Edition J.M.Gere and S.P. Timoshenko Published by Stanley Thornes

(**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.

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.
(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 and Physical Sciences
Assessment Results (Pass/Fail)	Yes ☐No ☒
School Assessment Board	Engineering
Moderator	Asraf Uzzaman
External Examiner	M Ghaleeh
Accreditation Details	This module is part of the IMechE accredited programmes BEng/Meng (Hons) Aircraft and BEng/Meng (Hons) Mechanical Engineering.
Changes/Version Number	2.17 (was 2.16) Module Delivery Changed to Face-To-Face from Hybrid C.

Assessment: (also refer to Assessment Outcomes Grids below)
Component 1- Unseen Closed Book Class Test (50%)
Component 2 – Laboratory Work (20%)
Assessment 3- Design Study (20%) & CPD Log (10%)

(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)**	**Weighting (%) of Assessment Element**	**Timetabled Contact Hours**
Unseen Closed Book (Class Test written)	✓	✓	✓	50	2

Component 2					
Assessment Type (Footnote B.)	**Learning Outcome (1)**	**Learning Outcome (2)**	**Learning Outcome (3)**	**Weighting (%) of Assessment Element**	**Timetabled Contact Hours**
Laboratory	✓	✓		20	2

Component 3					
Assessment Type (Footnote B.)	**Learning Outcome (1)**	**Learning Outcome (2)**	**Learning Outcome (3)**	**Weighting (%) of Assessment Element**	**Timetabled Contact Hours**
Design/ Diagram/ Drawing/ Photograph / Sketch	✓	✓	✓	20	0
Workbook/ Laboratory notebook/ Diary/ Training log/ Learning log	✓	✓	✓	10	0
Combined Total for All Components				**100%**	**4 hours**