

Summary Information

Module Code	5507ICBTCE
Formal Module Title	Civil Engineering Structural Design
Owning School	Civil Engineering and Built Environment
Career	Undergraduate
Credits	15
Academic level	FHEQ Level 5
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
Tutorial	15
Workshop	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_NS-PAR	PAR	September (Non-standard start date)	12 Weeks

Aims and Outcomes

Aims	This unit provides learners with an understanding of civil engineering structural design, beginning with simple structural elements found in buildings and moving on to stable earthwork retaining walls.
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After completing the module the student should be able to:

Learning Outcomes

Code	Number	Description
MLO1	1	Design and develop simple building elements for reinforce concrete and steel structures.
MLO2	2	Produce valid designs for building elements.
MLO3	3	Recognise theories for earth retaining structure design & design earth retaining structures.
MLO4	4	Demonstrate various traffic studies and apply the knowledge in planning and design of pavement.

Module Content

Outline Syllabus	<p>Design concepts: permissible stress, load factor, limit state concept, probabilistic approach, characteristic loads, characteristic strength (partial factors of safety), limit states, durability, fire resistance, other prime considerations Produce valid designs for simply supported beams in steel: concept of limit state design (applied to steel), classification of sections, and suitability of UB/UC sections regarding moment capacity, shear resistance and deflection Produce valid designs for simply supported beams in reinforced concrete: concept of limit state design as applied to reinforced concrete, reinforcing requirements and the deflection performance of singly reinforced rectangular beams, Produce valid designs for simply supported beams in timber: natural characteristics of timber (how these affect the design methods), suitability of rectangular beams (regarding moment capacity), shear capacity, bearing capacity and deflection Produce valid designs for columns in steel: buckling characteristics of UC, UB and SHS sections, axial load capacity of slender axially loaded sections (with bending moments about the major axis) Produce valid designs for short columns in reinforced concrete: design status of column, reinforcing requirements of a short reinforced column under axial load (with bending moments about one axis) Produce valid designs for columns in timber: axial load capacity of slender rectangular timber sections Produce valid designs for columns in masonry: vertical load capacity of square and rectangular masonry columns Further theories to analyse structures: energy theorems, force method, matrix force method of analysis, matrix displacement method of analysis, finite element formulation, energy method, yield criteria In-situ reinforced concrete structural elements: one-way spanning slab, two-way spanning slab Doubly reinforced concrete beams: column foundations, continuous beams, continuous one-way spanning floor slabs, cut-off points for reinforcement, distribution reinforcement, cover distances, main bars, distribution bars and links, shear reinforcement, column shutters (starter bars and kickers) Site investigation: geophysical exploration, sampling in soils, in-situ tests, site investigation report General engineering geology: site selection for dams and reservoir projects, highway and tunnel projects, ground improvement, temporary support Detail structural elements: manual and computer-aided design (CAD) techniques Retaining wall design: factors of safety, force calculation (different types of retaining walls), effects of groundwater in retaining wall design, stability against sliding and overturning Stability of slopes: failure surfaces, total and effective stress analysis Lateral pressure and retaining walls: active and passive earth pressure, Rankine theory, Coulomb theory, retaining structures and stability Shallow foundations: foundation types, bearing capacity (allowable bearing capacity), settlement calculation, foundations in difficult soils Deep foundations: pile types, single pile, pile groups, settlement calculation Transportation: Trends in the demand for travel: growth in the demand for personal and freight travel and the composition of travel, factors relating to travel demand, growth forecasts for travel Methods of transport modelling, data collection and processing, types of transportation models Design of pavement sections for standard code of practice</p>
Module Overview	
Additional Information	

Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Module Learning Outcome Mapping
Report	Coursework	30	0	MLO2, MLO4
Exam	Exam	70	3	MLO1, MLO3

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

