Module Definition Form (MDF)

Module code: MOD011138	**Version:** 1 **Date Amended:** 10/Jul/2025

1. Module Title
Computer Aided Engineering and Manufacturing Project

2a. Module Leader
Samuel McMaster

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
30

4b. Study Hours
300

5. Restrictions

Type	Module Code	Module Name	Condition
Pre-requisites:	None		
Co-requisites:	None		
Exclusions:	None		
Courses to which this module is restricted:	None		

LEARNING, TEACHING AND ASSESSMENT INFORMATION

6a. Module Description

This project-based module offers an immersive experience in modern engineering practices, simulating the full design-to-manufacturing cycle as seen in industry. You'll explore the iterative process of developing optimised engineering components through hands-on projects that blend theory with application.
The curriculum integrates foundational knowledge in Finite Element Analysis (FEA), smart design strategies, and advanced manufacturing technologies. A strong emphasis is placed on practical skills, including the use of additive manufacturing tools to bring digital designs to life.
By the end of the module, you'll not only understand the theoretical principles behind engineering optimisation and digital fabrication but also gain first-hand experience in using cutting-edge tools to solve real-world design challenges.

6b. Outline Content

- Refreshment study of foundational Finite Element Analysis (FEA) concept.
- Understanding mechanical behaviour of additively manufactured materials.
- Investigation of component/part's design and performance through computational based modelling and analysis techniques involving lattice structures and topology optimization.
- Designing and modelling of a product manufacturing process or line.
- Additive manufacturing the parts and testing the mechanical behaviour of the part.
- Understanding the importance of the teamwork and collaboration definition of individual projects (for each team).

6c. Key Texts/Literature

The reading list to support this module is available at: https://readinglists.aru.ac.uk/

6d. Specialist Learning Resources

None

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	Apply foundational and advanced engineering principles to design, analyse, and manufacture complex component geometries.
2	Knowledge and Understanding	Demonstrate the capacity to select and apply appropriate computational and analytical techniques to analyse and model a complex engineering problem, recognizing its scope, constraints, and limitations.
3	Knowledge and Understanding	Leveraging additive manufacturing to prepare, test and analyse the mechanical performance of the designed parts.
4	Intellectual, practical, affective and transferrable skills	Demonstrate the ability to independently conduct simulations addressing industrial design and manufacturing challenges, effectively applying theoretical, numerical, and practical knowledge, with a clear and critical evaluation of the method's applicability and limitations.
5	Intellectual, practical, affective and transferrable skills	Effectively function as an individual and as a member of a team; establish the proficiency to communicate effectively on complex engineering subjects orally and in writing, with technical and non-technical audiences.

8a. Module Occurrence to which this MDF Refers				
Year	**Occurrence**	**Period**	**Location**	**Mode of Delivery**
2026/7	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	24	1-5	1/3 of the sessions in the trimester will be lectures
Other teacher managed learning	36	1-5	2/3 of the sessions will cover tutorial, practice, and supervised activity in the computer room, laboratory, and workshop
Student managed learning	228	1-5	Self-directed activity and learning
TOTAL:	288		

9. Assessment for the above Module Occurrence					
Assessment No.	**Assessment Method**	**Learning Outcomes**	**Weighting (%)**	**Fine Grade or Pass/Fail**	**Qualifying Mark (%)**
010	Coursework	1,2,4,5	70 (%)	Fine Grade	30 (%)
One report on FEA and Manufacturing process of a group's chosen part, Max 4500 words associated with the requirements of Engineering Council learning outcomes C3, C6					
Assessment No.	**Assessment Method**	**Learning Outcomes**	**Weighting (%)**	**Fine Grade or Pass/Fail**	**Qualifying Mark (%)**
011	Practical	3-5	30 (%)	Fine Grade	30 (%)
Group oral presentation, 5 minutes per individual student in group plus 5 minutes Q&A, equivalent of maximum 1000 words per individual, associated with the requirements of Engineering Council learning outcomes C16					

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]