Prifysgol Wrecsam
Wrexham University

Module specification

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Module Code	COM479
Module Title	Fundamentals of Machine Learning
Level	4
Credit value	20
Faculty	FACE
HECoS Code	100992
Cost Code	GACP

Programmes in which module to be offered

Programme title	Is the module core or option for this programme
BSc (Hons) Computer Science	Core
BSc (Hons) Computer Science with Industrial Placement	Core
Stand-alone module aligned to BSc (Hons) Computer Science for QA and assessment	Option

Pre-requisites

N/A

Breakdown of module hours

Learning and teaching hours	12 hrs
Placement tutor support	0 hrs
Supervised learning e.g. practical classes, workshops	24 hrs
Project supervision (level 6 projects and dissertation modules only)	0 hrs
Total active learning and teaching hours	**36** hrs
Placement / work based learning	0 hrs
Guided independent study	164 hrs
Module duration (total hours)	**200** hrs

For office use only	
Initial approval date	08/11/2023

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With effect from date	Sept 2024
Date and details of revision	
Version number	1

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:

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

Assessment

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 on of their findings and conclusions based on those results.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)
1	1,2,3	Coursework	100%

Derogations

None

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.

Indicative Syllabus Outline

This is an indicative list:

- 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

Indicative Bibliography:

Please note the essential reads and other indicative reading are subject to annual review and update. Please *ensure correct referencing format is being followed as per University Harvard Referencing Guidance.*

Essential Reads

A. C. Muller, A.C. and S. Guido, *Introduction to Machine Learning with Python: A Guide for Data Scientists*. O'Reilly, 2016.

Other indicative reading

A. Géron, *Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow*, Oreilly, 2019.

S. Raschika, V. Mirjalili, *Python Machine Learning*, Pack Publishing, 2017.

A. Burkov, *The Hundred-Page Machine Learning Book*, Andriy Burkov, 2019.

J. Grus, *Data Science from Scratch: First Principles with Python*, Oreilly, 2019.

A. Ng, *Machine Learning*, Cambridge Press, 2022.