Module Specification

Robotic Fundamentals

Version: 2025-26, v2.0, Approved

Contents

Part 1: Information

Module title: Robotic Fundamentals

Module code: UFMF4X-15-M

Level: Level 7

For implementation from: 2025-26

UWE credit rating: 15

ECTS credit rating: 7.5

College: College of Arts, Technology and Environment

School: CATE School of Engineering

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: This module aims to provide students with a thorough understanding of the fundamental principles of robotics, focusing on the mechanics of robot bodies, kinematic properties and algorithms, and programming. Through a blend of theoretical instruction and practical application, students will learn to analyze and design robot manipulators, develop algorithms for motion control, and implement these concepts using MATLAB. Key topics include forward and inverse kinematics, dynamics, and trajectory planning. The module also emphasizes collaborative work, preparing students for teamwork in professional environments. Upon completion, students will have the foundational knowledge and skills necessary for advanced study or careers in robotics and related fields.

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 lectures (2 hours per week) , and practical sessions (1 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 : 24 hours

Practical / Facilitated Group Work : 12 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, techniques, and algorithm development for analysing and synthesising serial robotic manipulators.

MO2 Apply commonly used tools and techniques to solve robotic kinematics, dynamics, and design challenges efficiently.

MO3 Critically evaluate and design serial robotic architectures based on fundamental principles of robot dynamics.

Hours to be allocated: 150

Contact hours:

Independent study/self-guided study = 114 hours

Face-to-face learning = 36 hours

Reading list: The reading list for this module can be accessed at readinglists.uwe.ac.uk via the following link https://rl.talis.com/3/uwe/lists/72F0BFCE-F74E-FBE5-716E-586FD009B20A.html?lang=en-GB

Part 4: Assessment

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

Online Examination (100%): A 3-hour online examination; Students will have an additional 2-hour submission window to upload their completed exam.

Resit: The resit will be the same format as the first sit.

Assessment tasks:

Examination (Online) (First Sit)
Description: (3 hours exam 2 hours submission)
Weighting: 100 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2, MO3

Examination (Online) (Resit)
Description: Online Examination 3 hours, 2 hours submission (5 hours)
Weighting: 100 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2, MO3

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Robotics {Joint Award}[Frenchay] MSc 2025-26

Robotics and Autonomous Systems {Joint Award}[Frenchay] PhD 2025-26

Robotics and Autonomous Systems {Joint Award}[Frenchay] PhD 2025-26