Module Specification

Robotic Fundamentals

Version: 2024-25, v2.0, 30 Jul 2024

Contents

Part 1: Information

Module title: Robotic Fundamentals

Module code: UFMF4X-15-M

Level: Level 7

For implementation from: 2024-25

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: 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 = 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/ufmf4x-15-m.html

Part 4: Assessment

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

Online Examination (50%): A 3-hour online examination; Students will have an additional 2-hour submission window to upload their completed exam.

Coursework (50%): A group assignment of 3000 recommended words. Opportunities for formative assessment (which does not contribute to the module mark) will be provided. Feedback will be given on students' work each week.

Resit: The resit will be the same format 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 (Online) (First Sit)
Description: (3 hours exam 2 hours submission)
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: MO1, MO2, MO3, MO4, MO5

Examination (Online) (Resit)

Description: Online Examination (5 hours)

Weighting: 50 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO1, MO3, MO4

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Robotics {Joint Award}[Frenchay] MSc 2024-25

Robotics and Autonomous Systems {Joint Award}[Frenchay] PhD 2024-25

Robotics and Autonomous Systems {Joint Award}[Frenchay] PhD 2024-25