# Module Specification

Robot Learning

Version: 2026-27, v2.0, Approved

## Contents

## Part 1: Information

**Module title:** Robot Learning

**Module code:** UFMEAX-15-3

**Level:** Level 6

**For implementation from:** 2026-27

**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 introduces and explores the application of machine learning techniques into the control of robotic and mechatronic systems. The underlying theories of machine learning in the control of robot motion, planning and decision making will be covered including state-of-the art techniques and their applications.

**Features:** Not applicable

**Educational aims:** The aim of this modules is to equip students with the knowledge and skill to assess, develop and apply current machine learning techniques and algorithms to problems in robotic control, and other fields of engineering, to accommodate uncertainty and complexity.

**Outline syllabus:** Introduction:
Review of the links with other disciplines, e.g., classical AI, psychology, ethology, neuroscience and classical control. Scope and limitations of this module, especially with respect to classical control and AI.

Fundamentals:
Working definition of supervised, unsupervised and reinforcement learning.
Distinction between classification, regression, and clustering.

Architectures:
Linear and Non-linear regression; Probabilistic systems; Reinforcement learning; Evolutionary computing; Neural network and Neuro-fuzzy inference systems; Recurrent and event based Neural networks, Generative Neural networks

Example applications:
Inverse kinematics, locomotion, path/trajectory planning, navigation, dexterous manipulation

## Part 3: Teaching and learning methods

**Teaching and learning methods:** Lectures will introduce the fundamental concepts. Tutorial case study sessions will be used for two purposes. They will be used to expose students to demonstrations of the architectures in action. They will also be used to discuss real implementations of these techniques, each designed to illustrate the essential details of a particular concept or technique, and especially its strengths and weaknesses in both technical and business contexts. At all times specific examples will be used to "ground" the theory and students will use the case study material to contribute towards their portfolio of assessment

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

**MO1** Compare and evaluate contemporary machine learning techniques to problems of relevance to robotics.

**MO2** Design and implement machine learning algorithms to robotic control applications.

**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/1BDC65EE-D3F5-61D8-5387-713ED0BB5238.html

## Part 4: Assessment

**Assessment strategy:** The learning outcomes will be verfied through a portfolio of 3 assessment points throughout the course:

A) The submission of logbook of laboratory-based exercises undertaken during the initial practical sessions of the course (mid-term submission) (25%)

B) Submission of a written report summarising background, motivation, design process and results of individual applied Machine Learning project (50%)

C) Software based demonstration of performance of Machine Learning solution to project (25%)

Resit strategy:

Resit assessment will follow the same format as first sit accept lab exercises will be included into the written report submission that will be weighted accordingly

**Assessment tasks:**

**Portfolio** (First Sit)

Description: Project on a machine learning problem, submitting logbook lab exercises, Written report, and code demonstration
Weighting: 100 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2

**Portfolio** (Resit)
Description: Project on a machine learning problem with multiple facets.
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 [Frenchay] BEng (Hons) 2024-25

Robotics {Foundation} [Frenchay] BEng (Hons) 2023-24