Module Specification

Calculus and Numerical Techniques

Version: 2026-27, v3.0, Approved

Contents

Part 1: Information

Module title: Calculus and Numerical Techniques

Module code: UFMFJV-30-1

Level: Level 4

For implementation from: 2026-27

UWE credit rating: 30

ECTS credit rating: 15

College: College of Arts, Technology and Environment

School: CATE School of Computing and Creative Technologies

Partner institutions: None

Field: Computer Science and Creative Technologies

Module type: Module

Pre-requisites: None

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: The module contains the groundwork of methods needed by first year mathematics students and which are built on at later levels. Underlying concepts of calculus, which are fundamental to understanding, are explored. The module then builds on these concepts and investigates applications in differential equations and in numerical methods. As part of the module, the student will use mathematical software to construct and interpret solutions.

Features: Not applicable

Educational aims: The aim of this module is to develop knowledge and understanding in calculus and numerical methods and applications to support the study of related materials throughout the programme and to demonstrate the power of the mathematics in modelling and solving real world problems of interest.

Outline syllabus: Topics are likely to include but are not limited to:

Calculus:
Differentiation (from first principles);
Differentiation techniques and applications;
Sequences and series;
Multivariable functions and partial derivatives;
Critical point analysis;
Integration techniques and applications.

Differential Equations:
Basic concepts;
First order differential equations (including the use of an integrating factor and separation of variables);
Second order linear differential equations with constant coefficients.

Numerical Methods:
Finding zeros of real-valued functions;
Solving first order differential equations;
Approximating integrals;
Curve fitting;
Concepts of error and convergence.

Fourier Series:
Motivation from modelling;
Real and complex forms of Fourier series.

Part 3: Teaching and learning methods

Teaching and learning methods: The module is delivered by means of lectures and tutorials. The lectures will be delivered in a collaborative teaching space to allow underlying concepts and methods to be followed by exercises, small group discussions and research in a managed and coordinated manner. The tutorials will be delivered in a PC class to allow the flexibility for students to individually use mathematical software to support their learning as well as to work through theoretical exercises.

There will be a pre-lecture work package (containing for example background reading, screencasts to watch, assessment questions) which students are expected to complete in preparation for each class.

To prepare for assessment, students will be expected to undertake self-directed learning in addition to the directed learning which supports taught classes.

Module Learning outcomes: On successful completion of this module students will achieve the following learning outcomes.

MO1 Apply and evaluate appropriate techniques to solve problems in the domain of calculus, differential equations and numerical methods.

MO2 Implement simple numerical algorithms and evaluate their results.

MO3 Analyse and solve mathematical problems using mathematical software.

MO4 Communicate explanations of mathematical ideas and concepts, discussion of examples, and evaluation of solutions.

Hours to be allocated: 300

Contact hours:

Independent study/self-guided study = 228 hours

Staff-guided learning = 72 hours

Reading list: The reading list for this module can be accessed at readinglists.uwe.ac.uk via the following link https://uwe.rl.talis.com/index.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.

An examination mid-way through the module assesses competency with the mathematical methods taught in the first part of the course and provides students with rapid feedback. The majority of questions on the examination will have been encountered by students in formative assessments.

A written assignment in the form of a time constrained task will assess work covered throughout the module, including a pre-seen calculus/modelling case study, requiring students to demonstrate application and understanding of numerical methods.

Formative assessment will be conducted via weekly tasks that provide ongoing feedback both to students and to module teams, thereby allowing for timely adjustments to teaching strategies, and enabling students to monitor their progress and to address learning gaps before summative assessments take place.

Resit assessment will match first sit.

Assessment tasks:

Examination (First Sit)
Description: Examination (3 Hours).
Weighting: 50 %
Final assessment: No
Group work: No
Learning outcomes tested: MO1

Written Assignment (First Sit)

Description: Time Constrained Assessment: 3h assessment within an 8h submission window
Weighting: 50 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO2, MO3, MO4

Examination (Resit)
Description: Examination (3 Hours).
Weighting: 50 %
Final assessment: No
Group work: No
Learning outcomes tested: MO1

Written Assignment (Resit)
Description: Time Constrained Assessment: 3h assessment within an 8h submission window
Weighting: 50 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO2, MO3, MO4

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Mathematics [Frenchay] BSc (Hons) 2026-27

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