Module specification

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Module code	ENG506
Module title	Mechanical Principles
Level	5
Credit value	10
Faculty	FAST
Module Leader	R.Bolam
HECoS Code	100190
Cost Code	GAME

Programmes in which module to be offered

Programme title	Is the module core or option for this programme
HNC Mechanical Technology	Core

Pre-requisites

None.

Breakdown of module hours

Learning and teaching hours	30 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	**30** hrs
Placement / work based learning	0 hrs
Guided independent study	70 hrs
Module duration (total hours)	100 hrs

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Initial approval date	August 2016
With effect from date	September 2021
Date and details of revision	6 July 2021, revalidated March 2025 AM2 to change assessment type
Version number	3

Module aims

The aim of the module is to expand upon principles learned in Mechanical Science and to further develop engineering problem solving skills in practical engineering situations.

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

1	Evaluate and analyse stress and loading effects on typical engineering systems.
2	Evaluate and analyse complex strain on typical engineering systems.
3	Investigate and verify the theory to solve complex dynamic problems on typical engineering systems.

Assessment

Indicative Assessment Tasks:
Assessment is 100% in-course.

Assessment 1: Learning outcomes 1 and 2 will be assessed using an in-class test (1 hr 45 mins).
;
Assessment 2: Learning outcome 3 will be assessed using an in-class test based on a dynamics engineering based practical exercise (1 hr 45 mins)

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)
1	1, 2	In-class test	70%
2	3	In-class test	30%

Derogations

None.

Learning and Teaching Strategies

Theory will be delivered by a series of lectures underpinned with video/DVD support and practical or demonstration laboratory work where possible. Evaluation of learning will be as outlined above with report including a write up of practical work if possible. Assessments will ensure that the student has the opportunity to meet all of the stipulated learning outcomes.

Indicative Syllabus Outline

Stress and Strain

Elastic constants: Poisson's ratio, bulk modulus, relationships between elastic constants including Young's modulus and shear modulus.
Thin cylinders: hoop stress, longitudinal stress, efficiency of joints, volumetric strain.
Thick cylinders, Lame's equations for hoop stress, radial stress and longitudinal stress, cylinders subjected to internal and external pressure, stress distribution diagrams.
Complex stresses: complimentary shear stress, principal stress formulae, Mohr's stress circle.
Complex strains: relationship between principal stress and principal strain, Mohr's strain circle.

Loaded Beams
Beam slopes and deflections: double integration method for four standard cases, Macaulay's method for simply supported and cantilever beams subjected to point loads and uniformly distributed loads.

Dynamics
Velocity diagrams: relative velocities, application to practical mechanisms, power and torque.
Balancing of rotating systems: non-coplanar rotating masses, forces on bearings'.
Flywheels: energy fluctuation.

Power transmission
Belt drives: flat belts, tension and power transmission, angle of lap, v-belts.

Indicative Bibliography:

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

Essential Reads
Bird J., Ross C. (2019) Mechanical Engineering Principles. 4th ed. Routledge

Other indicative reading
Tooley M., Dingle L. (2020) Engineering Science: For Foundation Degree and Higher National. 2nd ed. Routledge

Bolton,M. (2006) Mechanical Science.3rd ed. Blackwell

Tooley M., Dingle L. (2004) Higher National Engineering. 2nd ed. Newnes

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. Click here to read more about the Glyndwr Graduate attributes

Core Attributes
Engaged
Creative

Key Attitudes
Commitment
Curiosity

Resilience
Confidence
Adaptability

Practical Skillsets
Digital Fluency
Critical Thinking
Communication