# Module Specification

## Robot Learning for Control

Version: 2025-26, v2.0, Approved

**Contents**

## Part 1: Information

**Module title:** Robot Learning for Control

**Module code:** UFME7R-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:** Standard

**Pre-requisites:** None

**Excluded combinations:** None

**Co-requisites:** None

**Continuing professional development:** No

**Professional, statutory or regulatory body requirements:** None

## Part 2: Description

**Overview:** Learning based technologies are rapidly becoming more popular than conventional control-based methods for robotic manipulation and control. This module introduces state of the art robotic learning knowledge for control to satisfy students' need to learn up-to-date robotic knowledge.

**Features:** Not applicable

**Educational aims:** This module will bring students state of the art robotic learning knowledge applied to control

**Outline syllabus:** Introduction to a wide range of skill-learning algorithms for robot control.

Robot skill modelling using probabilistic models; multidimensional Gaussian model, Gaussian mixture models (GMMs), and Gaussian mixture regression.

Generalization of robot skills using Dynamic movement primitives (DMPs) for adaptive motion planning and obstacle avoidance.
Understanding the fundamentals of robotic control, system components, feedback control, and stability criteria for dynamic systems.

Application of robot teaching and learning to transfer human-like skills to robots using probabilistic models.

Use of programming tools, such as Matlab and Simulink, to integrate robot skill-learning algorithms with control systems

## Part 3: Teaching and learning methods

**Teaching and learning methods:** The teaching and learning method involves a combination of theoretical knowledge and practical implementation to enhance students' understanding of robot learning. By incorporating hands-on experimentation and practice, students gain state-of-the-art theoretical knowledge of robot learning as well as practical skills, problem-solving abilities, and a deeper understanding of the challenges and opportunities of robot learning for control. This teaching and learning method encourages active engagement, critical thinking, and application of theoretical knowledge in real-world applications.

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

**MO1** Evaluate different machine learning methods considering their strengths, limitations, and applicability in real-world robot control.

**MO2** Apply robot learning algorithms to teach robots new skills and behaviours, enabling them to adapt and generalize from training data.

**Hours to be allocated:** 150

**Contact hours:**

Face-to-face learning = 12 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/3924ABAC-957B-CF56-115A-5A95093E1998.html?lang=en&login=1

## Part 4: Assessment

**Assessment strategy:** The assessment strategy for this course aims to accomplish several objectives:

Provide a measurement of students' achievement and certify their learning outcomes.

Develop and refine the course by incorporating feedback from students.

Evaluate students' learning skills in the practical application of robotics.

The learning outcomes for this module will be assessed through a portfollio of works:
[50% written report] A written technical report (~1500 words) summarising a student's solutions to a series of tasks that will be set during the weekly practical teaching sessions.
[30% video presentation] Students will submit a 10 minute video presentation of their solutions to these tasks in addition to the written report.
[20% demonstration] Each student will be asked to demonstrate to class tutors one of their task solutions (chosen at random) in the last weeks of the teaching block.

Plagiarism measures: We will employ anti-plagiarism software to detect any instances of plagiarism after the work is submitted. The video submission and in-person demonstration will also be used to verfy the authenticity and integrity of the written work submitted.

Resit strategy: Additional tasks will be set, at the same depth and level as in the first sit, for which a technical written report summarising the solutions will be submitted along with a video overview as in the first sit.

**Assessment tasks:**

**Portfolio** (First Sit)
Description: Portfolio
Weighting: 100 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2

**Portfolio** (Resit)
Description: (60% written report) new tasks set equivalent to first-sit with submitted solutions as a technical document (<2500 words)
(40% video presentation) 10-minute video submission of task summaries
Weighting: 100 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2

## Part 5: Contributes towards

This module contributes towards the following programmes of study:

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