

Module code: MOD009162	Version: 1 Date Amended: 07/Feb/2023
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1. Module Title
Advanced Structural Analysis and Design

2a. Module Leader
Sarinova Simanjuntak

2b. School
School of Engineering and the Built Environment

2c. Faculty
Faculty of Science and Engineering

3a. Level
6

3b. Module Type
Standard (fine graded)

4a. Credits
15

4b. Study Hours
150

5. Restrictions			
Type	Module Code	Module Name	Condition
Pre-requisite:	MOD007114	Product Development and Quality Engineering Project	Compulsory
Co-requisite:	MOD007119	Engineering Simulation and Optimisation Project	Compulsory
Exclusions:	None		
Courses to which this module is restricted:			

LEARNING, TEACHING AND ASSESSMENT INFORMATION

6a. Module Description
This module aims to develop your knowledge and skills in analysing complex engineering problems using various approaches with an emphasis on finite element and plasticity analysis, which are at the forefront of design and engineering disciplines. You will investigate the advanced mechanics of material, the linear and non-linear behaviour of structures, and how to design structures and engineering components to avoid failure, when subjected to various loadings. A variety of analysis tools including Finite Element and MatLab can be applied to the analysis of simple and complex structures. The module will introduce methods of how to analyse the dynamic response of structures. In addition, you will learn how to convey challenging concepts and complex information effectively to technical and non-technical audiences.
6b. Outline Content
1. Structural stability and lateral load transfer systems. 2. Engineering design and finite element methods to estimate the response of structures to realistic loads. 3. Linear and non-linear finite element analysis. 4. Applied plasticity for failure analysis and life prediction. 5. Evaluate and report the advantages and disadvantages of the selected approach/method in solving complex engineering problems.
6c. Key Texts/Literature
The reading list to support this module is available at: https://readinglists.aru.ac.uk/
6d. Specialist Learning Resources
ANSYS, CAD, MATLAB

7. Learning Outcomes (threshold standards)		
No.	Type	On successful completion of this module the student will be expected to be able to:
1	Knowledge and Understanding	To extend knowledge and understanding of engineering design and finite element methods to estimate the response of engineering structures to realistic loads.
2	Knowledge and Understanding	To develop working knowledge and skills to undertake linear and non-linear finite element analysis for solving complex design and engineering problems.
3	Intellectual, practical, affective and transferrable skills	To evaluate the effectiveness of the method of plasticity analysis and their roles in the design of safe structures and life prediction of engineering components.
4	Intellectual, practical, affective and transferrable skills	To communicate effectively the advantages and disadvantages of the selected approach/method in solving complex engineering problems.

8a. Module Occurrence to which this MDF Refers				
Year	Occurrence	Period	Location	Mode of Delivery
2025/6	ZZF	Template For Face To Face Learning Delivery		Face to Face

8b. Learning Activities for the above Module Occurrence			
Learning Activities	Hours	Learning Outcomes	Details of Duration, frequency and other comments
Lectures	12	1-2	1 hour per week for 12 weeks
Other teacher managed learning	24	2, 3, 4	2 hour per week for 12 weeks
Student managed learning	114	1-4	Preparation for formative and summative assessments
TOTAL:	150		

9. Assessment for the above Module Occurrence					
Assessment No.	Assessment Method	Learning Outcomes	Weighting (%)	Fine Grade or Pass/Fail	Qualifying Mark (%)
010	Coursework	1-3	80 (%)	Fine Grade	30 (%)
Up to 2,000 words report; maps to Engineering Council Learning Outcomes C2, C3					
Assessment No.	Assessment Method	Learning Outcomes	Weighting (%)	Fine Grade or Pass/Fail	Qualifying Mark (%)
011	Practical	4	20 (%)	Fine Grade	30 (%)
15 minutes presentation (including Q&A) per group; equivalent to 1000 words; maps to Engineering Council Learning Outcome C17					

In order to pass this module, students are required to achieve an overall mark of 40% (for modules at levels 3, 4, 5 and 6) or 50% (for modules at level 7*).

In addition, students are required to:

- (a) achieve the qualifying mark for each element of fine graded assessment as specified above
- (b) pass any pass/fail elements

[* the pass mark of 50% applies for all module occurrences from the academic year 2024/25 – see Section 3a of this MDF to check the level of the module and Section 8a of this MDF to check the academic year]