ES2F6-15 Engineering Mathematics and Data Analytics

23/24

Department
School of Engineering
Level
Undergraduate Level 2
Module leader
Thomas Popham
Credit value
15
Module duration
10 weeks
Assessment
50% coursework, 50% exam
Study location
University of Warwick main campus, Coventry

Description

Introductory description

Engineering Mathematics and Data Analytics

Module aims

To build on the fundamental material introduced in Engineering Mathematics in Year 1 thereby ensuring that students are equipped with the necessary analytical and computational tools to tackle advanced material in modules taught in later years. To present and provide skills in the application of more advanced mathematics and systems modelling concepts. To develop skills in the use of MATLAB for modelling and analysis of engineering systems. To introduce computer programming concepts and develop programming skills within MATLAB.

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.

Applied linear algebra: linear matrix/vector equations and their solution (applications such as linear

regression analysis, electrical circuits and fluid networks); eigenvalue/eigenvector analysis (applications such as oscillation in circuits, structural dynamics, solution of state variable models and stability analysis);

Data manipulation in MATLAB

Data analysis techniques: Regression, classification, PCA and design of experiments.

MATLAB as a system modelling and analysis tool.

Learning outcomes

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

- Recognise and apply advanced mathematical tools and techniques to solve engineering based problems.
- Develop complex mathematical models of engineering systems.
- Solve complex engineering problems using MATLAB.
- Apply data analytics techniques to datasets produced by engineering processes and systems

Indicative reading list

Croft, A. and Davison, R., “Mathematics for Engineers: and MyMathLab: A Modern Interactive Approach”, 3rd Ed., Pearson, ISBN-10: 1408263238, 2010.
James, G., “Modern Engineering Mathematics : 4th edition with MyMathLab”, Pearson, ISBN-10: 027373413X, 2010.
Magrab, E.B. et al., “An Engineer's Guide to MATLAB: International Edition”, 3rd Ed. Pearson, ISBN-10: 0137039549, 2010.

Subject specific skills

Follow a methodical approach to engineering problem solving.

Transferable skills

Prioritise quality. Follow rules, procedures and principles in ensuring work completed is fit for purpose, and pay attention to detail / error checks throughout activities.

Study

Study time

Type	Required
Lectures	20 sessions of 1 hour (13%)
Supervised practical classes	4 sessions of 2 hours (5%)
Work-based learning	50 sessions of 1 hour (33%)
Other activity	2 hours (1%)
Private study	70 hours (47%)
Total	150 hours

Private study description

70 hours guided independent learning (including VLE use) including working through maths examples, preparation of data analytics coursework.

Other activity description

2x1h of on-line test

Costs

No further costs have been identified for this module.

Assessment

You must pass all assessment components to pass the module.

Assessment group C1

	Weighting	Study time	Eligible for self-certification
Assessment component			
Data Analysis Assessment 10 page assignment	50%		Yes (extension)
Reassessment component is the same			
Assessment component			
Online Examination QMP online examination	50%		No

	Weighting	Study time	Eligible for self-certification
~Platforms - AEP,QMP			

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

Reassessment component is the same

Feedback on assessment

Advice and feedback are available on the lecture material and examination questions, via online web-forum based in module support Moodle pages.

Past exam papers for ES2F6

Availability

Courses

This module is Core for:

- Year 2 of DESA-H360 Undergraduate Electromechanical Engineering (Degree Apprenticeship)