

## Applied Mechanics 2

### Module Information

2022.01, Approved

#### Summary Information

Module Code	5104MECH
Formal Module Title	Applied Mechanics 2
Owning School	Engineering
Career	Undergraduate
Credits	20
Academic level	FHEQ Level 5
Grading Schema	40

#### Teaching Responsibility

LJMU Schools involved in Delivery
Engineering

#### Learning Methods

Learning Method Type	Hours
Lecture	22
Online	22
Tutorial	22

#### Module Offering(s)

Display Name	Location	Start Month	Duration Number Duration Unit
SEP-CTY	CTY	September	12 Weeks

#### Aims and Outcomes

Aims	To provide the means for solving many basic engineering problems by learning the principles of mechanics for rigid and deformable solid bodies.
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**After completing the module the student should be able to:**

**Learning Outcomes**

Code	Number	Description
MLO1	1	Determine stresses and strains in an elastic continuum
MLO2	2	Assess modes of failure for components under bending and torsional loading
MLO3	3	Analyse dynamic behaviour of systems with one-degree-of-freedom by applying the notions of stiffness, damping, natural frequency and rate decay.
MLO4	4	Determine equivalent models for rigid body systems, analyse and evaluate their dynamic behaviour by using notions of experimental dynamics.

**Module Content**

Outline Syllabus	<p>1 Continuum Stress Analysis Elasticity of a continuum. 2D stress/strain transformations, Mohr's Circle (stress/strain). Use of strain gauges to determine strains in loaded components. Practical examples. Thin and thick walled cylinders. Application of thin wall pressure vessel theory. Cylindrical and spherical vessels. Application of Lamé's equations .2 Failure Modes Yield criteria. Application of Rankine, Tresca and Von-Mises theories to components under bending and torsional loading conditions. Application to brittle and ductile materials. Elastic instability. Critical buckling loads. Use of Euler, Rankine-Gordon and Perry-Robertson methods. Fatigue. S-N curves and endurance limit. Factors affecting the endurance limit and their application. Effects of non-zero mean stress.3 Dynamics. Vibration 1 Free vibration of one-degree-of-freedom systems, modelling, equation of motion, harmonic motion and spectral analysis.4 Vibration 2 Forced vibration of damped and undamped systems, time and frequency response, natural frequencies and modes, notions of experimental dynamics.</p>
Module Overview	<p>This module will provide the means for solving many basic engineering problems by learning the principles of mechanics for rigid and deformable solid bodies.</p>
Additional Information	<p>The module extends previous studies in mechanics by examining more applied problems, which relate to real mechanical systems. It helps to strengthen the student's knowledge for successful mechanical design.</p>

**Assessments**

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Module Learning Outcome Mapping
Centralised Exam	Examination	60	2	MLO1, MLO2, MLO3, MLO4
Test	VLE Based Tests	40	0	MLO1, MLO2, MLO3, MLO4

**Module Contacts**

**Module Leader**

Contact Name	Applies to all offerings	Offerings
Ariyan Ashkanfar	Yes	N/A

**Partner Module Team**

Contact Name	Applies to all offerings	Offerings
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