

Applied Mechanics 2

Module Information

2022.01, Approved

Summary Information

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| Module Code | 5304MECH |
| Formal Module Title | Applied Mechanics 2 |
| Owning School | Engineering |
| Career | Undergraduate |
| Credits | 20 |
| Academic level | FHEQ Level 5 |
| Grading Schema | 40 |

Teaching Responsibility

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| LJMU Schools involved in Delivery |
| Engineering |

Learning Methods

| Learning Method Type | Hours |
|----------------------|-------|
| Lecture | 22 |
| Practical | 6 |
| Tutorial | 22 |

Module Offering(s)

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

Aims and Outcomes

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|------|--|
| Aims | To provide the means for solving many mechanical 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

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| 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 and Vibration 1: Free vibration of one-degree-of-freedom systems, modelling, equation of motion, harmonic motion and spectral analysis. 4. Dynamics and Vibration 2: Forced vibration of damped and undamped systems, time and frequency response, natural frequencies and modes, notions of experimental dynamics. |
| Module Overview | |
| Additional Information | This module includes content which relates to the following UN Sustainable Development Goals. SDG9 – This module considers how to build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation. SDG10 – This module will consider how engineering designers can consider accessibility when developing new products. |

Assessments

| Assignment Category | Assessment Name | Weight | Exam/Test Length (hours) | Module Learning Outcome Mapping |
|---------------------|-----------------|--------|--------------------------|---------------------------------|
| Centralised Exam | Examination | 70 | 2 | MLO1, MLO2, MLO3, MLO4 |
| Test | VLE Test | 30 | 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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