Module Code	MEU44B01
Module Name	Mechanics of Solids
ECTS Weighting	5 ECTS
Semester taught	Semester 2
Module Coordinator/s	Assistant Professor Mark Ahearne
Module Learning Outcomes with reference to the Graduate Attributes and how they are developed in discipline	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 a number of 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 LO5. Demonstrate a basic understanding of the finite element method **Graduate Attributes: levels of attainment** To act responsibly - Enhanced To think independently - Enhanced To develop continuously - Enhanced To communicate effectively - Not embedded
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.
Teaching and Learning Methods	This part of the module is taught using a combination of lectures and tutorials. During the tutorials the students work in groups thereby encouraging teamwork and cooperation.

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 or online examination	End of semester examination	1-5	85	Exam period
Assignment	Viscoelastic modelling of materials report	3	15	End of week 28

Reassessment Requirements

Written Examination

Contact Hours and Indicative Student Workload

Contact hours: 40 (32 Lectures, 8 tutorials)

Independent Study (preparation for course and review of materials): 50

Independent Study (preparation for assessment, incl. completion of assessment): 25

Recommended Reading List

- Theory of Elasticity, S Timoshenko & JN Goodier (McGraw-Hill)
- Plastics Engineering, RJ Crawford (Butterworth-Heinemann)
- Mechanics of Composite Materials, RM Jones (Taylor & Francis)

Module Pre-requisite

MEU33M03 Mechanics of Solids

Module Co-requisite

None

Module Website

www.tcd.ie/Engineering/undergraduate/baiyear4/modules/4B1.pdf

Are other Schools/Departments involved in the delivery of this module? If yes, please provide details.

No

COVID-19 contingency statement	While the intention is to deliver all lectures and tutorials face-to-face in a classroom, there is uncertainty due to the Covid-19 situation and part or all of the module delivery may need to change to an online delivery if required by government restrictions. In the case of a possible new lockdown scenario during teaching term: • All lectures and tutorials will be delivered online using Blackboard Collaborate Ultra. These sessions will be recorded and available for viewing via Blackboard at a later time. • The mid-term class test and the end of semester exam will be online.
Module Approval Date	
Approved by	
Academic Start Year	
Academic Year of Date	