**Module Specification**

# Robotic Fundamentals

Version: 2023-24, v2.0, 10 Jul 2023

## Contents

## Part 1: Information

**Module title:** Robotic Fundamentals

**Module code:** UFMF4X-15-M

**Level:** Level 7

**For implementation from:** 2023-24

**UWE credit rating:** 15

**ECTS credit rating:** 7.5

**Faculty:** Faculty of Environment & Technology

**Department:** FET Dept of Engineering Design & Mathematics

**Partner institutions:** None

**Field:** Engineering, Design and Mathematics

**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:** This module focuses on three fundamental aspects of robots:

The mechanics of robot bodies; kinematic properties and algorithms

Programming

**Features:** Not applicable

**Educational aims:** See Learning Outcomes

**Outline syllabus:** Topics will include:

Forward and Inverse kinematics solutions for manipulators with multiple degrees of freedom, Denavit Hartenberg notations

Parallel manipulators

Manipulator trajectories, velocities and forces. Jacobians

Forward and Inverse dynamics

Programming in MATLAB

## Part 3: Teaching and learning methods

**Teaching and learning methods:** Scheduled learning:
Sessions will include tutorials (2 hours per week) and intensive workshops - practical sessions (1-2 hours per week).

Independent learning includes hours engaged with essential reading, case study preparation, assignment preparation and completion etc. You'll be expected to spend about 75 hours outside of the scheduled time in these activities.

Contact Hours:

Lectures : 12 hours

Practical / Facilitated Group Work : 24 hours

Self-directed learning : 72 hours

Summative assessment : 42 hours

Total hours : 150

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

**MO1** Demonstrate knowledge and understanding of theories and techniques required to analyse and synthesise a robot manipulator for variety of tasks including serial manipulators

**MO2** Demonstrate algorithm development in the context of robotic systems

**MO3** Apply commonly used tools and techniques to enable the efficient solutions of different robotic kinematic architectures and design problems

**MO4** Create and critically evaluate the design of serial robotic architectures from underlying principles of robot dynamics

**MO5** Explore, develop, and practise team working through sharing the work

**Hours to be allocated:** 150

**Contact hours:**

Independent study/self-guided study = 114 hours

Face-to-face learning = 36 hours

Total = 150

**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/ufmf4x-15-m.html

# Part 4: Assessment

**Assessment strategy:** The assessment for this module is as follows:

A 3 hour examination.

Coursework: A group assignment of 3000 recommended words. Additionally, there will be opportunities for formative assessment (which does not contribute to the module mark). Feedback will be given on students' work each week.

Resit is the same as the first sit

Resit deliverable(s) will be scaled appropriately to group size and task complexity

**Assessment tasks:**

**Laboratory Report** (First Sit)

Description: Group lab report 3000 words (kinematics)

Weighting: 50 %

Final assessment: No

Group work: Yes

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

**Examination** (First Sit)

Description: Examination  (3 hours)

Weighting: 50 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO1, MO3, MO4

**Laboratory Report** (Resit)

Description: Group lab report 3000 words (kinematics)

Resit deliverable(s) will be scaled appropriately to group size and task complexity

Weighting: 50 %

Final assessment: No

Group work: Yes

Learning outcomes tested:

**Examination** (Resit)

Description: Examination  (3 hours)

Weighting: 50 %

Final assessment: Yes

Group work: No

Learning outcomes tested:

## Part 5: Contributes towards

This module contributes towards the following programmes of study:

Robotics {Joint Award}[Frenchay] MSc 2023-24

Robotics and Autonomous Systems {Joint Award}[Frenchay] PhD 2023-24