



Module Specification

Mathematical Methods

Version: 2021-22, v1.0, 24 Jul 2019

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Part 1: Information

Module title: Mathematical Methods

Module code: UFMFF9-30-2

Level: Level 5

For implementation from: 2021-22

UWE credit rating: 30

ECTS credit rating: 15

Faculty: Faculty of Environment & Technology

Department: FET Dept of Engineering Design & Mathematics

Partner institutions: None

Delivery locations: Frenchay Campus

Field: Engineering, Design and Mathematics

Module type: Standard

Pre-requisites: Calculus and Numerical Methods 2021-22

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: Not applicable

Features: Not applicable

Educational aims: See Learning Outcomes

Outline syllabus: Vector Calculus:

Vector and Scalar Fields; grad, div and curl

Line Integrals and scalar potential

Double integrals; Surface Integrals; Volume Integrals

Integral Theorems

Partial Differential Equations:

Fourier Series: Periodic functions; Definitions and concepts; Evaluation of Fourier coefficients; Convergence; Odd and Even functions

Introduction to Partial Differential Equations. Change of variables; Separation of variables. Boundary value problems.

Fourier Series solutions; Use of Sine and Cosine Series.

Nonlinear Mathematics:

One-dimensional (1D) linear and affine maps.

1D Nonlinear maps: fixed points; stability; linearisation theorem.

Periodic points; cycles; stability of cycles; application.

Bifurcation; Period doubling.

Sarkovskii's Theorem; chaos

Numerical Methods:

Polynomial approximations; Cubic splines

Numerical Integration: Trapezoidal rule + error analysis; Gaussian quadrature;

Root finding: Bisection method. fixed-point iteration + analysis

Part 3: Teaching and learning methods

Teaching and learning methods: The module is delivered by means of lectures and tutorials or workshops. To prepare for assessment, students will be expected to undertake self-directed learning in addition to the directed learning which supports taught classes.

Contact time 72 hours

Assimilation and development of knowledge 150 hours

Coursework preparation 39 hours

Examination preparation 39 hours

TOTAL 300 HOURS

Scheduled teaching hours will take the form of:

- (i) A weekly whole group lecture, used to deliver new material and to consolidate previous material, and
- (ii) A weekly small-group session, in the form of either a computer workshop or a tutorial

Module Learning outcomes:

MO1 Solve mathematical problems using an understanding of the concepts, processes and techniques underlying a range of advanced mathematical methods

MO2 Show an understanding of the strengths and limitations of such methods

MO3 Use mathematical methods for problem analysis and solution in a range of application areas

MO4 Use a computer algebra tool to apply mathematical methods in a range of problems

MO5 Communicate mathematical ideas and concepts in written form

Hours to be allocated: 300

Contact hours:

Independent study/self-guided study = 228 hours

Face-to-face learning = 72 hours

Total = 300

Reading list: The reading list for this module can be accessed at [readinglists.uwe.ac.uk](https://uwe.rl.talis.com/modules/ufmff9-30-2.html) via the following link <https://uwe.rl.talis.com/modules/ufmff9-30-2.html>

Part 4: Assessment

Assessment strategy: The assessment strategy is designed to assess achievement of the learning outcomes, to support the development of skills and to provide individual feedback such that students are aware of their progress and level of achievement during the year.

Component B consists of a practically focussed assignment. The individual practically focussed assignment will assess summatively the module outcomes as they relate to material covered in semester one and will enable students to engage with a practical element of the module, coding. The assessment will also act as a mid-year progress indicator and as a source of feedback.

Component A consists of an e-assessment mid-way through the semester to provide rapid feedback. The end of module examination assesses work covered in the second semester.

The re-sit will also comprise two components.

Component B consists of a written assignment that will assess summatively the module outcomes as they relate to material covered in semester one and will enable students to engage with a practical element of the module, coding.

Component A consists of an examination assessing the module outcomes relating to material from semester two. All questions will be unseen.

Assessment components:

In-class test - Component A (First Sit)

Description: E-assessment

Weighting: 10 %

Final assessment: No

Group work: No

Learning outcomes tested: MO1, MO3, MO4

Examination (Online) - Component A (First Sit)

Description: Written examination (2hours)

Weighting: 40 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO1, MO2, MO3, MO5

Online Assignment - Component B (First Sit)

Description: coding assignment

Weighting: 50 %

Final assessment: No

Group work: No

Learning outcomes tested: MO1, MO2, MO3, MO4, MO5

Examination (Online) - Component A (Resit)

Description: Written examination (2 hours)

Weighting: 50 %

Final assessment: Yes

Group work: No

Learning outcomes tested:

Written Assignment - Component B (Resit)

Description: Written assignment

Weighting: 50 %

Final assessment: No

Group work: No

Learning outcomes tested:

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Mathematics and Statistics [Sep][SW][Frenchay][4yrs] BSc (Hons) 2020-21

Mathematics and Statistics [Sep][FT][Frenchay][3yrs] BSc (Hons) 2020-21

Mathematics {Foundation} [Sep][FT][Frenchay][4yrs] BSc (Hons) 2019-20

Mathematics {Foundation} [Sep][SW][Frenchay][5yrs] BSc (Hons) 2019-20

Mathematics with Qualified Teacher Status (QTS) {Foundation}

[Sep][FT][Frenchay][4yrs] BSc (Hons) 2019-20

Mathematics and Statistics {Foundation} [Sep][SW][Frenchay][5yrs] BSc (Hons)
2019-20

Mathematics and Statistics {Foundation} [Sep][FT][Frenchay][4yrs] BSc (Hons)
2019-20