Liverpool John Moores University

Title:	STRUCTURES AND MATERIALS
Status:	Definitive
Code:	**4501CVQR** (127379)
Version Start Date:	01-08-2021
Owning School/Faculty:	Civil Engineering and Built Environment
Teaching School/Faculty:	Oryx Universal College WLL

Team	Leader
George Kamaris	Y
Rafal Al-Mufti	

Academic Level:	FHEQ4	**Credit Value:**	20	**Total Delivered Hours:**	80
Total Learning Hours:	200	**Private Study:**	120		

Delivery Options
Course typically offered: Semester 1

Component	Contact Hours
Lecture	42
Practical	14
Tutorial	22

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Artefacts	AS1	LABORATORY BASED <2000 WORDS	30	
Exam	AS2	EXAMINATION	70	2

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.

Learning Outcomes

After completing the module the student should be able to:

1	Construct free body, shear force and bending moment diagrams and use them to solve mechanics problems.
2	Perform qualitative and quantitative structural analysis.
3	Analyse various shapes of cross section to determine: cross sectional area, centre of gravity, second moment of area and section modulus.
4	Explore the properties of materials justifying the reasons for their selection and their effect on the design of buildings and installations.
5	Select materials for construction and consider the effects of material selection on the environment suggesting suitable alternatives and possibilities for recycling.
6	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 <2000 WORDS	1	2	4	6	
EXAMINATION	1	2	3	4	5

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.

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 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.