Liverpool John Moores University

Title:	STRUCTURAL AND EARTHQUAKE ENGINEERING
Status:	Definitive
Code:	**7103BEUG** (118084)
Version Start Date:	01-08-2021
Owning School/Faculty:	Civil Engineering and Built Environment
Teaching School/Faculty:	Civil Engineering and Built Environment

Team	Leader
George Kamaris	Y
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Academic Level:	FHEQ7	**Credit Value:**	20	**Total Delivered Hours:**	51
Total Learning Hours:	200	**Private Study:**	149		

Delivery Options
Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	24
Tutorial	24

Grading Basis: 50 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS1	Examination	70	3
Test	AS2	Test	15	
Report	AS3	Report	15	

Aims

The aim of this module is to introduce students to the design of structures under dynamic loading conditions. Students will gain an understanding of earthquake generation and the quantification of earthquake effects. Students will gain a knowledge of the behavior of materials, structural elements and composite structures under earthquake loading.

Learning Outcomes

After completing the module the student should be able to:

1	Evaluate the dynamic response of structures using common analytical techniques and apply classical analytical methods to solve the dynamic response of simple structures
2	Assess seismic hazard, characterise earthquake actions, and hence estimate earthquake loads
3	Design structural elements to Eurocode 8
4	Estimate seismic risk to structures
5	Critically evaluate structures and their response to dynamic loading
6	Select materials and structural forms from an understanding of sustainability and the behaviour of building materials, structural elements and global structures under cyclic (earthquake) loading.

Learning Outcomes of Assessments

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

EXAMINATION	2	3	4	6
TEST	1			
REPORT	5			

Outline Syllabus

Introduction: types and sources of dynamic loads, structural vibration and consequences, the excitation of structures by time varying loads; *basic seismology, earthquake measurement and recurrence rates, ground motions, risk and hazard*
Single degree of freedom (SDOF) systems: motion, natural frequency, undamped/damped free vibration, excitation response, numerical analysis, Duhammel integral.
Multi-degree of freedom (MDOF) systems: property matrices, eigenvalues, mode shapes, mode superposition;
Foundations and isolation methods
Continuous systems: longitudinal/transverse vibration;
Case studies: failure under earthquake conditions, earthquake ground motion;
Eurocode 1998 (EC8): Design of structures for earthquake resistance.

Learning Activities

Lectures, tutorials, practicals, seminars, and design studio sessions.

Notes

This module provides an understanding of dynamic structural design and earthquake engineering