

<b>Module Title:</b>	Structural Analysis II
<b>Credits:</b>	5
<b>NFQ Level:</b>	8
<b>Module Delivered In</b>	<a href="#">1 programme(s)</a>
<b>Teaching &amp; Learning Strategies:</b>	Lectures, Projects, Independent Learning
<b>Module Aim:</b>	1) To develop an understanding of the stress and strain behaviour of elastic and elastoplastic materials under axial, flexural and torsional loads. (2) To develop an understanding of basic structural concepts relevant to civil engineering structures. (3) To develop the skills required to analyse the force distributions on simply supported beams and plane trusses.

Learning Outcomes	
<i>On successful completion of this module the learner should be able to:</i>	
LO1	Analyse the stresses and strains due to normal forces on simple axially loaded members and structures.
LO2	Analyse the stresses and strains due to torsion on circular shafts and rectangular beams.
LO3	Analyse the stresses and strains due to shear force and bending moment on a beam.
LO4	Apply the principles of statics to analyse the reactions and internal member forces for statically determinate beams, trusses and simple statics problems.

Pre-requisite learning	
<b>Module Recommendations</b> <i>This is prior learning (or a practical skill) that is recommended before enrolment in this module.</i>	
No recommendations listed	
<b>Incompatible Modules</b> <i>These are modules which have learning outcomes that are too similar to the learning outcomes of this module.</i>	
No incompatible modules listed	
<b>Co-requisite Modules</b>	
No Co-requisite modules listed	
<b>Requirements</b> <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
<b>Mechanics of Solids - Stresses and Strains</b> (i) Normal strain (ii) Shear strain (iii) Stress / Strain relationships (iv) Stress concentrations (v) Elasticity (vi) Plasticity
<b>Mechanics of Solids - Pure Bending of Beams</b> (i) The Flexure formula (ii) 2nd moment of area (iii) Relationship between flexure and curvature (iv) Differential equation of flexure (v) Macaulay's method (vi) Inelastic bending of beams (vii) Beams of two materials
<b>Mechanics of Solids - Shearing Stress in Beams</b> (i) Relation between shear and bending moment (ii) Shear Flow (iii) Shearing Stress formula for beams (iv) Limitations of shearing stress formula (v) Shear centre
<b>Mechanics of Solids - Torsion</b> (i) Torsion Force, Strain, Angle of twist (ii) The torsion formula for circular sections (iii) Torsional stress calculations (iii) Angle of twist of circular members (iv) Thin walled tubes (v) Thick walled tubes (vi) Solid noncircular members
<b>Mechanics of Solids - Compound Stresses</b> (i) Superpositions (ii) Combined axial and flexural stresses (iii) The Dam problem (iv) Unsymmetrical bending
<b>Mechanics of Solids - Plane Stress and Strain</b> (i) Equations for the transformation of plane stress and plane strain (ii) Principle stresses and strains (iii) Maximum shearing stress and strain
<b>Structural Analysis - Basic Structural Concepts</b> (i) Equilibrium, Actions and reactions (ii) Linearity (iii) Superposition (iv) Compatibility (v) Determinacy (vi) Geometric Stability
<b>Structural Analysis - Statically Determinate Plane Structures</b> (i) Problems in statics - equilibrium, friction, buoyancy (ii) Analysis of plane trusses (iii) Statically determinate beams

Assessment Breakdown	%
Project	30.00%
End of Module Formal Examination	70.00%

No Continuous Assessment

Project				
Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Project	Project 1 - Team Project - build a truss bridge from cardboard	4	6.00	n/a
Project	Project 2 - Team Project - Strength tests on cardboard ties and struts	1,4	7.00	n/a
Project	Project 3 - Team Project - Design and Build a truss bridge from cardboard.	4	7.00	n/a
Project	Project 4 - Individual Project Report on a Structure	4	10.00	n/a

No Practical

End of Module Formal Examination				
Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Formal Exam	n/a	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**

<b>Workload: Full Time</b>		
<i>Workload Type</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>
Lecture	Every Week	4.00
Independent Learning	Every Week	7.00
Total Hours		11.00

**Module Delivered In**

Programme Code	Programme	Semester	Delivery
CW_CMHCE_B	<a href="#">Bachelor of Engineering (Honours) in Civil Engineering</a>	5	Mandatory