

STRU C3501: Structural Analysis II

Module Title:		Structural Analysis II
Credits:	5	
NFQ Level:	8	
Module Delivered In		1 programme(s)
Teaching & Learning Strategies:		Lectures, Projects, Independent Learning
Module Aim:		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		

Learning Outcomes				
On successful completion of this module the learner should be able to:				
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
<i>Module Recommendations</i> This is prior learning (or a practical skill) that is recommended before enrolment in this module.
No recommendations listed
<i>Incompatible Modules</i> These are modules which have learning outcomes that are too similar to the learning outcomes of this module.
No incompatible modules listed
Co-requisite Modules
No Co-requisite modules listed
Requirements This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed.
No requirements listed



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Module Content & Assessment

Indicative Content

Mechanics of Solids - Stresses and Strains

(i) Normal strain (ii) Shear strain (iii) Stress / Strain relationships (iv) Stress concentrations (v) Elasticity (vi) Plasticity

Mechanics of Solids - Pure Bending of Beams

(i) The Flexure formula (ii) 2nd moment of area (iii) Relationship between flexure and curvature (iv) Differential equation of flexure (v) Macauly's method (vi) Inelastic bending of beams (vii) Beams of two materials

Mechanics of Solids - Shearing Stress in Beams

(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

Mechanics of Solids - Torsion

(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

Mechanics of Solids - Compound Stresses

(i) Superpositions (ii) Combined axial and flexural stresses (iii) The Dam problem (iv) Unsymmetrical bending

Mechanics of Solids - Plane Stress and Strain

(i) Equations for the transformation of plane stress and plane strain (ii) Principle stresses and strains (iii) Maximum shearing stress and strain

Structural Analysis - Basic Structural Concepts

(i) Equilibrium, Actions and reactions (ii) Linearity (iii) Superposition (iv) Compatibility (v) Determinancy (vi) Geometric Stability

Structural Analysis - Statically Determinate Plane Structures

(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



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Module Workload

Workload: Full Time				
Workload Type	Frequency	Average Weekly Learner Workload		
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	Bachelor of Engineering (Honours) in Civil Engineering	5	Mandatory		