

Module code: MOD007113	Version: 2 Date Amended: 09/Dec/2022
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1. Module Title
Advanced Engineering Mathematics

2a. Module Leader
Mohamed Yehia

2b. School
School of Engineering and the Built Environment

2c. Faculty
Faculty of Science and Engineering

3a. Level
5

3b. Module Type
Standard (fine graded)

4a. Credits
15

4b. Study Hours
150

5. Restrictions			
Type	Module Code	Module Name	Condition
Pre-requisite:	MOD007035	Applied Engineering Mathematics	Compulsory
Co-requisites:	None		
Exclusions:	None		
Courses to which this module is restricted:			

LEARNING, TEACHING AND ASSESSMENT INFORMATION

6a. Module Description

Building on previous modules, here you will continue applying mathematics to express and solve engineering problems, moving on to include more complex mathematical concepts. You'll be introduced to applications of calculus, complex numbers, Laplace transforms, and Fourier Series, helping you to develop an appreciation of the overwhelming influence that these concepts have had on engineering analysis and design, particularly with their application to specialist software. You'll learn to apply differentiation and integration techniques to solve engineering problems in dynamics, control, structural analysis, engineering optimisations, and computational engineering. You'll also learn to analyse engineering concepts by solving complex equations and differential equations using analytical and numerical techniques. Coding is also used to develop your problem-solving skills and create solutions to complex mathematical problems; you'll apply this to engineering problems to create a logical sequence of steps or solutions after which you'll develop tests to check the solution is correct.

6b. Outline Content

- Applications of calculus
- Differential equations
- Laplace transform
- Fourier Series
- Complex numbers
- Numerical methods
- Introduction to coding

6c. Key Texts/Literature

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

6d. Specialist Learning Resources

Microsoft Office, 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	Analyse complex problems to reach substantiated conclusions using the first principles of mathematics and engineering principles.
2	Intellectual, practical, affective and transferrable skills	Critically analyse the suitability of techniques for the solution of a range of routine and non-routine engineering problems.
3	Intellectual, practical, affective and transferrable skills	Select and apply appropriate computational and analytical techniques to model complex problems, recognising the limitations of the techniques employed.
4	Intellectual, practical, affective and transferrable skills	Use coding to develop solutions to complex mathematical problems.

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	12	1-4	1 hour lecture per week
Other teacher managed learning	24	1-4	2 hours per week of tutorials and workshops
Student managed learning	114	1-4	Self Directed Learning
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	3, 4	30 (%)	Fine Grade	30 (%)
Maximum 1000-word equivalent report, aligned with the C2 Engineering Council's AHEP4 Learning Outcomes					
Assessment No.	Assessment Method	Learning Outcomes	Weighting (%)	Fine Grade or Pass/Fail	Qualifying Mark (%)
011	Examination	1-3	70 (%)	Fine Grade	30 (%)
2 hour closed book examination; aligned with the C3 Engineering Council's AHEP4 Learning Outcomes					

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]