

**Summary Information**

<b>Module Code</b>	4301DCIV
<b>Formal Module Title</b>	Structural Analysis and Design I
<b>Owning School</b>	Civil Engineering and Built Environment
<b>Career</b>	Undergraduate
<b>Credits</b>	20
<b>Academic level</b>	FHEQ Level 4
<b>Grading Schema</b>	40

**Module Contacts**

**Module Leader**

Contact Name	Applies to all offerings	Offerings
Yaser Jemaa	Yes	N/A

**Module Team Member**

Contact Name	Applies to all offerings	Offerings
Georgios Kamaris	Yes	N/A

**Partner Module Team**

Contact Name	Applies to all offerings	Offerings
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**Teaching Responsibility**

<b>LJMU Schools involved in Delivery</b>
Civil Engineering and Built Environment

**Learning Methods**

Learning Method Type	Hours
Lecture	22
Online	22
Practical	6
Tutorial	11

### Module Offering(s)

Offering Code	Location	Start Month	Duration
JAN-CTY	CTY	January	12 Weeks

### Aims and Outcomes

<b>Aims</b>	To introduce structural mechanics and provide an understanding of the basic concepts and techniques, with emphasis on the application of these to the solution of statically determinate structures. To apply mathematical and geometrical calculations to the determination of structural properties of sections. To design and detail simple structural elements in compliance with current codes of practice and standards with due consideration for sustainability.
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### Learning Outcomes

After completing the module the student should be able to:

Code	Description
MLO1	Perform structural analysis for determinate trusses and beams.
MLO2	Analyse various shapes of cross section to determine: cross sectional area, centre of gravity, second moment of area and section modulus.
MLO3	Design Simple Structural Steel Elements.
MLO4	Design Simple Reinforced Concrete Elements.
MLO5	Perform laboratory experiments safely and interpret experimental data to deduce structural behaviour.

### Module Content

Outline Syllabus
Analysis component: principles of equilibrium, load paths, axial forces, resolution of forces, analysis of pin-jointed frames, free body diagrams, actions, shear force and bending moment relationships, cantilevers and simply supported beams, properties of sections, use of standard formulae or manufacturer's published tables in steel. Design component: concept of limit state design, design of reinforced concrete and steel beams, classification of Universal Beam and Universal Column sections, moment capacity, shear resistance and deflection, concrete beam design for bending moment and shear, detailing and reinforcing requirements, design of columns. Health and Safety, both in terms of experimental laboratory work and the use of materials on site.

## Module Overview

### Additional Information

The module prepares students to achieve an understanding of and be familiar with structural analysis of statically determinate structures. It will demonstrate how simple representative engineering problems can be formulated and solved. Students should develop a competence in using scientific equipment adopting an active learning approach. Learners will carry out the design of common structural elements to the appropriate Code of Practice or European Code of Practice. Laboratory work will have an emphasis on the manipulation, interpretation and analysis of the data, which should allow students to assess whether theoretical assumptions are supported by laboratory observations.

## Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Learning Outcome Mapping
Report	Practical based report	30	0	MLO5, MLO4, MLO3
Centralised Exam	Examination	70	2	MLO2, MLO4, MLO3, MLO1