Module Descriptor

Title	Design Analysis 1		
Session	2025/26	**Status**	Published
Code	ENGG08017	**SCQF Level**	8
Credit Points	20	**ECTS (European Credit Transfer Scheme)**	10
School	**Computing, Engineering and Physical Sciences**		
Module Co-ordinator	T 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	**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	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 combined loading systems.
L2	Identify, describe and analyse single degree of freedom vibration systems
L3	Analyse the principles of rigid body kinetics and kinematics and apply them to solve analytical problems.
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 8** A broad knowledge and understanding of the core theories, principles and concepts of mechanics of materials and dynamic systems.

[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

Practice: Applied Knowledge and Understanding	**SCQF 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 8** Use a range of approaches to formulate solutions to routine engineering design problems.
Communication, ICT and Numeracy Skills	**SCQF 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 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.

Prerequisites	**Module Code** ENGG07001	**Module Title** Engineering Mechanics
	Other	
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. The learning and teaching for this module comprises a series of lectures, laboratories and tutorials.

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	18
Tutorial / Synchronous Support Activity	18
Laboratory / Practical Demonstration / Workshop	12
Personal Development Plan	18
Independent Study	134
n/a	0
TOTAL	200

Indicative Resources

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

Hearn, E. J. (1985) Mechanics of Materials Vol 1. 2nd edn. Oxford : Pergamon Press.

Gere, J. M. and Timoshenko, S. P. (1999) Mechanics of Materials. 4th edn. Cheltenham : Stanley Thornes.

Meriam, J. L. and Kraige, L. G. (2013) Engineering Mechanics, Vol. 2, Dynamics. 7th edn. Hoboken, N.J. : Wiley.

(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, they will have their 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 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, material 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 laboratory-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	Design
Moderator	A 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.
Module Appears in CPD catalogue	☐ **Yes** ☒ **No**
Changes / Version Number	2.18 (was 2.17) Module Descriptor copied to 2025/26 template, resources list updated to reflect ILR feedback, Attendance and Engagement and EDI statements updated.

Assessment (also refer to Assessment Outcomes Grids below)
Assessment 1
Unseen Closed Book Class Test (50%)
Assessment 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.)

Component 1							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
Unseen Closed Book (Class Test written)	☒	☒	☒	☐	☐	50	2

Component 2							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
Laboratory	☒	☒	☐	☐	☐	20	2

Component 3							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
Design Study & CPD Log	☒	☐	☐	☐	☐	30	0
Combined total for all components						100%	4 hours

Change Control

What	When	Who
Module Descriptor copied to 2025/26 template, resources list updated to reflect ILR feedback, Attendance and Engagement and EDI statements updated.	March 2025	T. Murmu