MODULE DESCRIPTION FORM

DEPARTMENT OF MECHANICAL AND AEROSPACE ENGINEERING

ME315 ENGINEERING ANALYSIS (FEA)

Module Registrar: Prof Donald Mackenzie d.mackenzie@strath.ac.uk	**Taught To (Course): Cohorts for whom class is compulsory – special cohort INSA Lyon**	
Other Lecturers Involved:	**Credit Weighting: 10**	**Semester: 2**
Compulsory class	**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.

- **Mathematics:** Vectors & matrices; solution of simultaneous equations; Differentiation and integration; Interpolation.
- **Mechanics:** Linear elastic, static structural analysis; Engineers Theory of Bending.
- **CAD Modelling**

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.

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***	Number	***Weighting***
1	April/May	1 hr	60%			4	10% (each)		
* LO1, LO2, LO3						* LO2		*	

* ***L/Os:*** *Indicate which Learning Outcomes (L01, L02, etc) are to be assessed by exam/coursework/practical/project as required.*

Coursework / Submission deadlines (*academic weeks*):

Resit Assessment Procedures:
Submission of ^^alternate coursework prior to commencement of the 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 August 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: 2022/23

Approved:

Course Director Signature:	**S Connolly (on behalf of E Henderson)**
Date of Last Modifications:	**14/09/2023**

(Updated September 2023)

MODULE TIMETABLE

Module Code:	**ME315**	**Module Title:**	**Engineering Analysis (FEA)**

Brief Description of Assessment:

ME315 is assessed by a 1-hour exam and Untimed Quizzes (Coursework) for the 4 FEA Workshops

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 can and will change, this should only be used as a guide.

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