

Liverpool John Moores University

Title: STRUCTURES AND MATERIALS

Status: Definitive

Code: **4231BEUG** (125659)

Version Start Date: 01-08-2020

Owning School/Faculty: Civil Engineering and Built Environment

Teaching School/Faculty: Civil Engineering and Built Environment

Team	Leader
Raj Shah	Y

Academic Level: FHEQ4 **Credit Value:** 20 **Total Delivered Hours:** 82

Total Learning Hours: 200 **Private Study:** 118

Delivery Options

Course typically offered: Semester 2

Component	Contact Hours
Lecture	44
Practical	14
Tutorial	22

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Practice	AS1	LABORATORY BASED	50	
Exam	AS2	EXAMINATION (OPEN BOOK)	50	2

Aims

To introduce students to the concepts of structural mechanics and provide an understanding of the basic techniques used to analyse and design structural elements.

To apply mathematical and geometrical calculations to the determination of structural properties of sections.

To examine and explore the behaviour of construction materials, the relationship between ultimate stress and working stress and the likely modes of failure. Provide a sound rationale for selection and use of materials in the construction of buildings.

Learning Outcomes

After completing the module the student should be able to:

- 1 Analyse simply supported beams subject to point and distributed loadings, calculating shear force and bending moment values.
- 2 Determine safe loadings for axially loaded elements.
- 3 Explore the properties of materials justifying the reasons for their selection and their effect on the design of buildings and the environment.
- 4 Perform laboratory experiments safely and interpret experimental data to deduce structural or material behaviour.

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

LABORATORY BASED	1	2	4	3
EXAMINATION (OPEN BOOK)	1	2	3	

Outline Syllabus

Structures component: principles of equilibrium, load paths, axial forces, resolution of forces, shear force and bending moment relationships, cantilevers and simply supported beams, properties of sections, use of standard formulae and manufacturer's published tables.

Materials component: materials used in structures, design criteria and the specification of materials including concrete, metals, alloys, timber (including engineered timbers), insulation materials and polymers including vapour and damp-proofing barriers, protective coatings including paints, stains and renders may 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, in terms of experimental laboratory work, design and the use of materials on site.

Learning Activities

Lectures, tutorials and laboratory practicals.

Notes

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. 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 structural 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.