

Module Details	
Module Title	Advanced Structural Analysis & Earthquake Engineering
Module Code	CSE7015-B
Academic Year	2023/4
Credits	20
School	Department of Civil and Structural Engineering
FHEQ Level	FHEQ Level 7

Contact Hours	
Type	Hours
Directed Study	160
Lectures	40

Availability	
Occurrence	Location / Period
BDA	University of Bradford / Semester 1

Module Aims
To develop an understanding of some key methods of advanced structural analysis. To study the concepts of structural dynamics and earthquake engineering and thereafter impart the key knowledge and skills required to design buildings to resist earthquakes. To develop the ability and skills to use laboratory equipment to measure the behaviour of simple and complex systems.

Outline Syllabus
Students will study displacement analysis methods for beam and frame structures, plastic analysis of beams and frames and stability analysis of beams and columns, which can be applied to a wide range of civil engineering structures. Students will also develop an understanding of structural dynamics and examine the behaviour of structures under cycling loading and understand how to avoid common mechanisms of failure. Seismic waves and how to read seismographs. Single and multiple degree of freedom. Damping and vibration isolation. Response of structures to earthquake excitation. Soil structure interaction measurements using shake tables and liquefaction tank. Design of structures to resist earthquakes according to Eurocode 8. Critically evaluating the behaviour of structures under earthquake loads using Sap2000.

Learning Outcomes	
Outcome Number	Description
01	Solve beams and frames using displacement method of structural analysis
02	Determine the plastic collapse load for beams and frames
03	Determine the buckling load for beams and columns
04	Use appropriate methods for the analysis of elastic and elastic-plastic structures
05	Appreciate the effects of non-linearities on structural performance
06	Critically evaluate structure failure patterns and risks due to static loads and those due to cyclic (dynamic) loading
07	Show mastery of reading seismographs
08	Apply knowledge of soil properties in designing structures to resist earthquake loads
09	Design structures according to Eurocode 8 including health and safety

Learning, Teaching and Assessment Strategy
<p>Concepts are introduced using formal lectures. Deeper understanding is developed during problems classes, and further enhanced using the laboratory class. Oral feedback is given during the laboratory sessions and problems classes. The Lab Report will assess the application of practical skills to the knowledge base of the module (6, 7, 8, 9) and the closed book examination will assess the wider learning outcomes expressed in the descriptor (1-5). A formative exam will provide students with feedback in order to improve their learning and understanding of the subjects.</p>

Mode of Assessment			
Type	Method	Description	Weighting
Summative	Laboratory Report	Report on modelling simulations (2000 words)	30%
Summative	Examination - Closed Book	Closed book examination (2 hours)	70%

Reading List
To access the reading list for this module, please visit https://bradford.rl.talis.com/index.html

Please note:

This module descriptor has been published in advance of the academic year to which it applies. Every effort has been made to ensure that the information is accurate at the time of publication, but minor changes may occur given the interval between publishing and commencement of teaching. Upon commencement of the module, students will receive a handbook with further detail about the module and any changes will be discussed and/or communicated at this point.