Prifysgol Wrecsam
Wrexham University

Module specification

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Module Code	ENG4C6
Module Title	Fundamentals of Mechanical Engineering
Level	4
Credit value	20
Faculty	FACE
HECoS Code	100190
Cost Code	GAME
Pre-requisite module	N/A

Programmes in which module to be offered

Programme title	Core/Optional/Standalone
BEng (Hons) Mechanical Engineering	Core

Breakdown of module hours

Learning and teaching hours	30 hrs
Placement tutor support hours	0 hrs
Supervised learning hours e.g. practical classes, workshops	30 hrs
Project supervision hours	0 hrs
Active learning and teaching hours total	**60 hrs**
Placement hours	0 hrs
Guided independent study hours	140 hrs
Module duration (Total hours)	**200 hrs**

Module aims

This module combines conceptual teaching with guided practical work to strengthen students' understanding of fundamental principles. Learners explore how theoretical knowledge connects with real-world practice through structured experimentation and applied tasks. The approach builds confidence, technical awareness, and the ability to apply knowledge effectively within authentic learning contexts.

This module aims to set the foundations and develop an understanding of the principles of mechanical engineering related to forces, stress and strain, simple flexion and torsion, developing a strong practical understanding of their measurement.

Module Learning Outcomes

At the end of this module, students will be able to:

1	Explain and apply the fundamentals of direct stress, shear stress, strain, bending moments, and axial loading in simple engineering contexts.
2	Apply basic mechanical principles to analyse simple structural behaviour, including the influence of section properties in bending and buckling.
3	Calculate and interpret forces, stresses, strains, bending, and torsion in straightforward engineering situations, using appropriate methods.
4	Communicate technical findings clearly and professionally, demonstrating accurate interpretation of experimental and simulation results.

Assessment

Indicative Assessment Tasks:

This section outlines the type of assessment task the student will be expected to complete as part of the module. More details will be made available in the relevant academic year module handbook.

Assessment 1: Portfolio

This assessment evaluates the development of fundamental engineering knowledge and practical competence. Students submit a portfolio of evidence derived from practical, laboratory, workshop, or equivalent applied activities undertaken during the module. Evidence may take a range of appropriate forms, including measurements, observations, visual records, and brief technical commentary.

Minimum expectation: The portfolio must demonstrate engagement with a representative range of activities and include sufficient evidence of method, results, and basic interpretation to allow academic judgement of performance and achievement of learning outcomes.

Assessment 2: Oral Presentation

This assessment evaluates students' ability to communicate engineering understanding using appropriate technical content and supporting evidence.

Students deliver a structured presentation based on a selected system, topic, or set of activities relevant to the module. The presentation should demonstrate understanding of underlying principles, use of relevant data or evidence, and a basic level of analysis.

Minimum expectation: The presentation must include appropriate supporting material (such as data, examples, or applications) and demonstrate a clear link to the learning activities of the module.

Assessment number	Learning Outcomes to be met	Type of assessment	Duration/Word Count	Weighting (%)	Alternative assessment, if applicable
1	1-3	Portfolio	Equivalent to 2000 words	75%	N/A
2	4	Presentation	10 minutes	25%	N/A

Derogations

Credits shall be awarded by an Assessment Board for those modules in which a pass mark 40% has been achieved, with a minimum mark of 30% in each assessment element.

Learning and Teaching Strategies

Learning and teaching combine classroom-based instruction with structured laboratory practice to reinforce theoretical understanding through application. Students participate in lectures, workshops, and supervised experiments that link principles to professional practice. Online materials and activities complement face-to-face sessions, supporting reflection and self-paced learning. Tutorials and group discussions promote collaboration and the development of analytical and communication skills.

Welsh Elements

This module will be delivered through the medium of English; however, students have the option to submit their assessments in the medium of Welsh. While this module is not currently offered fully through Welsh, Welsh language support and guidance are available, and some learning materials or tutorial discussions may incorporate Welsh elements where appropriate. To further promote bilingual learning, all students have the opportunity to take the 20-credit *Welsh for STEM* short course, designed to develop confidence and subject-specific language skills in both English and Welsh.

Indicative Syllabus Outline

Fundamental mechanical principles:

> Forces, moments, and equilibrium in two-dimensional and three-dimensional systems. Use of free-body diagrams, couples, and equivalent force systems to describe and analyse mechanical behaviour.

Application of mechanical analysis:

> Introduction to stress, strain, and elastic deformation in simple elements. Analysis of axial loading, bending of simply supported beams, and torsion of circular sections. Interpretation of results in relation to structural behaviour and basic engineering applications.

Function and behaviour of mechanical systems:

Understanding how loads are transmitted through simple mechanical components and structures, including the concept of stress concentration and its influence on performance and failure.

Measurement and experimental techniques:

Use of basic measurement tools such as dial test indicators (DTI) and strain gauges to obtain experimental data. Introduction to measurement accuracy, including systematic and random errors, and comparison between theoretical and measured results.

Indicative Bibliography

Please note the essential reads and other indicative reading are subject to annual review and update.

Essential Reads:

J. Wickert, An Introduction to Mechanical Engineering, 4th Edition, Cengage, 2020.

Other indicative reading:

R.C. Hibbeler, Mechanics of Materials, 9th ed. Singapore: Pearson, 2014.

Grous A. Applied Mechanical Design: Solved Case Studies and Projects. Somerset: John Wiley & Sons, Incorporated; 2018.

Administrative Information

For office use only	
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Date and details of revision	
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