WM272-15 Numerical Methods

23/24

Department
WMG
Level
Undergraduate Level 2
Module leader
Karen Kudar
Credit value
15
Module duration
13 weeks
Assessment
100% coursework
Study locations
Distance or Online Delivery Primary
University of Warwick main campus, Coventry

Description

Introductory description

This module builds on the fundamental mathematics introduced in the first-year engineering mathematics module (WM175) and provides a basis for advanced modules in the 3rd and 4th year of the Applied Professional Engineering Programme. This module concentrates on fundamental numerical methods to provide the student with a range of alternate techniques with which to approach contextualised engineering/mathematical problems.

Module web page

Module aims

Look at contextualised mathematical (i.e., engineering) problems and identify how to navigate the problem using their mathematical knowledge. Identify the mathematical tools that will be required to solve a problem and recognise their limitations. Apply appropriate mathematical tools correctly to produce a solution that is presented in a concise and comprehensive manner.

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.

- Error analysis
- Numerical solutions of equations
- Approximating functions
- Numerical differentiation (including partial differentiation)
- Numerical solutions to differential equations.
- Numerical integration

Learning outcomes

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

- Implement a variety of numerical methods appropriately to investigate contextualised problems.
- Demonstrate the interconnectedness of mathematical concepts.
- Critically appraise the limitations of the mathematical tools used.
- Present solutions that contain the appropriate use of mathematical notation, terminology and methods.

Indicative reading list

Croft, A., Davison, R., Engineering Mathematics. 5th edition. Pearson 2019.
ISBN: 1292253649, 9781292253640

Stroud K.A., Booth D.J. Engineering Mathematics. 7th edition. Palgrave Macmillan 2013.
ISBN: 1137031204, 9781137031204

Engineering Mathematics Through Applications, Kuldeep Singh, 2nd edition. Palgrave Macmillan 2011. ISBN: 023027479X, 9780230274792

MATLAB for Engineers, Holly Moore. 5th edition. Pearson 2019. ISBN: 1292231203, 9781292231204

View reading list on Talis Aspire

Subject specific skills

Communication of mathematical knowledge.
Describing an engineering problem mathematically.
Breaking a contextualised problem down into smaller parts.
Quantitative reasoning.

Transferable skills

Analytical skills
Problem solving
Resilience

Time management
Critical thinking
Creativity
Intellectual rigour

Study

Study time

Type	Required
Lectures	10 sessions of 1 hour (7%)
Seminars	10 sessions of 2 hours (13%)
Tutorials	6 sessions of 1 hour (4%)
Online learning (independent)	4 sessions of 1 hour (3%)
Private study	50 hours (33%)
Assessment	60 hours (40%)
Total	150 hours

Private study description

The students will complete technology, solution formatting and mathematical resilience elements. Recapping of prior learning is expected where necessary.
Reading around the topics covered will provide the depth of understanding required to complete the course to a good standard. This may be both prior to and/or after the teaching and learning sessions.
Support from teaching staff is available but students will be expected to increasingly develop their independent learning skills.
Time spent on preparation for assessments is required - advice regarding this will be given.

Costs

No further costs have been identified for this module.

Assessment

You must pass all assessment components to pass the module.

Assessment group A1

	Weighting	Study time	Eligible for self-certification
Assessment 1 (Problem Sets/Coursework)	30%	18 hours	Yes (extension)

Problem sets covering new mathematical material from week 1 testing the students on their communication of mathematical solutions/ideas. To be completed in the students' own time although some time will be given in class to partially complete it (hence coursework in nature). Number of words not relevant as calculations will be submitted but a maximum of 15 sides of A4 is required.

Assessment 2 (Problem Sets/Coursework)	70%	42 hours	Yes (extension)

Problem sets with engineering contexts to be solved fully by students using the rest of the course content, showing a critical analysis of the tools used and a knowledge of the interconnectedness of previously taught mathematical concepts. To be completed in the students' own time (hence coursework in nature). Number of words not relevant as calculations will be submitted but a maximum of 20 sides of A4 is required.

Feedback on assessment

Assessment 1 (Problem Sets/Coursework): Individualised feedback given.
Assessment 2 (Problem Sets/Coursework): Individualised feedback given.

Availability

Courses

This module is Core for:

- Year 2 of UWMS-H7C3 Undergraduate Applied Professional Engineering (Control/Technical Support Engineer)
- Year 2 of DWMS-H7C7 Undergraduate Applied Professional Engineering (Control/Technical Support Engineer) (Degree Apprenticeship)
- Year 2 of UWMS-H7C2 Undergraduate Applied Professional Engineering (Electrical/Electronic Support Engineer)
- Year 2 of DWMS-H7C6 Undergraduate Applied Professional Engineering (Electrical/Electronic Support Engineer) (Degree Apprenticeship)
- Year 2 of UWMS-H7C1 Undergraduate Applied Professional Engineering (Manufacturing Engineer)
- Year 2 of DWMS-H7C5 Undergraduate Applied Professional Engineering (Manufacturing Engineer) (Degree Apprenticeship)
- Year 2 of UWMS-H7C4 Undergraduate Applied Professional Engineering (Product Design and Development Engineer)
- Year 2 of DWMS-H7C8 Undergraduate Applied Professional Engineering (Product Design

and Development Engineer) (Degree Apprenticeship)