



## **Module Specification**

# **Mathematical Modelling for Electronics and Robotics**

Version: 2023-24, v2.0, 02 Feb 2023

### **Contents**

<b>Module Specification .....</b>	<b>1</b>
<b>Part 1: Information .....</b>	<b>2</b>
<b>Part 2: Description .....</b>	<b>2</b>
<b>Part 3: Teaching and learning methods .....</b>	<b>3</b>
<b>Part 4: Assessment.....</b>	<b>4</b>
<b>Part 5: Contributes towards .....</b>	<b>6</b>

## Part 1: Information

**Module title:** Mathematical Modelling for Electronics and Robotics

**Module code:** UFMFFT-15-1

**Level:** Level 4

**For implementation from:** 2023-24

**UWE credit rating:** 15

**ECTS credit rating:** 7.5

**Faculty:** Faculty of Environment & Technology

**Department:** FET Dept of Computer Sci & Creative Tech

**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:** After successful completion of this module students will have the requisite mathematical knowledge and skill to model a variety of engineering problems that occur in electronic engineering and robotics. Areas of interest will include modelling and design of circuits and systems, signals and kinematics . Students will be prepared for more advanced study encountered in signal processing and control.

In this module students will be introduced to a computer based methodology for solving mathematical problems and presenting numerically based information. For example, students will be introduced to the modelling cycle with the phases of problem formulation and modelling, computer based implementation (e.g, via MATLAB) and verification.

The work will involve development of coding skills, but no prior knowledge is assumed. The module will integrate study of mathematics with engineering subjects studied in other level level 4 modules.

**Features:** Not applicable

**Educational aims:** This module provides the initial underpinning for mathematical skills and analysis of engineering problems studied across electronic engineering and robotics programmes.

**Outline syllabus:** Outline Syllabus:

Mathematical topics

Standard Engineering Functions, Solving Equations; analytical and numerical methods; Differentiation; rates of change and turning points; Integration –area, average value, root mean square values, linear constant coefficient differential equations; Matrices; Fourier series.

Engineering applications, modelling, implementation through software and verification.

### **Part 3: Teaching and learning methods**

**Teaching and learning methods:** The typical delivery follows a one or two week cycle with a one hour lecture used to introduce a problem of interest and then followed by a two hour workshop in a computer simulation lab where students will work either individually or in small groups on mathematical and engineering modelling problems.

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

**MO1** Formulate, implement and validate an appropriately constructed mathematical model of an engineering problem

**MO2** Select and apply appropriate techniques to the solution of mathematical problems encountered in engineering.

**MO3** Use mathematical software to implement appropriate mathematical solutions and produce a clear presentation of results.

**Hours to be allocated:** 150

**Contact hours:**

Independent study/self-guided study = 114 hours

Computer-based activities = 24 hours

Total = 150

**Reading list:** The reading list for this module can be accessed at [readinglists.uwe.ac.uk](https://rl.talis.com/3/uwe/lists/5B1050B0-513C-8C2B-BE55-1E407E0FC3F3.html?lang=en-GB&login=1) via the following link <https://rl.talis.com/3/uwe/lists/5B1050B0-513C-8C2B-BE55-1E407E0FC3F3.html?lang=en-GB&login=1>

## Part 4: Assessment

**Assessment strategy:** The assessment is designed to allow students to build confidence in their mathematical abilities over time and to be able to demonstrate the use of computer based methods for implementing mathematical solutions to engineering problems.

The assessment will involve a portfolio of e-assessments designed to provide regular and rapid feedback to students as to their progress and a two hour examination in a pc-lab where students will demonstrate that they can formulate a mathematical description of short engineering problems and then implement the solution using standard mathematical software (such as MATLAB).

Examinations are summative and assess the students' understanding of concepts and techniques, and their ability to apply them in relatively straightforward problems. The computer based tests help develop and assess competency of the mathematical methods taught in the course.

The resit assessment will follow the same format as the first sit assessment profile.

**Assessment tasks:**

**Examination (First Sit)**

Description: PC-based examination involving use of mathematical software (2 hours)

Weighting: 80 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO1, MO3

**Online Assignment (First Sit)**

Description: A series of short e-assessments taken at regular intervals during the module.

Weighting: 20 %

Final assessment: No

Group work: No

Learning outcomes tested: MO2

**Examination (Resit)**

Description: PC-based examination involving use of mathematical software (2 hours)

Weighting: 80 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO1, MO3

**Online Assignment (Resit)**

Description: A series of short e-assessments taken at regular intervals during the module.

Weighting: 20 %

Final assessment: No

Group work: No

Learning outcomes tested: MO2

## **Part 5: Contributes towards**

This module contributes towards the following programmes of study:

Mechatronics {Apprenticeship-UCW} [UCW] FdSc 2023-24

Mechatronics Engineering [Frenchay] MEng 2023-24

Electrical and Electronic Engineering [Frenchay] BEng (Hons) 2023-24

Electronic Engineering [Frenchay] BEng (Hons) 2023-24

Electronic and Computer Engineering {Apprenticeship-GLOSCOLL} [GlosColl] BEng (Hons) 2023-24

Mechatronics Engineering [Frenchay] BEng (Hons) 2023-24

Robotics [Frenchay] BEng (Hons) 2023-24

Electronic and Computer Engineering [Frenchay] BEng (Hons) 2023-24

Electronic and Computer Engineering [GlosColl] BEng (Hons) 2023-24

Electronic Engineering [Frenchay] BEng (Hons) 2022-23

Electronic Engineering {Foundation} [Frenchay] BEng (Hons) 2022-23

Robotics {Foundation} [Frenchay] BEng (Hons) 2022-23