

Module specification

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Module Code	COM768
Module Title	Intelligent Agents
Level	7
Credit value	20
Faculty	FACE
HECoS Code	100757
Cost Code	GACP
Pre-requisite module	None

Programmes in which module to be offered

Programme title	Core/Optional/Standalone
MSc Artificial Intelligence	Core

Breakdown of module hours

Learning and teaching hours	10 hrs
Placement tutor support hours	0 hrs
Supervised learning hours e.g. practical classes, workshops	11 hrs
Project supervision hours	0 hrs
Active learning and teaching hours total	21 hrs
Placement hours	0 hrs
Guided independent study hours	179 hrs
Module duration (Total hours)	200 hrs

Module aims

This module introduces students to the principles and practical challenges of creating autonomous intelligent agents capable of learning and decision-making in complex environments. Students will develop a broad understanding of key frameworks and techniques such as reinforcement learning for agent training, multi-agent coordination and communication methods, and the use of virtual simulations to model intelligent behaviour. This will be combined with the analytical skills required to compare, select, and justify appropriate agent-based approaches for real-world tasks, while developing effective agent solutions in software.



Module Learning Outcomes

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

1	Critically evaluate advanced theories, methodologies, and frameworks in project management and their application to information technology and business contexts
2	Analyse and interpret key algorithms and architectures in autonomous and multi-agent systems
3	Design and implement intelligent agents using industry-standard tools and simulations.
4	Communicate and critically reflect on agent system outcomes, proposing informed improvements.

Assessment

Indicative Assessment Tasks:

Students will complete a practical project that involves designing and implementing one or more intelligent agents within suitable simulation or experimental environments. The portfolio will demonstrate how the agent(s) learn, adapt, and perform assigned tasks. This may include experiments such as testing different learning strategies, comparing decision-making approaches, or exploring multi-agent interaction and coordination.

The portfolio will also include analysis and reflection on the design, performance, and behaviour of the developed agent systems. Students are expected to evaluate how their agents made decisions, learned from their environment, and collaborated where applicable. The work should connect the practical outcomes to relevant theoretical concepts, providing critical insights into the strengths, limitations, and real-world implications of intelligent agent systems.

Portfolio assessments may comprise multiple pieces of work that collectively demonstrate a student's knowledge and skills developed throughout the module. These may take the form of one or two substantial tasks, or a series of smaller tasks, typically ranging from one to eight across the duration of the module.

Assessment number	Learning Outcomes to be met	Type of assessment	Duration/Word Count	Weighting (%)	Alternative assessment, if applicable
1	1, 2, 3.,4	Portfolio	5000 Words or Equivalent	100%	N/A

Derogations

N/A



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. For each week, a topic will be started with tutor-led demonstrations, and practical-based sessions will be given to ensure that the students get to practice what they have been taught in relevant concepts. Sessions will be intertwined between instructional explanation and practical depending on the specific indicated syllabus necessities.

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

Introduction to Intelligent Agents

- Autonomous agents: definitions, properties, architectures

Reinforcement Learning (RL)

- Markov Decision Processes (MDPs)
- Value-based learning (Q-learning)
- Deep reinforcement learning (DQN, policy gradients, actor-critic)
- Reward design and training considerations

Agent-Based Systems and Multi-Agent Coordination

- Cooperative vs. competitive agents
- Communication, negotiation, and consensus
- Multi-agent planning and resource allocation



- Multi-agent learning and game-theoretic concepts

Virtual Robotics and Simulation

- Simulation platforms (OpenAI Gym, Unity ML-Agents)
- Navigation, pathfinding, obstacle avoidance
- Task-oriented agent behaviours (case studies)
- Integrating and evaluating agents in simulation

Applications and Case Studies

- Real-world examples: autonomous vehicles, robotic assistants, game AI, e-commerce agents
- Ethical and societal considerations

Indicative Bibliography

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

Essential Reads:

There are no essential texts; the module will use relevant online reference material.

Other indicative reading:

Wooldridge, M., 2009. *An Introduction to MultiAgent Systems*. 2nd ed. Chichester: Wiley.

Sutton, Richard S., Barto, Andrew G., 2018. *Reinforcement Learning :An Introduction*, 2n Edition, MIT Press

Administrative Information

For office use only	
Initial approval date	29 th January 2026
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