Prifysgol Wrecsam
Wrexham University

Module specification

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Module Code	COM757
Module Title	Artificial Intelligence
Level	7
Credit value	20
Faculty	FACE
HECoS Code	100359
Cost Code	GACP

Programmes in which module to be offered

Programme title	Is the module core or option for this programme
MSc Computer Science	Core
MSc Computer Science with Advanced Practice	Core

Pre-requisites

N/A

Breakdown of module hours

Learning and teaching hours	11 hrs
Placement tutor support	0 hrs
Supervised learning e.g. practical classes, workshops	10 hrs
Project supervision (level 6 projects and dissertation modules only)	0 hrs
Total active learning and teaching hours	**21** hrs
Placement / work based learning	0 hrs
Guided independent study	179 hrs
Module duration (total hours)	**200** hrs

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Initial approval date	08/11/2023
With effect from date	Sept 2024

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Date and details of revision	
Version number	1

Module aims

This module aims to provide students with a deep understanding of advanced concepts, algorithms, and techniques used in artificial intelligence (AI), as well as their ethical and societal implications. Students will develop practical skills in designing, implementing, and evaluating complex AI systems to solve real-world problems, using advanced programming languages, tools, and frameworks. Through independent research, critical analysis, and effective communication, students will be able to contribute to the knowledge and practice of AI and its applications in various domains.

Module Learning Outcomes - at the end of this module, students will be able to:

1	Design and implement complex AI systems to solve real-world problems, considering ethical and societal implications.
2	Critically evaluate contemporary and emerging AI research and methods.
3	Synthesize and disseminate advanced AI concepts and research to both technical and non-technical audiences.

Assessment

Indicative Assessment Tasks:
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.

The assessment for this module is designed to evaluate the student's understanding of the course material, their ability to apply theoretical concepts to practical problems, and their communication skills. Students will complete a practical assignment that involves building and testing an AI implementation. The assignment will assess their ability to apply AI concepts to real-world problems, and their proficiency in using programming tools and libraries. Students will write a research report presenting data gathered from their implemented AI coursework piece. The report (1500 words) will demonstrate their ability to critically evaluate existing research, synthesize ideas, and present a coherent argument.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)
1	1	Coursework	70%
2	2,3	Written Assignment	30%

Derogations

None

Learning and Teaching Strategies

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 self-efficacy in relation to applied Artificial Intelligence (AI) concepts.

Indicative Syllabus Outline

The following list is indicative and may change:

- Introduction to Artificial Intelligence: history, types, and applications
- Mathematical Foundations of AI
    - Linear algebra
    - Calculus
    - Probability theory
    - Statistics
- Machine Learning Algorithms: supervised, unsupervised, and reinforcement learning; decision trees, support vector machines, neural networks, and deep learning
- Natural Language Processing
- Computer Vision:
    - Image classification
    - Object detection
    - Segmentation
    - Tracking
- Robotics
    - Control theory
    - Kinematics, and dynamics
    - Robot perception
    - Planning, and Control
- AI Evaluation and Impact
    - Metrics for evaluating AI performance
    - Ethical and Social
- Reinforcement learning
- Transfer learning
- Generative models
- Multi-agent systems

Indicative Bibliography:

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

Essential Reads

S. Russell & P Norvig, *Artificial Intelligence: A Modern Approach,* Global Edition, Pearson, 2021.

Other indicative reading

C. O'Neil, *Weapons of Math Destruction: How Big Data Increases Inequality and Threatens Democracy,* Penguin, 2017.
S. Russell, *Human Compatible: Artificial Intelligence and the Problem of Control,* Allen Lane, 2019.
N. Bostrom, *Superintelligence: Paths, Dangers, Strategies*, OUP Oxford, 2016.
P. Domingos, *The Master Algorithm: How the Quest for the Ultimate Learning Machine Will Remake Our World*, Penguin, 2017.
G. Kasparov & M Greengard, *Deep Thinking: Where Machine Intelligence Ends and Human Creativity Begins,* 2018.
M. Tegmark, *Life 3.0: Being Human in the Age of Artificial Intelligence,* Penguin, 2018.