LIVERPOOL JOHN MOORES UNIVERSITY

Engineering Mechanics and Strength of Materials

Module Information

2022.01, Approved

Summary Information

Module Code	4503ICBTCE
Formal Module Title	Engineering Mechanics and Strength of Materials
Owning School	Civil Engineering and Built Environment
Career	Undergraduate
Credits	15
Academic level	FHEQ Level 4
Grading Schema	40

Teaching Responsibility

LJMU Schools involved in Delivery
LJMU Partner Taught

Partner Teaching Institution

Institution Name
International College of Business and Technology

Learning Methods

Learning Method Type	Hours
Lecture	45
Off Site	8
Practical	9
Tutorial	15

Module Offering(s)

Display Name	Location	Start Month	Duration Number Duration Unit

APR-PAR	PAR	April	12 Weeks
JAN-PAR	PAR	January	12 Weeks
SEP-PAR	PAR	September	12 Weeks

Aims and Outcomes

Aims	The aim of this unit is to give learners an understanding of the properties, structural behaviour and use of construction materials. Learners will examine forces in engineering applications at rest or in motion and develop mathematical skills to solve complex engineering problems. Learners will also develop skills to solve statically determinate structures subjected to different loading systems. Also it aims to concepts of statics and dynamics in civil engineering structures.

After completing the module the student should be able to:

Learning Outcomes

Code	Number	Description
MLO1	1	Identify behaviour of various structural elements applying concepts of resolution of forces for statics problems for civil engineering applications.
MLO2	2	Demonstrate the properties and use of construction materials justifying the reasons for their selection, considering factors such as effect on the design of buildings and installations, effects on the environment and Perform laboratory experiments safely and deal with recording, analysing and interpretation of results.
MLO3	3	Solve dynamics problems for civil engineering application.
MLO4	4	Analyse various shapes of cross section to determine: cross sectional area, centre of gravity, second moment of area and section modulus and simple structures subject to point loads and UDLs, to calculate support reactions, shearing force, bending moment values and deflections.

Module Content

Outline Syllabus	Draw a static force system for a given civil engineering structure, the forces in a given pulley system.Centroid of composite bodies used in civil engineering structures, first moment of area of composite bodies, Second moment of area of composite bodies and its use in civil engineering applications.Structural behaviour: internal and external forces, equilibrium and free body diagrams, stresses and strains, deformations due to force and displacement induced loads, relationship between behaviour and use, forms of loading, inherent properties of structural materials (timber, steel, reinforced concrete), behaviour of structural materials when formed into structural members(e.g. beams, columns, frames, pads, bases, studs, steel brackets).Cantilevers and simply supported beams: variety of point loads and uniformly distributed loads, uniformly varying loads, load bending moment diagrams, shear force diagrams, Mohr's moment-area method (variety of point loads and uniformly distributed loads), Macaulay's method (variety of point loads and uniformly distributed loads), bending deflection in beams (variety of materials for beam section).Axial load carrying capacity: elastic buckling, Euler's method for determining the critical load, concept of effective length.Properties of construction materials: metals and alloys, e.g. iron, steel, zinc, copper, brass, aluminium, lead, timber and timber products, clay products (e.g. bricks, tiles), cements and concretes, plastics and other artificial materials, coatings and finishes, e.g. paints, clear finishes, wood treatments.Properties of materials: as appropriate to field of study, e.g. strength, elasticity, porosity and water absorption, thermal and moisture movement, thermal and electrical conductivity/resistivity, durability, workability, density, specific heat capacity, viscosity.Uses of materials: construction, refurbishment, maintenance, replacement, energy efficiency, environmental issues, use of renewable resources.Particle motion problems for civil engineering applications, angular velocity, angular acceleration centrifugal force linear and rotational rigid body motion problems, impulse momentum theory to solve civil engineering structural problem.Solving scientific problems for civil engineering applications: experimentation relevant to the above as appropriate to field of study, use of scientific method (nature of experiment, intended aims and objectives, apparatus, method, results, calculations, analysis, conclusion).Construction materials related laboratory practical work such as slump test, compressive strength test of concrete, basic structural mechanics lab tests.
Module Overview	
Additional Information	

Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Module Learning Outcome Mapping
Portfolio	Portfolio	50	0	MLO1, MLO2, MLO3
Exam	Written Examination	50	2	MLO4

Module Contacts

Module Leader

Contact Name	Applies to all offerings	Offerings
Karl Jones	Yes	N/A

Partner Module Team

Contact Name	Applies to all offerings	Offerings