

MODULE DESCRIPTION FORM

DEPARTMENT OF MECHANICAL AND AEROSPACE ENGINEERING

ME108 Engineering Analysis and Numerical Methods

Module Registrar: Dr S Manoli stella.manoli@strath.ac.uk	Taught To (Course): Cohorts for whom class is compulsory	
Other Lecturers Involved:	Credit Weighting: 10 [ECTS 5]	Semester: 1 and 2
Compulsory class	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		20					30	34	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.

Learning Outcomes

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

LO1 Demonstrate understanding of the use of mathematical methods and their role in formulating equations to represent a variety of problems in engineering.

LO2 Demonstrate the ability to implement basic programming principles and develop effective algorithms in Matlab environment.

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

Syllabus

The module will teach the following:

1. Introduction to Matlab; Matlab as a calculator; Matlab as a programming language; comparison with other programming languages.
2. Programming principles: variables and arrays; operators, expressions and statements; algorithms, structured programming logic and flow diagrams; computer arithmetic and errors.
3. Fundamentals of programming in Matlab: data types; input and output; functions and structures; parameters and variables; memory allocation.
4. Mathematical methods: linear algebra, vectors & matrices.
5. Numerical Methods: solution of linear and nonlinear equations; differentiation and integration; numerical quadrature; interpolation.

Assessment of Learning Outcomes

Criteria

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

L01 Demonstrate understanding of the use of mathematical methods and their role in formulating equations to represent a variety of problems in engineering.
C1 Students will be able to demonstrate the ability to identify appropriate equations and solution schemes for simple engineering systems.
C2 Students will be able to identify different systems and particular solution approaches that are suitable for that system.

L02 Demonstrate the ability to implement basic programming principles and develop effective algorithms in the Matlab environment.

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.

L03 Demonstrate the ability to identify and implement appropriate numerical methods to solve specific mathematical problems.

C1 Students will be able to demonstrate selection of an appropriate method to solve a range of problem types.

C2 Students will demonstrate ability to numerically solve problems in linear and non-linear algebra and calculus.

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/>)

Coursework submissions will be returned with mark breakdown to allow the students to reflect on their performance. Scripts from the final examination will not be returned to students.

Tutorial sessions will provide opportunities for students to discuss their work and course material with members of staff. Formative feedback may also be given during personal appointments with the course Lecturers/Demonstrators.

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	Apr/May	2hrs	50%	2	40%	10	10%		
* All LOs				* All LOs		* All LOs		*	

* **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*):

Week 10 sem 1 - Week 10, sem2

Resit Assessment Procedures:

2 hour examination in August diet.

PLEASE NOTE:

Students need to gain a summative mark of 40% to pass the module (the first attempt is a summative mark accumulated from 50% May exam, 10% completion of 10 Project tutorials within timetabled laboratory slots and 40% coursework). Students who fail the module at the first attempt will be re-assessed during the August diet. This re-assessment will consist entirely of an exam. No marks from previous attempts will be transferred to new attempts.

Recommended Reading

Reading List to be set up on Myplace - please refer to this list.

**Highly recommended reading

**1) Matlab: A Practical Introduction to Programming and Problem Solving
by Stormy Attaway

**2) An Introduction to MATLAB® Programming and Numerical Methods for Engineers
by Timmy Siau, Alexandre Bayen

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: 2021/22

Approved:

Course Director Signature: Dr E Henderson (SG)

Date of Last Modifications: September 3, 2021

(Updated July 2021-MAE)

MODULE TIMETABLE

Module Code:

ME108

Module Title:

Engineering Analysis and Numerical Methods

Brief Description of Assessment:

- 1 - Examination in May diet (50%), written exam – 2 hours
- 2 - Coursework – semester 1 (20%) and semester 2 (20%), submission of a Matlab script containing the function specifications of the assignments
- 3 - Completion of 10 Project Tutorials within timetabled laboratory slot (10%)

Assessment Timing

Indicated on the table below are the start/submission dates for each assignment/project and the timing of each exam/assessment. Dropdowns may be left blank. Add extra notes below the dropdowns where relevant.

Please note: Timings can and will change, 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.	Choose an item. Choose an item.	Course work Set	Choose an item. Choose an item.	Choose an item. Choose an item.	Course work Submit	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.	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.	Choose an item. Choose an item.	Course work Submit	Choose an item. Choose an item.	Exam