

## MODULE DESCRIPTION FORM

### DEPARTMENT OF MECHANICAL AND AEROSPACE ENGINEERING

## ME315 ENGINEERING ANALYSIS (FEA)

Module Registrar: Prof Donald Mackenzie <a href="mailto:d.mackenzie@strath.ac.uk">d.mackenzie@strath.ac.uk</a>	Taught To (Course): Cohorts for whom module is compulsory – special cohort INSA Lyon		
Other Lecturers Involved:	Credit Weighting: 10	Semester: 2	
Assumed Prerequisites: Mathematics, Mechanics, CAD Modelling (see below)	Compulsory module	Academic Level: 3	Suitable for Exchange: N

### Required prerequisites

**Note:** It is the responsibility of ALL students to ensure that they satisfy the prerequisite knowledge for this module BEFORE adding as part of curriculum selection. If unsure, please contact the Module Registrar or discuss with your Programme/Year Adviser of Studies.

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|---|--|
| <ul style="list-style-type: none"> <li>• <b>Mathematics:</b> Vectors &amp; matrices; solution of simultaneous equations; Differentiation and integration; Interpolation.</li> </ul> | <ul style="list-style-type: none"> <li>• <b>Mechanics:</b> Linear elastic, static structural analysis; Engineers Theory of Bending.</li> <li>• <b>CAD Modelling</b></li> </ul> |
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### Module Format and Delivery (HOURS i.e., 1 credit = 10hrs of study):

Lecture	Tutorial	Laboratory	Groupwork	External	Online	Project	Assignments	Private Study	Total
10		5			15			70	100

### Educational Aim

This module aims to introduce students to the theory and application of one of the most widely used numerical methods in engineering analysis: the Structural Finite Element Method.

### Learning Outcomes

On completion of the module the student is expected to be able to:

- LO1 Understand the basic theory of the Finite Element Method.
- LO2 Use FEM software ANSYS Workbench to solve various simplified practical engineering problems.
- LO3 Understand how mathematics, numerical analysis and computing technology are combined to model and simulate the behaviour of physical systems.

### Syllabus

The module will teach the following:

Mathematical modelling of engineering systems using the Finite Element Method: Theory and practice. Introduction to the commercial finite element program ANSYS Workbench; structural analysis; stress analysis.

### Assessment of Learning Outcomes

#### Criteria

For each of the Module Learning Outcomes the following criteria will be used to make judgements on student learning:

- LO1
  - C1 Demonstrate understanding of the energy method, displacement interpolation, element stiffness matrix, global stiffness matrix, boundary conditions, numerical solution procedure.
  - C2 Demonstrate ability and understanding of procedure to solve structural problems numerically.

LO2

C1 Demonstrate appropriate use of commercial FEM software to solve solid and structure problems.

C2 Ability to obtain and verify important results from commercial software through post processing.

LO3

C1 Understand how to simulate the behaviour of a physical system by transferring the practical problem into a mathematical model and using suitable numerical methods to solve the problem with a computer.

C2 Be able to know the types of error in numerical analysis and how to improve the accuracy of numerical results.

The standards set for each criterion per Module Learning Outcome to achieve a pass grade are indicated on the assessment sheet for all assessment.

### Principles of Assessment and Feedback

(within Assessment and Feedback Policy at: <https://www.strath.ac.uk/professionalservices/staff/policies/academic/>)

Each student may receive advice concerning practical computer analysis workshops and tutorial examples through the class forum or in-person during lab sessions.

Questions raised by students may be collated and discussed in class meetings.

### Assessment Method(s) Including Percentage Breakdown and Duration of Exams (*individual weightings*)

Examination				Coursework / Practical		Project	
Number	Month(s)	Duration	Weighting	Number	Weighting	Number	Weighting
1	April/May	1 hr	60%	2 Myplace Untimed Quiz (coursework) submissions - related to 4 FEA workshops	40% (20% each)		
* LO1, LO2, LO3				* LO2		*	

\* **L/Os:** Indicate which Learning Outcomes (LO1, LO2, etc) are to be assessed by exam/coursework/practical/project as required.

### Coursework / Submission deadlines (*academic weeks*):

Two Myplace Untimed Quiz submissions (coursework) in week 3, 4, 5 and 6 - submissions due in sem2 week 5 and 7.

### Resit Assessment Procedures:

Submission of alternate coursework prior to commencement of the July/August exam diet.

**Students must contact the module Registrar for details as soon as results confirm that a resit is required.**

### PLEASE NOTE:

Students must gain a summative mark of 40% to pass the module. Students who fail the module at the first attempt will be re-assessed before the July/August exam diet. This re-assessment will consist entirely of coursework. No marks from any previous attempts will be transferred to a new resit attempt.

### Recommended Reading

**\*\*\*Purchase recommended    \*\*Highly recommended reading    \*For reference**

\*\* "Finite Element Simulations with ANSYS Workbench" by Huei-Huang Lee, SDC Publications.

Please see Reading List on Myplace for further details.

### Additional Student Feedback

(Please specify details of when additional feedback will be provided)

Date	Time	Room No
		Check Myplace for details

Session: 2025/26

### Approved:

**Programme Lead/Director Signature: Dr Andrew McLaren**

**Date of Last Modifications: 11 August 2025**

## MODULE TIMETABLE

Module Code:

ME315

Module Title:

Engineering Analysis (FEA)

### Brief Description of Assessment:

ME315 is assessed by a 1-hour exam (60%) and 2 untimed Quizzes (Coursework) relating to the work conducted in 4 FEA Workshops in week 3, 4, 5 and 6 (submissions in week 5 and 7 with a weighting of 20% each)

### Assessment Timing

Indicated on the table below are the start/submission dates for each assignment/project and the timing of each exam/assessment.

**Please note: Timings could change during unforeseen periods of disruption; this should only be used as a guide.**

Semester One	C&D Wk	WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	WK9	WK10	WK11	Exam Period
	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item.

Semester Two	C&D Wk	WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	WK9	WK10	WK11	Exam Period
	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Course work Set	Course work Submit	Course work Set	Course work Submit	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Exam