

University of the West of Scotland

Module Descriptor

Session: 2023/24

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Status: Proposal

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:	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	HybridO	Work-based Learning
			✓		

Face-To-Face

Term used to describe the traditional classroom environment where the students and the lecturer meet synchronously in the same room for the whole provision.

Blended

A mode of delivery of a module or a programme that involves online and face-to-face delivery of learning, teaching and assessment activities, student support and feedback. A programme may be considered "blended" if it includes a combination of face-to-face, online and blended modules. If an online programme has any compulsory face-to-face and campus elements it must be described as blended with clearly articulated delivery information to manage student expectations

Fully Online

Instruction that is solely delivered by web-based or internet-based technologies. This term is used to describe the previously used terms distance learning and e learning.

HybridC

Online with mandatory face-to-face learning on Campus

HybridO

Online with optional face-to-face learning on Campus

Work-based Learning

Learning activities where the main location for the learning experience is in the workplace.

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)

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)

On successful completion 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 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 at Higher National Level
Co-requisites	Module Code:	Module Title:

* Indicates that module descriptor is not published.

Learning and Teaching

The learning and teaching activity for this module include lectures, tutorials and problem based learning.

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	10
Laboratory/Practical Demonstration/Workshop	2
Independent Study	164
	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:
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)

Engagement Requirements

In line with the Academic Engagement Procedure, Students are defined as academically engaged if they are regularly engaged with timetabled teaching sessions, course-related learning resources including those in the Library and on the relevant learning platform, and complete assessments and submit these on time. Please refer to the Academic Engagement Procedure at the following link: [Academic engagement procedure](#)

Supplemental Information

Programme Board	Engineering
Assessment Results (Pass/Fail)	No
Subject Panel	Engineering
Moderator	Asraf Uzzaman
External Examiner	M Ghaleeh
Accreditation Details	This module is accredited by IMechE as part of BEng (Hons) Mechanical Engineering and BEng (Hons) Aircraft Engineering programmes. This module is accredited by IChemE as part of BEng (Hons) Chemical Engineering
Changes/Version Number	<p>2.16</p> <p>Hybrid C Selected in lieu of Blended/Face-To-Face Learning Activities updated to reflect delivery. Assessment Changed to Unseen Closed Book Class Test from Unseen Open Book Examination. Laboratory Hours Updated to reflect delivery. Equality and Diversity Statement Updated.</p> <p>v2.15 Terminology in module descriptor updated to reflect IMechE accreditation feedback. This change is to ensure clearer links between AHEP4 Learning Outcomes and module descriptor are evident.</p> <p>v2.14 Module summary updated to reflect Curriculum Framework principles. Employability Skills and Personal Development Planning (PDP) Skills updated to reflect assessment changes. Learning and Teaching updated to reflect restructuring of module delivery involving greater focus on practical laboratory sessions. Accreditation details updated to reflect IMechE accreditation of BEng (Hons) Aircraft Engineering Assessment text and Assessment Outcome Grids updated to include 10% CPD Log. Unseen open book examination reduced to 50% from 60% to compensate for this additional assessment element.</p> <p>v2.13 Reference to 'unseen closed book examination' replaced with 'unseen open book examination' as per revised University policy. Change confirmed with accrediting body.</p> <p>v2.11 Summary of Module Updated to include Macaulay's method. Assessment updated- Unseen closed book examination added (60%), Laboratory (20%) and Design Study (20%) with assessment outcome grids updated accordingly.</p> <p>V2.10 Module coordinator changed to Tony Murmu was TBC. MM changed to Asraf Uzzaman. As a result of the Covid-19 situation, assessment component 1 changed from Unseen Closed Book to Unseen Open Book and Blended added as a Module Delivery Method.</p> <p>v2.09 4. MC changed to TBC (Mech) 9. Contact hours changed to Lecture 36h, Tutorial 12h, Laboratory 1h to reflect delivery. 10. Assessment grid changed to remove Portfolio (30%) and add Design Task (30%)</p> <p>Graduate Attributes reference added. Summary reworded to better reflect content. L2 and L3 swapped to match delivery.</p> <p>Vers2.3 - Moderator updated</p> <p>Vers2.4 - accreditation details added</p> <p>Vers 2.5 pre requisites added version 2.6 Module coordinator changed to Tony Leslie, moderator to Bob Bailey</p>

Ver2.7
Correction of contact hours
Module moderator changed to Tony Murmu

Assessment: (also refer to Assessment Outcomes Grids below)

Unseen Closed Book Class Test 50%

Laboratory Work 20%

Design Study 20%
Continuous Professional Development 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 Handbook.)

Assessment Outcome Grids (Footnote A.)

Component 1

Assessment Type (Footnote B.)	Learning Outcome (1)	Learning Outcome (2)	Learning Outcome (3)	Weighting (%) of Assessment Element	Timetabled Contact Hours
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/ Clinical/ Field notebook	✓	✓		20	12

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%	14 hours

Footnotes

- A. Referred to within Assessment Section above
B. Identified in the Learning Outcome Section above

Note(s):

1. More than one assessment method can be used to assess individual learning outcomes.
2. Schools are responsible for determining student contact hours. Please refer to University Policy on contact hours (extract contained within section 10 of the Module Descriptor guidance note).
This will normally be variable across Schools, dependent on Programmes &/or Professional requirements.

Equality and Diversity

The programme leaders have considered how the programme meets the requirements of potential students from minority groups, including students from ethnic minorities, disabled students, students of different ages and students from under-represented groups.

Students with special needs (including additional learning needs) would be assessed/accommodated and any identified barriers to particular groups of students discussed with the Enabling Support Unit and reasonable adjustments would be made for classes and site visits.

UWS Equality and Diversity Policy

(N.B. Every effort will be made by the University to accommodate any equality and diversity issues brought to the attention of the School)