Module Specification

Intelligent Systems

Version: 2023-24, v2.0, 27 Jul 2023

Contents

Part 1: Information

Module title: Intelligent Systems

Module code: UFCFB4-30-2

Level: Level 5

For implementation from: 2023-24

UWE credit rating: 30

ECTS credit rating: 15

Faculty: Faculty of Environment & Technology

Department: FET Dept of Computer Sci & Creative Tech

Partner institutions: None

Field: Computer Science and Creative Technologies

Module type: Module

Pre-requisites: Introduction to Artificial Intelligence 2023-24

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: Not applicable

Features: Not applicable

Educational aims: In addition to Learning Outcomes, the educational experience may explore, develop, and practise but not formally discretely assess the following:

Tutorial problem-solving activity, working as a team member, contributing to group discussion

Outline syllabus: Part A: Bivalent to multi-valent logics and probabilistic reasoning

Symbolic reasoning – logical reasoning, knowledge representation, and knowledge based systems; cognitive issues; critical AI and philosophical perspectives

Probabilistic reasoning and Fuzzy systems - reasoning under conditions of uncertainty, certainty factors and belief measures, Bayesian reasoning and belief networks; fuzzy expert systems, fuzzy sets and rules, membership functions, fuzzy operators, linguistic variables and hedges, fuzzy probability, fuzzy inferencing, fuzzy controllers.

Hybrid Intelligent Systems – notions of hybridity and types; rationale; examples

Part B: Agent-based systems

Agent-based systems - an introduction to agent autonomy, agent architectures (e.g. proactive / reactive / hybrid, subsumption), MEA and planning, deductive and practical reasoning agents and theorem proving, multi-agent communication and cooperation

Part C: Biological models of intelligence.
Artificial neural networks - the neural model, artificial neurons and neuronal learning, the perceptron, multi-layer NNs, Hopfield networks, supervised and unsupervised learning NNs, reinforcement learning.

Evolutionary computing - the evolutionary model, evolutionary strategies, chromosones, fitness, population selection and selection operators (random, tournament etc); genetic algorithms, crossover, mutation; genetic programming.

Swarm Intelligence - the social model, particle swarm optimization, social networks, PSO algorithms, PSO system parameters, cooperative PSO, ant colony optimization.

Hybrid Intelligent Systems – case studies.

Comparisons of methods - using appropriate benchmark problems and data to allow useful differentiation.

Part 3: Teaching and learning methods

Teaching and learning methods: This module will involve 6 hours contact time per fortnight. The time will be divided between lecture sessions, tutorials, and laboratory sessions
Over the course of the academic year students should expect to spend approximately:

Contact time: 72 hours

Assimilation and development of knowledge: 148 hours

Exam preparation: 40 hours

Coursework preparation: 40 hours

Total study time: 300 hours

Scheduled learning:
The main material in the module will be introduced in lectures and lab sessions. This exposure will be supplemented by tutorials.

Independent learning:
In addition, students will be expected to develop independent learning approaches through directed reading and study.

Group and teamwork learning:

In addition, tutorial sessions will include scheduled student presentations in which the focus of individual, autonomous study will be supplemented by appropriate group work.

By these contrasting and complementary approaches, it is envisaged that a wide array of teaching and learning styles will be represented in the module, with a view to capturing and representing a wide cross section of student learning styles and orientations.

In addition the educational experience may explore, develop, and practise but not formally discretely assess the following:

Tutorial problem-solving activity, working as a team member, contributing to group discussion.

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

MO1 Understand and critically appraise all the dominant paradigms within artificial intelligence

MO2 Critically evaluate the needs of given problem domains with a view to determining the most suitable AI techniques for their examination and solution

MO3 Engage in types of critical-analytical activity that have both subject specific and generic application

MO4 Complete independent work involving high degrees of autonomy and critical engagement; develops capacities to present ideas to peers and critical audiences

MO5 Be aware of and critically examine those ethical, political, legal, and economic issues that arise from applying.

Hours to be allocated: 300

Contact hours:

Independent study/self-guided study = 228 hours

Face-to-face learning = 72 hours

Total = 300

Reading list: The reading list for this module can be accessed at readinglists.uwe.ac.uk via the following link https://uwe.rl.talis.com/modules/ufcfb4-30-2.html

Part 4: Assessment

Assessment strategy: At both first sit and resit, the assessment strategy comprises TWO parts:

Written examination comprising material relating directly to all topics covered in lectures.

Themed coursework that elaborates and extends experiences gained in laboratory sessions and exercises, integrating various paradigms.

Assessment tasks:

Examination (Online) (First Sit)
Description: Online Examination (unseen) 3 hours
24-hour window
Weighting: 50 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2, MO3, MO5

Portfolio (First Sit)
Description: Themed coursework that elaborates and extends experiences gained in laboratory sessions and exercises, integrating various paradigms.
Weighting: 50 %
Final assessment: No
Group work: No
Learning outcomes tested: MO3, MO4

Examination (Online) (Resit)
Description: Online Examination (unseen) 3 hours
24-hour window
Weighting: 50 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2, MO3, MO5

Portfolio (Resit)
Description: Themed coursework that elaborates and extends experiences gained in laboratory sessions and exercises, integrating various paradigms.
Weighting: 50 %
Final assessment: No
Group work: No
Learning outcomes tested: MO3, MO4

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Computer Science [Sep][FT][Villa][3yrs] - Not Running BSc (Hons) 2022-23

Computer Science [May][FT][Villa][3yrs] - Not Running BSc (Hons) 2022-23

Computer Science [Jan][FT][Villa][3yrs] - Not Running BSc (Hons) 2022-23

Digital Media [Frenchay] BSc (Hons) 2022-23

Digital Media {Foundation}[Sep][SW][Frenchay][5yrs] BSc (Hons) 2021-22

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