Module Specification

The Professional Mathematical Scientist I

Version: 2024-25, v4.0, 20 May 2024

Contents

Part 1: Information

Module title: The Professional Mathematical Scientist I

Module code: UFMFLV-30-1

Level: Level 4

For implementation from: 2024-25

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: In this module we aim to produce mathematical scientists for the 21st century, who not only have the technical knowledge required for participation in the key emerging industries, but who are also equipped with transferable skills such as critical and creative thinking, communication, innovation, problem solving, collaboration, and who are capable of assessing the human and global impact of science and technology.

By adapting our curriculum, pedagogy and assessment to incorporate these skills we aim to develop mathematical scientists that can adapt to the rapidly changing world, and contribute to a more productive, sustainable, and just future.

Features: Not applicable

Educational aims: The goal of this module is to enable students to experience how real-world problems can be modelled mathematically and hence solved. Participation in field trips will acquaint with real life challenges faced by professional mathematicians.

In doing this module, students will develop their professional skills using projects and problems of varying complexity, through active learning. In doing so, they will learn to appreciate project and modelling cycles.

Students will be expected to work as part of a team to carry out projects and communicate their findings.

Computer programming and version management will be an important strand of this module, which will provide a basic foundation that feeds into other modules at all level.

This module will complement the material taught on other modules, where challenges and active learning will help students develop their skills in mathematical modelling; computational thinking and statistical reasoning.

Outline syllabus: Computer Programming:

Arithmetic expressions, data visualisation, symbolic algebra, control statements (loops and condition statements), data types and structures (e.g. arrays, matrices, scalars, strings), procedures / functions, local and global variables, reading from and writing to text files, implementation and basic analysis of algorithms.

The Nature of Modelling and the Modelling Cycle:

Problem formulation, making underlying assumptions, modelling techniques,

verification of results, validation of model, presentation of information; algebraic, numerical and graphical. Interpretation and communication of results. The modelling activities will focus on problems that require familiarity with discrete mathematics structures and concepts. The entry level technical knowledge required to solve the mathematical problems involved in the projects will be derived either from other level 4 modules on the programme or from pre-existing knowledge of mathematics students would have from their previous study.

Professional attributes:

Research skills, scientific writing, group working skills, communication skills, presentation skills, reflective practice, ethics.

Part 3: Teaching and learning methods

Teaching and learning methods: Learning material will be delivered using lectures and workshops taught in collaborative learning spaces (TEAL rooms) and pc-labs.

Using appropriate case studies, in TEAL rooms, students will work in groups on problems that give them the opportunity to engage with research, industry and both local and global community sectors. The problems will be designed to develop core skills; IT, research, scientific writing, communication, presentation, referencing, reflection. Immersive Project weeks are used to integrate material from across the level 4 programme.

Programming will be taught using structured weekly workshops.

Professional and academic skills will be taught in workshops where small group discussions and where further on-line research can take place.

Problem formulation and mathematical modelling will be taught via lectures and workshops.

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

MO1 Implement the modelling cycle to solve problems based on real life scenarios using mathematical methods where a variety of solution methods are possible.

MO2 Write programs in an appropriate computer language, and apply appropriate software, to solve structured mathematical problems.

MO3 Communicate the findings of a mathematical investigation to a specified audience.

MO4 Reflect on the professional, cultural, ethical, or sustainability impact of mathematical applications.

Hours to be allocated: 300

Contact hours:

Independent study/self-guided study = 224 hours

Face-to-face learning = 72 hours

Total = 0

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/modules/ufmflv-30-1.html

Part 4: Assessment

Assessment strategy: Assessment will comprise a Group Presentation and a Skills Portfolio

The Group Presentation will be based on modelling a problem derived from a real life scenario and presenting the solutions of the mathematical enquiry. Peer assessment and a Q&A session will be used to determine an individual mark for this assessment.

Indicative content for "The Skills Portfolio" includes:
Library workbook and a reflective log which will identify, and provide evidence of how key skills have been developed and include a reflection on the cultural, ethical or sustainability impact of mathematical applications as experienced through project work and field trips.
A Group Project with individual component and peer assessment. The group project will be based on a problem derived from a real life scenario, and the solution will require application of methods developed across the level 4 programme as well as demonstrate knowledge of the syntax and structure of a programming environment and its application to mathematical problems.

The resit assessment will have the same essential structure as the first sit assessment, with group work tasks scaled accordingly for the size of the group.

Assessment tasks:

Presentation (First Sit)
Description: Presentation (total 20 minutes: 8 minutes presentation, 12 minutes Q&A)
Weighting: 25 %
Final assessment: Yes
Group work: Yes
Learning outcomes tested: MO1, MO2, MO4

Portfolio (First Sit)
Description: Library Workbook.
Reflective Log.
Report (2500 words)
Weighting: 75 %
Final assessment: No
Group work: Yes
Learning outcomes tested: MO1, MO2, MO3, MO4

Presentation (Resit)

Description: Presentation (total 20 minutes: 8 minutes presentation, 12 minutes Q&A)

Weighting: 25 %

Final assessment: Yes

Group work: Yes

Learning outcomes tested: MO1, MO2, MO4

Portfolio (Resit)

Description: Library Workbook.

Reflective Log.

Report (2500 words)

Weighting: 75 %

Final assessment: No

Group work: Yes

Learning outcomes tested: MO1, MO2, MO3, MO4

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Mathematics [Frenchay] BSc (Hons) 2024-25

Mathematics {Foundation} [Frenchay] BSc (Hons) 2023-24