

## Module specification

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<b>Module Code</b>	COM479
<b>Module Title</b>	Fundamentals of Machine Learning
<b>Level</b>	4
<b>Credit value</b>	20
<b>Faculty</b>	FACE
<b>HECoS Code</b>	100992
<b>Cost Code</b>	GACP
<b>Pre-requisite module</b>	N/A

### Programmes in which module to be offered

<b>Programme title</b>	<b>Core/Optional/Standalone</b>
BSc (Hons) Computer Science	Core
BSc (Hons) Computer Science with Industrial Placement	Core
BSc (Hons) Computing for Business	Core
Stand-alone module aligned to BSc (Hons) Computer Science for QA and assessment	Option

### Breakdown of module hours

Learning and teaching hours	12 hrs
Placement tutor support hours	0 hrs
Supervised learning hours e.g. practical classes, workshops	24 hrs
Project supervision hours	0 hrs
<b>Active learning and teaching hours total</b>	<b>36 hrs</b>
Placement hours	0 hrs
Guided independent study hours	164 hrs
<b>Module duration (Total hours)</b>	<b>200 hrs</b>

### Module aims

The aim of this module is to provide students with a solid foundation in the principles and techniques of machine learning. By the end of the module, students should be able to apply a range of supervised and unsupervised learning algorithms to real-world problems, evaluate the performance of different models, and be aware of ethical considerations and potential biases involved in machine learning.



## Module Learning Outcomes

At the end of this module, students will be able to:

<b>1</b>	Identify the core concepts and principles of machine learning.
<b>2</b>	Apply Machine Learning algorithms to real-world problems.
<b>3</b>	Communicate machine learning concepts and results to a non-technical audience effectively.

## Assessment

This section outlines the type of assessment task the student will be expected to complete as part of the module. More details will be made available in the relevant academic year module handbook.

Indicative Assessment Tasks:

Students will be tasked with applying machine learning algorithms to given real-world problems using industry standard tools and techniques. They will also be required to capture data from the integrated development environment (IDE) and then give a professional and coherent presentation of their findings and conclusions based on those results.

Assessment number	Learning Outcomes to be met	Type of assessment	Duration/Word Count	Weighting (%)	Alternative assessment, if applicable
1	1, 2, 3	Coursework	4000 Words or Equivalent	100%	

## Derogations

N/A

## Learning and Teaching Strategies

The learning and teaching strategies for this module will typically involve a combination of lectures, practical exercises, and independent study. Lectures will provide an overview of the key concepts and techniques, while practical exercises will allow students to apply these concepts to real-world problems using industry-standard tools. Independent study will be encouraged through assigned readings, online resources, and self-directed learning tasks, as well as the opportunity for students to work on individual and group projects. Formative and summative assessments will be used to evaluate students' understanding of the material and their ability to apply machine learning techniques to solve problems. In line with the Active Learning Framework, this module will be blended digitally with both a VLE and online community. Content will be available for students to access synchronously and asynchronously and may indicatively include first and third-party tutorials and videos, supporting files, online activities any additional content that supports their learning. As this module progresses, the strategies will change to best support a diverse learning environment.



Initially, the module will start with a heavier reliance on engaging tutor-led lectures, demonstrations, and workshops to ensure that the students get the relevant threshold concepts. As the module continues experiential and peer learning strategies will be encouraged as the students' progress with their portfolio work. Assessment will occur throughout the module to build student confidence and awareness in relation to applying machine learning in practical applications within the current climate.

## Welsh Elements

This module is designed to support Welsh-speaking students in line with the Welsh Language Standards. While the primary delivery will be in English, students will have the opportunity to submit assessments, including coursework and projects, in Welsh if preferred. Relevant module materials, such as reading lists, key texts, and guidance, will be available bilingually upon request, ensuring accessibility for all students. Additionally, where possible, guest speakers, case studies, or examples may include references to the Welsh business context, especially in areas such as data use in local industries and Welsh public sector organisations.

The department encourages students to develop bilingual digital skills by incorporating Welsh-language datasets, tools, and resources where appropriate, offering an inclusive learning environment. We also support the development of bilingual visualisation techniques, enabling students to create digital outputs that reflect the Welsh language, should they wish to do so.

## Indicative Syllabus Outline

Indicative syllabus includes topic areas that may include:

- Introduction to Machine Learning
- Linear Models
- Decision Trees
- Random Forests
- Evaluation Metrics
- Neural Networks
- Deep Learning
- Ethics and Bias
- Image/Speech Recognition
- Natural Language Processing
- Data Pre-processing

This is an indicative list.

## Indicative Bibliography

Please note the essential reads and other indicative reading are subject to annual review and update.

### Essential Reads:

Müller, A.C. & Guido, S. (2016). Introduction to Machine Learning with Python: A Guide for Data Scientists. O'Reilly.



**Other indicative reading:**

Géron, A. (2019). Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow. O'Reilly.

Raschka, S. & Mirjalili, V. (2017). Python Machine Learning. Packt.

Burkov, A. (2019). The Hundred-Page Machine Learning Book.

Grus, J. (2019). Data Science from Scratch: First Principles with Python. O'Reilly.

Ng, A. (2022). Machine Learning. Cambridge University Press.

**Administrative Information**

<b>For office use only</b>	
Initial approval date	08/11/2023
With effect from date	Sept 2026
Date and details of revision	March 2026 – Addition of BSc (Hons) Computing for Business from Sept 26
Version number	2

