



Module Specification

Machine Learning Algorithms

Version: 2026-27, v2.0, Approved

Contents

Module Specification	1
Part 1: Information	2
Part 2: Description	2
Part 3: Teaching and learning methods	4
Part 4: Assessment.....	6
Part 5: Contributes towards	7

Part 1: Information

Module title: Machine Learning Algorithms

Module code: UFCEP1-30-M

Level: Level 7

For implementation from: 2026-27

UWE credit rating: 30

ECTS credit rating: 15

College: College of Arts, Technology and Environment

School: CATE School of Computing and Creative Technologies

Partner institutions: None

Field: Computer Science and Creative Technologies

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 will introduce students to a range of contemporary machine learning techniques, their principles, characteristics and applications to real-world problems. It will give students the opportunity to learn skills in how to select, apply and evaluate solutions based on these techniques using the state-of-the-art software tools.

Features: Not applicable

Educational aims: The module introduces students to the paradigm of Machine Learning, and its sub-division into unsupervised, supervised, and reinforcement learning.

The module places an emphasis on the practical applications of Machine Learning techniques, enabling students to gain hands-on experience in developing machine learning solutions to real-world problems.

The module also enables students to gain core competency in identifying and formulating context-appropriate responses to the ethical and societal concerns surrounding the construction and deployment of machine learning-based solutions.

Outline syllabus: The start of the module will be devoted to establishing core competency in coding and the use of key Python libraries for data manipulation, particularly pandas. Thereafter, the module materials are broadly divided into four main topics, with potential wider societal and ethical implications highlighted throughout the coverage of each area.

The module begins with an exploration of the paradigm of Machine Learning as an approach to automatically learn models from data, establishing foundational understanding of how machines can derive insights and make predictions from datasets.

The first major topic addresses supervised learning for extracting insights from labelled datasets. This comprehensive section covers several critical areas of study. Students will examine key technical challenges in applying machine learning techniques to real-world problems, including the appropriate partitioning of data for training and testing purposes, and the practical realities of data handling such as preprocessing, managing missing values, and addressing imbalanced class distributions.

The module explores how to formulate application problems involving various types of data and labels, examining distinctions between classification, regression, and time-sequence prediction tasks. This includes understanding the implications for

selecting appropriate algorithms and evaluation metrics based on problem characteristics.

A comprehensive survey of contemporary supervised learning approaches will include instance-based methods such as k-Nearest Neighbours, rule and decision tree induction techniques, and kernel methods including support vector machines. The curriculum also covers Artificial Neural Networks, progressing from basic perceptrons through multi-layer perceptrons to an introduction to Deep Learning concepts.

Finally, ensemble methods will be examined, including bagging and boosting techniques, with particular attention to Random Forests as a practical implementation of ensemble principles. Throughout this section, students will develop understanding of how combining multiple models can often achieve superior performance compared to individual approaches.

The second topic introduces reinforcement learning principles, focusing on how systems can learn optimal behaviours through periodic rewards and feedback. Key contemporary algorithmic approaches will be explored, demonstrating how agents can develop strategies through trial-and-error interactions with their environment.

The third topic covers unsupervised learning techniques for extracting patterns from unlabelled data. Students will examine clustering algorithms alongside comparative analysis of top-down versus bottom-up clustering approaches. This section emphasises how meaningful structures can be discovered in data without predetermined categories or outcomes.

Part 3: Teaching and learning methods

Teaching and learning methods: Lectures will introduce the core concepts and algorithmic essences of each topic listed in the syllabus. Each topic will be explained and illustrated with intuitive examples, expanded with developing the practical solutions to the real-world problems.

Practical classes will provide supervised activities to cover different problem domains, with an emphasis on developing students' hands-on experience in solving real-world problems using contemporary machine learning techniques.

Scheduled teaching and learning study hours include lectures , practical classes/tutorials/project supervision/software demonstration.

Additionally, a mixture of online resources (through the Virtual Learning Environment) and scheduled sessions will provide background and resources to help students develop their reflective writing skills.

Independent learning study hours include engagement with essential and exploratory reading, practical study, assignment preparation and completion etc.

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

MO1 Evaluate, appraise and analyse machine learning algorithms to solve real world problems, justifying the choices with respect to requirements and performance indicators.

MO2 Effectively communicate the results of machine learning solutions for real world problems to a range of different audiences.

MO3 Critically appraise a proposed machine learning approach to a given problem, reporting on its efficacy and efficiency in meeting the ethical and social requirements, and how to improve further.

Hours to be allocated: 300

Contact hours:

Independent study/self-guided study = 252 hours

Face-to-face learning = 48 hours

Reading list: The reading list for this module can be accessed at [readinglists.uwe.ac.uk](https://uwe.rl.talis.com/modules/ufcep1-30-m.html) via the following link <https://uwe.rl.talis.com/modules/ufcep1-30-m.html>

Part 4: Assessment

Assessment strategy: Presentation (15 minutes per group).

The module will be assessed through a group-based live presentation. Students will work in small groups throughout the term to explore a topic or solve a problem related to the core areas of the module: Introduction, Supervised/Unsupervised Machine Learning, Ensemble Methods and Neural Approaches.

The only formal assessment will be a final live presentation delivered by each group. In this presentation, students will demonstrate their understanding of the topic, explain and justify their approaches, critically discuss their findings and propose innovative future works. Address relevant ethical and practical considerations. The presentation will also assess students' ability to communicate complex ideas clearly and respond to questions.

Formative Feedback:

Tutors will provide formative feedback during lab sessions.

Resit:

Students required to resit will undertake the same assessment format.

Assessment tasks:

Presentation (First Sit)

Description: Presentation (30 minutes per group including QA)

Weighting: 100 %

Final assessment: Yes

Group work: Yes

Learning outcomes tested: MO1, MO2, MO3

Presentation (Resit)

Description: Presentation (30 minutes per group including QA)

Weighting: 100 %

Final assessment: Yes

Group work: Yes

Learning outcomes tested: MO1, MO2, MO3

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Artificial Intelligence [Frenchay] MSc 2026-27

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