Module Specification

Autonomous Agents and Multi-Agent Systems

Version: 2024-25, v4.0, 20 May 2024

Contents

Part 1: Information

Module title: Autonomous Agents and Multi-Agent Systems

Module code: UFCFXR-15-3

Level: Level 6

For implementation from: 2024-25

UWE credit rating: 15

ECTS credit rating: 7.5

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: Artificial Intelligence I 2022-23, Principles of Programming 2022-23

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: Autonomous agents and multi-agent systems have emerged as one of the most important computer technologies, holding out many promises for solving real-world problems. A multi-agent system is a software system composed of multiple interacting components known as agents, which are typically capable of cooperating to solve problems that no single agent could solve alone and/or to solve problems more effectively. Agents are being used in wide variety of applications that include small systems like email filtering and prioritising, IoT, and safety-critical

systems to e-commerce applications.
Topics include agent theories and architectures, inter-agent communication, teamwork, distributed problem solving, agent modelling, and agent learning.

Features: Not applicable

Educational aims: This module aims at introducing the basic concept of an agent and multi-agent systems, the theories and methods regarding multi-agent systems and their appropriate applications.

Outline syllabus: Basic concepts and applications of agents: concept of an agent, agents and distributed systems, the design of intelligent agents, agent-environment interactions, Belief, Desire and Intentions (BDI), typical application areas of agent systems.
Multi-agent systems: concept of a multi-agent system, multi-agent interactions, cooperative and non-cooperative interactions, reasoning agents, logics of agency, interaction languages and protocols, multi-agent systems and machine learning, multi-agent systems design and development using available cutting-edge tools.

Part 3: Teaching and learning methods

Teaching and learning methods: Lectures will provide the theoretical underpinning to allow students to explore the potential of agent-based AI techniques to solve complex problems.

Practical sessions and tutorials will facilitate deeper understanding via activities working through the process of applying the techniques covered in the lectures to solve concrete problems.
These will provide students the opportunity to work independently and learn with the support of the tutors.

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

MO1 Apply agent-based analysis and design skills and techniques, appropriate to solving complex AI problems.

MO2 Identify situations where agent-based problem analysis, system design and programming paradigms are applicable and to create software that exploits them.

MO3 Appraise the concepts of multi-agent systems including cooperation, competition, learning and develop multi agent systems to solve complex problems.

Hours to be allocated: 150

Contact hours:

Independent study/self-guided study = 114 hours

Face-to-face learning = 36 hours

Reading list: The reading list for this module can be accessed at readinglists.uwe.ac.uk via the following link https://rl.talis.com/3/uwe/lists/E7CA0023-3F2F-7518-A7B0-6D5DA9BBA413.html?draft=1&lang=en-GB&login=1

Part 4: Assessment

Assessment strategy: The assignment assesses, via a case study, the students' application of practical skills in designing and developing an agent-based application system using a state-of-the art development framework such as JADE. Students will be required to submit a portfolio containing documents, including the system design, software code, logs of the analysis, and the expected results. Practical cases from real world problems such as design and optimisation problems, networking and communication problems etc., will be considered for the coursework.

Students will have the opportunity for formative feedback during practical lab/tutorial sessions.

The resit strategy is the same as the first sit.

Assessment tasks:

Portfolio (First Sit)

Description: Portfolio containing a case study system design, software code, logs of the analysis, and the expected results.
Weighting: 100 %
Final assessment: No
Group work: No
Learning outcomes tested: MO1, MO2, MO3

Portfolio (Resit)
Description: Portfolio containing a case study system design, software code, logs of the analysis, and the expected results.
Weighting: 100 %
Final assessment: No
Group work: No
Learning outcomes tested: MO1, MO2, MO3

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Computer Science {Dual} BSc (Hons) 2022-23

Computer Science {Foundation}[Sep][SW][Frenchay][5yrs] BSc (Hons) 2020-21

Computer Science {Foundation}[Sep][FT][Frenchay][4yrs] BSc (Hons) 2021-22

Computer Science {Foundation}[Oct][FT][GCET][4yrs] BSc (Hons) 2021-22

Computer Science (Artificial Intelligence) {Foundation}[Oct][FT][GCET][4yrs] BSc (Hons) 2021-22

Computer Science (Smart Devices) {Foundation}[Oct][FT][GCET][4yrs] BSc (Hons) 2021-22

Computer Science {Foundation}[Feb][FT][GCET][4yrs] BSc (Hons) 2021-22

Computer Science (Smart Devices) {Foundation}[Feb][FT][GCET][4yrs] BSc (Hons) 2021-22

Computer Science (Artificial Intelliegence) {Foundation}[Feb][FT][GCET][4yrs] BSc (Hons) 2021-22

Computer Science {Foundation}[Feb][PT][GCET][8yrs] BSc (Hons) 2021-22

Computer Science [Sep][SW][Frenchay][4yrs] BSc (Hons) 2021-22

Computer Science [Villa] BSc (Hons) 2022-23

Computer Science [Frenchay] BSc (Hons) 2022-23

Computer Science (Artificial Intelligence) [NepalBrit] BSc (Hons) 2022-23