Module specification

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Module Code	ENG4B6
Module Title	Mechanical Systems
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 Mechanical Engineering	Core
MEng Mechanical Engineering	Core

Pre-requisites

N/A

Breakdown of module hours

Learning and teaching hours	28 hrs
Placement tutor support	0 hrs
Supervised learning e.g. practical classes, workshops	8 hrs
Project supervision (level 6 projects and dissertation modules only)	0 hrs
Total active learning and teaching hours	36 hrs
Placement / work based learning	0 hrs
Guided independent study	164 hrs
Module duration (total hours)	200 hrs

For office use only	
Initial approval date	22/08/2022
With effect from date	September 2022
Date and details of revision	
Version number	1

Module aims

- To develop a conceptual understanding of mechanical engineering systems
- To provide a practical and working knowledge of static structures
- To develop an understanding of thermodynamic laws for mechanical engineering.

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

1	Plan and conduct engineering experiments safely, record, interpret and present the results obtained.
2	Conduct static force analysis on mechanical systems.
3	Explain the properties of fluids, their effect on fluid flow and the importance of their effects on objects in contact with flowing fluids.
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, C3, C4, C12, C13, C17, M1, M2, M3, M4, M12, M13 and M17

Assessment

Indicative Assessment Tasks:

Assessment 1 – A two-hour in-class test covering Learning outcomes 2, 3, and 4.

Assessment 2 – Portfolio (2000 words) of individual laboratory reports (Bernoulli's, torsion, flexure of beams etc)

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)
1	2-4	In-class test	50%
2	1-4	Portfolio	50%

Derogations

A derogation from regulations has been approved for this programme 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

The module is taught through a combination of lectures and practical workshops. An active and inclusive approach is used to engage learners in the topics and will involve individual, group work and flipped learning experiences aligned to the university's Active Learning Framework (ALF), The approach offers students a flexible and adaptive learning experience that can accommodate a range of options that includes both on campus learning and remote learning where appropriate.

The Moodle VLE and other on-line materials and resources will be available to support learning. ALF offers a balance between the classroom elements and digitally enabled activity incorporating flexible and accessible resources and flexible and accessible feedback to support learning.

Indicative Syllabus Outline

Simply Supported Beams**:** shear force, bending moments and stress due to bending; radius of curvature in simply supported beams; stress distribution; point and distributed loads; first and second moments of area.

Torsion in Circular Shafts: theory of torsion; distribution of shear stress and angle of twist in solid and hollow circular section shafts.

Dynamics: Newton's Laws of linear and angular motion; connected bodies; centrifugal and centripetal forces; friction; conservation of energy; radius of gyration.

Energy transfer: gravitational potential energy; linear and angular kinetic energy; strain energy; principle of conservation of energy; work-energy transfer in systems with combine linear and angular motion; effects of impact loading;

Fluid mechanics: fluid statics; pressure, forces, stresses, moments; fluid kinematics; Bernoulli equation; momentum equation.

Vibrations: simple harmonic motion; linear and transverse systems.

Indicative Bibliography**:**

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

Essential Reads

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

Other indicative reading

R.C. Hibbeler, *Engineering Mechanics: Statics*,14th Ed. Prentice Hall, 2016.

W. Bolton, *Mechanical Science*, 3rd Ed. 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
Creative

Key Attitudes
Commitment
Curiosity
Confidence
Adaptability

Practical Skillsets
Organisation
Critical Thinking
Communication