MODULE DESCRIPTION FORM

DEPARTMENT OF MECHANICAL AND AEROSPACE ENGINEERING

ME108 Engineering Analysis and Numerical Methods

Module Registrar: Dr Christie Maddock christie.maddock@strath.ac.uk	**Taught To (Course): Cohorts for whom module is compulsory**	
Other Lecturers Involved: Dr Chris Triantafyllou	**Credit Weighting: 10 [ECTS 5]**	**Semester: 1 and 2**
Compulsory module	**Academic Level: 1**	**Suitable for Exchange: N**

Module Format and Delivery (HOURS i.e., 1 credit = 10hrs of study):

Lecture	Tutorial	Laboratory	Groupwork	External	Online	Project	Assignments	Private Study	**Total**
16		15					30	39	100

Educational Aim

This module aims to teach the basic principles of programming (focused on MATLAB) and the solution of mathematical problems with numerical techniques, and to give a basic understanding of probability theory and statistics with applications and practical examples in the MATLAB environment.

Learning Outcomes

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

LO1 Demonstrate understanding of the use of concepts and methods of statistics and probabilities, applied in engineering principles.

LO2 Demonstrate the ability to implement programming principles and develop effective algorithms in a MATLAB environment.

LO3 Demonstrate the ability to identify and implement appropriate numerical methods to solve specific mathematical problems.

LO4 Develop practical cyber security awareness and skills

Syllabus

The module will teach the following:

Numerical methods and programming:

Introduction to MATLAB; MATLAB as a calculator; MATLAB as a programming language; comparison with other programming languages.

Programming principles: variables and arrays; operators, expressions, and statements; algorithms, structured programming logic and flow diagrams; computer arithmetic and errors.

Fundamentals of programming in MATLAB: data types; input and output; functions and structures; parameters and variables.

Mathematical methods: linear algebra, vectors & matrices

Numerical Methods: solution of linear equations

Statistics and Probability:

Data presentation: frequency tables, histograms, mean, standard deviations, quartiles.

Mean and expected value, mean, variance. Sampling distributions, estimation, confidence intervals, t-distribution.

Estimation and hypothesis testing. Sampling, standard errors, confidence limits.

Probability theory and models. Random variables and probability distributions. Elementary distributions: Properties of distribution, central limit theorem

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 Students will be able to demonstrate the ability to identify appropriate statistical techniques for simple engineering problems.
C2 Students will be able to mathematical methods in statistics and probabilities and their role in a variety of problems in engineering

LO2
C1 Students will be able to demonstrate basic programming skills by the construction of flow charts to summarise key steps of a problem
C2 Students will construct MATLAB scripts to demonstrate the ability to implement numerical schemes based on the flow charts, to solve simple numerical problems.

LO3
C1 Students will be able to demonstrate a selection of an appropriate methods to solve a range of problem types.
C2 Students will demonstrate the ability to numerically solve problems in linear and non-linear algebra and calculus.

LO4
C1 Students will be able to demonstrate the ability to identify processes and controls measurement to protect online environments networks, devices, and data from cyber-attacks.
C2 Students will be able to identify types of cyberattacks and recovery strategies.

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/)

Summative assessments: Coursework submissions will be returned with mark breakdown to allow the students to reflect on their performance.

Formal feedback: Feedback will be generated through a quality assessment matrix for the coursework.

Informal feedback: Verbal feedback will be provided to the students during the lectures and tutorial sessions. Written feedback will be given via Myplace forum.

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

Examination				**Coursework**		**Practical**		**Online**	
Number	Month(s)	Duration	***Weighting***	Number	***Weighting***	Number	***Weighting***	Number	***Weighting***
1	Apr/May	60 min	60%	2	20% (10% each)	1	P/F	2	20% (10% each)
*LO1, 3				* LO2, 3		*LO4		*LO1, 2, 3	

* *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*):
Coursework: Semester 1 Week 8, and Semester 2 Week 6
Online time-constrained quiz: Semester 2 Week 1, and Semester 2 Week 9
Submission of completion certificate for Cyber Security Awareness: End of Sem 1

Resit Assessment Procedures:
2hr examination in July/August diet and/or online submission of Cyber Security Awareness certificate

PLEASE NOTE:
Students need to gain a summative mark of 40% to pass the module. Students who fail the module at the first attempt will be reassessed during the July/August exam diet. For the numerical element of the grade, the re-assessment will consist of an exam. No marks from previous attempts will be transferred to new attempts.
For the case of failing the pass/fail Cyber Security element, the re-assessment will consist of an online submission of this element.

Recommended Reading

****Highly recommended reading *Simply for reference (do NOT purchase)**

**1) Stormy Attaway, MATLAB: A Practical Introduction to Programming and Problem Solving
**2) T. Siauw, A. Bayen, An Introduction to MATLAB Programming and Numerical Methods for Engineers
*3) Thomas, G.B. & Finney, R.L. Calculus and Analytic Geometry, Addison-Wesley, ISBN: 0201400154.
*4) Kreyszig, E., Advanced Engineering Mathematics, Wiley, ISBN: 047133328X.

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

Date	Time	Room No
Weekly tutorials		Check timetable webpages for details

Session: 2025/26

Approved:

Programme Lead/Director Signature:	**Dr Andrew McLaren**
Date of Last Modifications:	**30 September 2025**

(MAE template updated July 2025)

MODULE TIMETABLE

Module Code:	**ME108**	**Module Title:**	**Engineering Analysis and Numerical Methods**

Brief Description of Assessment: -

Coursework in semester 1 (10%) and semester 2 (10%)
Online time-constrained quiz at the start of semester 2, on semester 1 material (10%), and end of semester 2 (10%)
Final exam during April/May exam diet (60%)

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	W&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.	Course work Set	Choose an item. Choose an item.	Course work Submit	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.	Online Test	Choose an item. Choose an item.	Choose an item. Choose an item.	Course work Set	Choose an item. Choose an item.	Course work Submit	Choose an item. Choose an item.	Choose an item. Choose an item.	Online Test	Choose an item. Choose an item.	Choose an item. Choose an item.	Exam