ES1A8-15 Engineering Mathematics

22/23

Department
> School of Engineering

Level
> Undergraduate Level 1

Module leader
> David Tapp

Credit value
> 15

Module duration
> 24 weeks

Assessment
> 30% coursework, 70% exam

Study location
> University of Warwick main campus, Coventry

Description

Introductory description

To present, in context, and provide skills in the application of fundamental mathematics and systems modelling concepts that underpin all of Engineering.

Module aims

This module aims to encourage the development of problem-solving and modelling skills as required in other Year 1modules and in order that more advanced material can be tackled in modules taught in later years. Within the context of the syllabus, students should be able to manipulate mathematical formulae, follow the mathematical argument, formulate engineering problems in mathematical form and to solve these. In particular, this module provides the necessary mathematical background for the technical modules in year 1.

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

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Vector Algebra, Matrices and Determinants, Matrix Algebra and Linear equations, Complex Numbers, Integration, Applications of Integration, Solution of 1st and 2nd Order Ordinary Differential Equations, Laplace Transforms, Probability Theory, Discrete and Continuous Probability Distributions. Partial Differentiation

Learning outcomes

By the end of the module, students should be able to:

- Recognise and be able to apply mathematical tools and techniques to solve engineering based problems.
- Recognise and be able to apply probabilistic and statistical tools and techniques to solve engineering based problems.
- Develop mathematical models of engineering based systems via the physical laws that they obey.
- Make structured assumptions to simplify and thus model real-life Engineering problems.
- Analyse models using basic mathematical techniques including statistical and numerical techniques.
- Demonstrate an understanding of mathematics and mathematical processes consistent with the syllabus. Reason logically and recognise incorrect reasoning.

Indicative reading list

"Mathematics for Engineers: A Modern Interactive Approach (fourth Edition)" by Anthony Croft and Robert Davison, Pearson/Prentice Hall, 2015, ISBN 978-0-13-205156-9

Subject specific skills

Numeracy: apply mathematical and computational methods to communicate parameters, model and optimize solutions
Follow a methodical approach to engineering problem solving.
Model real-world mechanical systems efficiently.

Transferable skills

Self-motivated, work independently and take responsibility for their actions. Set themselves challenging personal targets and make own decisions.
Prioritise quality. Follow rules, procedures and principles in ensuring work completed is fit for purpose, and pay attention to detail / error checks throughout activities.

Apply problem-solving skills, information retrieval, and the effective use of general IT facilities.
Communicate (written and oral; to technical and non-technical audiences) and work with others
Overcome difficulties by employing skills, knowledge and understanding in a flexible ma

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Study

Study time

Type	Required
Lectures	24 sessions of 1 hour (16%)
Tutorials	15 sessions of 1 hour (10%)
Work-based learning	52 sessions of 1 hour (35%)
Other activity	1 hour (1%)
Private study	58 hours (39%)
Total	150 hours

Private study description

58 hours guided independent learning (including VLE use) including:
20 hours of online extra support for foundation maths
10 hours of online learning via MOBIUS supported by apprenticeship tutor including formative
activities and self assessment

Other activity description

1 * 1 hour of computer-based test

Costs

No further costs have been identified for this module.

Assessment

You must pass all assessment components to pass the module.

Assessment group D1

	Weighting	Study time	Eligible for self-certification
Assessment component			
Computer-based test	30%		No
Reassessment component is the same			
Assessment component			

	Weighting	Study time	Eligible for self-certification
Online Examination	70%		No
Online QMP examination			

~Platforms - AEP,QMP

- Online examination: No Answerbook required
- Engineering Data Book 8th Edition
- Students may use a calculator
- Graph paper

Reassessment component is the same

Feedback on assessment

Model solutions to questions for exam preparation.
Cohort-level feedback to computer-based test.
Cohort-level feedback on examinations.
Verbal feedback in tutorial classes.
Support through advice and feedback hours.

Past exam papers for ES1A8

Availability

Courses

This module is Core for:

- Year 1 of DESA-H360 Undergraduate Electromechanical Engineering (Degree Apprenticeship)