

Liverpool John Moores University

Title: Applied Mechanics 2
Status: Definitive
Code: **5503MECBHG** (128779)
Version Start Date: 01-08-2021

Owning School/Faculty: Engineering
Teaching School/Faculty: Beaconhouse IC Islamabad

Team	Leader
Russell English	Y

Academic Level: FHEQ5 **Credit Value:** 20 **Total Delivered Hours:** 68
Total Learning Hours: 200 **Private Study:** 132

Delivery Options

Course typically offered: Semester 2

Component	Contact Hours
Lecture	44
Tutorial	22

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS2	Examination	60	2
Test	AS1	Coursework - V.L.E. based tests	40	

Aims

To provide the means for solving many basic engineering problems by learning the principles of mechanics for rigid and deformable solid bodies.

Learning Outcomes

After completing the module the student should be able to:

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

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

Examination	1	2	3	4
VLE Based Tests	1	2	3	4

Outline Syllabus

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.

Learning Activities

Lectures and tutorials

Notes

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.