Module Code	MEU44B01
Module Name	SOLID MECHANICS 2
ECTS Weighting	5 ECTS
Semester taught	Semester 2
Module Coordinator/s	Associate Professor Mark Ahearne
Module Learning Outcomes with reference to the Graduate Attributes and how they are developed in discipline	On successful completion of this module, students should be able to: LO1. Demonstrate a fundamental knowledge of the theory of elasticity, including equilibrium equations, compatibility equations, boundary conditions and stress functions. LO2. Calculate the stress and strain distribution using stress functions in engineering structures under load. LO3. Assess the suitability of specific viscoelastic models for different materials and different mechanical characterization techniques. LO4. Calculate the mechanical behaviour of laminates in different orientations **Graduate Attributes: levels of attainment** To act responsibly – Enhanced To think independently – Enhanced To develop continuously – Enhanced To communicate effectively – Enhanced
Module Content	This module expands upon fundamental topics developed in MEU33B03. Theory of elasticity is used to develop equations describing the stress-strain behaviour in different components under load. The use of stress functions is developed and applied to problems such as thick-walled pressure vessels and holes in plates. Rheological models are developed and used to describe the behaviour of viscoelastic materials. The mechanical characteristic of laminate structures and the influence orientation has on mechanical strength are examined. Finally, the theory of the finite element method and its use in solving problems in mechanics is introduced. **Module Syllabus** Theory of Elasticity • Deformation, displacements and strains • Stress and equilibrium • Constitutive relations – linear elastic solids • Stress functions • Beams • Thick-walled pressure vessels • Concentrated load at a point • Hole in a plate Viscoelastic behaviour • Viscoelastic modelling • Intermittent loading Laminate theory

	• Influence of orientation • Strength of unidirectional laminates • Analysis of composite laminates
Teaching and Learning Methods	Lectures: The teaching strategy follows several different textbooks that examine different aspects of mechanics of solids. Tutorials: Tutorials follow a series of question sheets, with problems similar to exam questions. The solutions for these are available online and are released gradually as the module progresses. The tutorials are given to class groupings and are informal. Tutorials are attended by teaching assistants or by the lecturer, to provide formative feedback (e.g., on the micro-project work). No assessment of tutorial performance is noted.

Assessment Details
Please include the following:

- **Assessment Component**
- **Assessment description**
- **Learning Outcome(s) addressed**
- **% of total**
- **Assessment due date**

Assessment Component	Assessment Description	LO Addressed	% of total	Week due
Written exam	End of semester examination	1-5	850	Exam period
Assignment	Written report	5	15	Week 31

Reassessment Requirements	Written examination (100%)
Contact Hours and Indicative Student Workload	**Contact hours: 40 (32 lectures, 8 tutorials)** **Independent Study (preparation for course and review of materials): 30** **Independent Study (preparation for assessment, incl. completion of assessment): 45**
Recommended Reading List	Elasticity Theory, Applications and Numerics, Sadd, Elsevier Theory of Elasticity, Timoshenko, McGraw-Hill Mechanics of Materials, Gere, 5th edition, Nelson Thornes
Module Pre-requisite	3B3 Mechanics of Solids (or equivalent)
Module Co-requisite	Not applicable
Module Website	
Are other Schools/Departments involved in the delivery of this module?	No
Module Approval Date	
Approved by	
Academic Start Year	
Academic Year of Date	