

Module Title:	Mechanics of Materials 4
Language of Instruction:	English
Credits:	5
NFQ Level:	8
Module Delivered In	No Programmes
Teaching & Learning Strategies:	The module will be delivered using lectures and tutorials with a mixture of presentations, example exercises, question and answer sessions, group discussions and online resources. Laboratory classes will be delivered to students working in groups to obtain experimental data with subsequent individual reporting/assessment.
Module Aim:	• To provide the student with a specialized knowledge of the internal effects of forces applied to structures, as evidenced by the stresses and deformations produced. • To provide the student with a specialized knowledge of the response of structures due to the properties of materials
Learning Outcomes	
<i>On successful completion of this module the learner should be able to:</i>	
LO1	Develop finite element models of simple structures to solve for load, deflection and stress.
LO2	Describe and predict the behaviour of materials in service. Specify and select suitable materials for engineering applications.
LO3	Analyse relationships between stress and strain in mechanical systems
LO4	Predict the behaviour and/or failure of mechanical systems subjected to loads for the purposes of design.
Pre-requisite learning	
Module Recommendations	
<i>This is prior learning (or a practical skill) that is recommended before enrolment in this module.</i>	
No recommendations listed	
Incompatible Modules	
<i>These are modules which have learning outcomes that are too similar to the learning outcomes of this module.</i>	
No incompatible modules listed	
Co-requisite Modules	
No Co-requisite modules listed	
Requirements	
<i>This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed.</i>	
No requirements listed	

Module Content & Assessment

Indicative Content

- **Finite Element Method**

o Introduction to stiffness matrices. o Finite elements, o Co-ordinates systems o Types of elements. o Manual analysis of simple structures

- **Properties and Behaviour of Materials in Service**

o Fatigue o Cracking and fracture mechanics o Creep and Viscoelasticity o Corrosion and Degradation of Materials

- **Stress-strain relations**

o Plane stress o Mohr's strain circle o Strain gauge rosettes o Stress-strain transformations in composites

- **Bending**

o Buckling of slender columns o Bending of composite beams o Asymmetric bending o Beams with axial loads o Bending and shear stress in I beams o Shear stress in thin-walled open sections

- **Thin plates**

o Bending and deflection of thin plates

- **Plasticity**

o Effect of plastic deformation on mechanical structures

Assessment Breakdown

	%
Continuous Assessment	30.00%
End of Module Formal Examination	70.00%

Continuous Assessment

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Examination	Class Test: Finite Element Analysis, Stress strain relations, Laminates	1,2,4	10.00	Week 9
Written Report	Material selection assignment	2	10.00	n/a
Examination	Class Test: Bending, Plasticity.	3,4	10.00	Week 25

No Project

No Practical

End of Module Formal Examination

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Formal Exam	A final written examination will assess the extent to which the student has achieved the module learning outcomes	1,2,3,4	70.00	End-of-Semester

SETU Carlow Campus reserves the right to alter the nature and timings of assessment

Module Workload

Workload: Full Time		
<i>Workload Type</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>
Lecture	Every Week	3.00
Estimated Learner Hours	Every Week	2.00
Total Hours		5.00

