

Module specification

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Module Code	ENG499
Module Title	Mechanical Engineering
Level	4
Credit value	20
Faculty	FAST
HECoS Code	100190
Cost Code	GAME

Programmes in which module to be offered

Programme title	Is the module core or option for this programme
BEng (Hons) Production Engineering	Core
BEng (Hons) Integrated Engineering Design (Mechanical)	Core
BEng (Hons) Integrated Engineering Design (Electrical & Electronic)	Core
FdEng Industrial Engineering (Mechanical) FdEng Industrial Engineering (Manufacturing and Production) FdEng Industrial Engineering (Electrical and Automation)	Core

Pre-requisites

None

Breakdown of module hours

Learning and teaching hours	40 hrs
Placement tutor support	0 hrs
Supervised learning e.g. practical classes, workshops	0 hrs
Project supervision (level 6 projects and dissertation modules only)	0 hrs
Total active learning and teaching hours	40 hrs
Placement / work based learning	0 hrs
Guided independent study	160 hrs
Module duration (total hours)	200 hrs

For office use only	
Initial approval date	11/09/19
With effect from date	11/09/19
Date and details of revision	30/01/20 Admin update of derogation 12/8/20 Temporary change to assessment for 2020/21 post Covid, and addition to FdEng programme as option 22/9/21 Temporary change to assessment extended for 21/22 Oct 22 minor modification to LO wording through the revalidation and template update Sept 22: addition of FdEng programmes
Version number	5

Module aims

The aim of this module is to develop various foundation for the conceptual understanding of mechanical engineering.

Module Learning Outcomes - at the end of this module, students will be able to:

1	Conduct static force analysis on mechanical systems.
2	Demonstrate knowledge of the theory of material properties and failure and how this influences mechanical design choices.
3	Select and evaluate the appropriate mathematical techniques for a range of mechanical engineering science problems.
4	Evaluate and implement fluid mechanical and thermodynamics theories in practice

In addition to the module learning outcomes, students will also cover the following accreditation of higher education programme (AHEP) fourth edition learning outcomes: C1, C2 & C12 for BEng degree apprenticeship programmes and F1, F2 & F12 for FdEng programmes.

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 is by mean of a Portfolio of coursework and laboratory exercises spread throughout this part of the module, covering outcomes 1 and 3.

A typical laboratory exercise is the analysis of a T-section beam under various load cases including impact. Strain gauge readings and deflections would be taken to determine strain and hence stress values and these would then be contrasted against classical bending theory. The student would then produce a written report of the findings.

Assessment 2 is by means of time constrained examination (2-hour) with a fixed number of questions covering outcomes 2 and 4.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)
1	1,3	Portfolio	50
2	2,4	Examination	50

Derogations

A derogation from regulations has been approved for this module which means that whilst the pass mark is 40% overall, each element of assessment (where there is more than one assessment) requires a minimum mark of 30%.

Learning and Teaching Strategies

Lectures - presentation of theory, facts and concepts, relating to product design, in order to convey critical information. Interaction or active learning should be implemented to develop an understanding of principles and concepts and stimulate discussion.

Tutorials – Close interaction with students ensuring that the work presented during lectures has been understood, with specific help being given in order to overcome any learning problems, should they occur.

'Break out sessions' and guest lecturers may be used to cover specific elements for sub-groups within the cohort.

Indicative Syllabus Outline

Introduction:

ISO units, Newton's laws, scalar and vector quantities, engineering indices.

Properties of engineering materials:

Basic properties of engineering materials. Elasticity, plasticity, work hardening and failure.

Forces in 2-Dimensions:

Forces and turning moments, free body diagrams, forces and angles. Centres of gravity.

Simply Loaded Beams: Shear force and bending moments, stiffness and second moment of area, simple bending theory. Basics of torsion in beams.

Dynamics:

Linear and angular motion: displacement, velocity, and uniform acceleration.

Acceleration torque, centripetal acceleration and force.

Energy:

Work, potential and strain energy, linear and angular kinetic energy. Power.

Conservation of energy. Basic thermodynamics. Heat energy, temperature, specific heat and latent heat.

Thermal expansion and temperature stresses.

Engineering and the Environment:

Awareness of environmental science relating to engineering. Engineering and

Indicative Bibliography:

Please note the essential reads and other indicative reading are subject to annual review and update. Please *ensure correct referencing format is being followed as per University Harvard Referencing Guidance.*

Essential Reads

J. Bird and C. Ross, *Mechanical Engineering Principles*, 4th ed. Routledge, 2019.

Other indicative reading

R. C. Hibbeler and K. B. Yap, *Engineering Mechanics: Statics*, 14th ed. Hoboken: Pearson, 2016.

W. Bolton, *Mechanical Science*, 3rd ed. Oxford: Blackwell Publishing, 2006.

Employability skills – the Glyndŵr Graduate

Each module and programme is designed to cover core Glyndŵr Graduate Attributes with the aim that each Graduate will leave Glyndŵr having achieved key employability skills as part of their study. The following attributes will be covered within this module either through the content or as part of the assessment. The programme is designed to cover all attributes and each module may cover different areas.

Core Attributes

Engaged
Enterprising
Creative
Ethical

Key Attitudes

Commitment
Curiosity
Resilience
Confidence
Adaptability

Practical Skillsets

Digital Fluency
Organisation
Leadership and Team working
Critical Thinking
Emotional Intelligence
Communication