

#### Summary Information

Module Code	4201CIV
Formal Module Title	Structures and Materials
Owning School	Civil Engineering and Built Environment
Career	Undergraduate
Credits	20
Academic level	FHEQ Level 4
Grading Schema	40

#### Teaching Responsibility

LJMU Schools involved in Delivery
Civil Engineering and Built Environment

#### Learning Methods

Learning Method Type	Hours
Lecture	42
Practical	14
Tutorial	22

#### Module Offering(s)

Display Name	Location	Start Month	Duration Number Duration Unit
JAN-CTY	CTY	January	12 Weeks

#### Aims and Outcomes

Aims	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 examine and explore the structural behaviour of materials, the relationship between ultimate stress and working stress and the likely modes of failure and hence provide a sound rationale for selection and use of materials in engineering.
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**After completing the module the student should be able to:**

### Learning Outcomes

Code	Number	Description
MLO1	1	Construct free body, shear force and bending moment diagrams and use them to solve mechanics problems.
MLO2	2	Perform qualitative and quantitative structural analysis.
MLO3	3	Analyse various shapes of cross section to determine: cross sectional area, centre of gravity, second moment of area and section modulus.
MLO4	4	Explore the properties of materials justifying the reasons for their selection and their effect on the design of buildings and installations.
MLO5	5	Select materials for construction and consider the effects of material selection on the environment suggesting suitable alternatives and possibilities for recycling.
MLO6	6	Perform laboratory experiments safely and interpret experimental data to deduce structural or material behaviour.

### Module Content

Outline Syllabus	Structures 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. Materials component: materials used in structures, design criteria and the specification of materials including concrete, metals, alloys, timber (including engineered timbers), clay products, insulation materials and polymers including vapour and damp-proofing barriers, protective coatings including paints, stains and renders will be considered. The need for maintenance and replacement of building components will be considered along with an introduction to sustainability and environmental issues relating to construction. Health and Safety, both in terms of experimental laboratory work and the use of materials on site.
Module Overview	This module introduces you to structural mechanics and provides an understanding of its basic concepts and techniques, with an emphasis on the application of these to the solution of statically determinate structures. The module includes consideration of issues related to long term durability, as well as sustainability and recycling, raising awareness of safety and risk issues in engineering. You will also learn to apply mathematical and geometrical calculations to the determination of structural properties.
Additional Information	The module provides students with an introduction to the properties of materials and the factors relating to behaviour and selection for use in construction. It will include consideration of issues related to long term durability, as well as sustainability and recycling and will raise awareness of safety and risk issues in engineering. 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. 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. Where this module is part of a Degree Apprenticeship programme, the knowledge learning outcomes are K1, K2, K4 and K6, the skills learning outcomes are S3, S5 and S6.

## Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Module Learning Outcome Mapping
Report	LABORATORY BASED <2000 WORDS	30	0	MLO1, MLO2, MLO4, MLO6
Centralised Exam	Examination	70	2	MLO1, MLO2, MLO3, MLO4, MLO5

## Module Contacts

### Module Leader

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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