Applied Mechanics 2

Module Information

2022.01, Approved

Summary Information

Module Code	5509USST
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
LJMU Partner Taught

Partner Teaching Institution

Institution Name
University of Shanghai For Science and Technology

Learning Methods

Learning Method Type	Hours
Lecture	44
Tutorial	22

Module Offering(s)

Display Name	Location	Start Month	Duration Number Duration Unit
SEP-PAR	PAR	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.

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	Apply the equations of motion for rigid bodies undergoing translation, rotation about fixed axes and general plane motion. Analyse the dynamical behaviour of systems with one-degree-of-freedom by applying the notions of stiffness, damping, natural frequency, rate decay.
MLO4	4	Apply mathematical models for systems with two-degree-of-freedom, analyse their dynamical behaviour in terms of natural frequencies and modes and evaluate solutions for vibration control.

Module Content

Outline Syllabus	1 Continuum Stress AnalysisElasticity 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 Lame's equations .2 Failure ModesYield 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 1Free body diagrams. Two-dimensional kinematics and dynamics of rigid bodies. Applications.1DOF systems. Free vibration of undamped/damped systems. Harmonic motion/Damped motion. Response of one-degree-of-freedom systems to harmonic excitations. 4 Vibration 22DOF systems. Free vibration of two-degree-of-freedom systems. Eigenvalues and modes. Frequency response function. Vibration isolation. Vibration transmission.
Module Overview	
Additional Information	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.

Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Module Learning Outcome Mapping
Exam	Examination	60	2	MLO1, MLO2, MLO3, MLO4
Presentation	In course 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