Module Specification

Intelligent and Adaptive Systems

Version: 2021-22, v2.0, 07 Jun 2022

Contents

Part 1: Information

Module title: Intelligent and Adaptive Systems

Module code: UFMF99-15-3

Level: Level 6

For implementation from: 2021-22

UWE credit rating: 15

ECTS credit rating: 7.5

Faculty: Faculty of Environment & Technology

Department: FET Dept of Engineering Design & Mathematics

Partner institutions: None

Delivery locations: Frenchay Campus

Field: Engineering, Design and Mathematics

Module type: Standard

Pre-requisites: None

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: See Learning Outcomes.

Outline syllabus: Introduction: Review of the links with other disciplines, e.g. classical AI, psychology, robotics, ethology, neuroscience and classical control.

Scope and limitations of this module, especially with respect to classical control and AI.

Learning and adaptive systems: Working definitions of intelligence, adaptive systems and learning. Adaptation through learning versus design.

Basic Architectures: Neural networks. Fuzzy systems. Evolutionary computation. Supervised, unsupervised and reinforcement learning.

Example applications: Review of work carried out in this Faculty, and at other establishments, in order to demonstrate the major strengths and weaknesses of the techniques. For example; intelligent multiple agents for fault diagnosis in electrical power distribution systems, fuzzy control of an automated underground transportation system, co-operative behaviour in multi-agent mobile robotics, neurocontrol of an industrial robot manipulator, fuzzy classifier systems for telecommunications network routing, evolutionary computation as an aid to engineering design, human face and handwriting recognition using neural networks.

Part 3: Teaching and learning methods

Teaching and learning methods: Lectures will introduce the fundamental concepts. Tutorial case study sessions will be used for two purposes. They will be used to expose students to demonstrations of the basic architectures in action. They will also be used to discuss real implementations of these new techniques, each designed to illustrate the essential details of a particular concept or technique, and especially its strengths and weaknesses in both technical and business contexts. At all times specific examples will be used to "ground" the theory and students will use the case study material to contribute towards the coursework assignment.

Scheduled learning includes lectures, tutorials, practical classes and workshops; work based learning; supervised time in studio/workshop.

Independent learning includes hours engaged with essential reading, case study

preparation, assignment preparation and completion etc.

Contact: 36 hours
Assimilation and skill development: 66 hours
Undertaking Coursework: 24 hours
Exam preparation: 24 hours
Total: 150 hours

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

MO1 Show a knowledge and understanding of the critical features of intelligent and adaptive systems

MO2 Show a knowledge and understanding of appropriate terminology and working definitions in the subject

MO3 Compare the characteristics of the advanced new techniques covered in this module with traditional approaches to selected problems in signal processing, classification and control

MO4 Demonstrate communication skills

MO5 Demonstrate IT skills in context

MO6 Demonstrate ability to formulate problems, critically analyse them and evaluate appropriate techniques for their solution

Hours to be allocated: 150

Contact hours:

Independent study/self-guided study = 114 hours

Face-to-face learning = 36 hours

Total = 150

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/ufmf99-15-3.html

Part 4: Assessment

Assessment strategy: End of module examination to assess individual abilities on problem analysis and subject knowledge.

One coursework assignment that assesses practical design and implementation abilities and understanding of a chosen topic from the syllabus.

Assessment components:

Examination (Online) - Component A (First Sit)
Description: Online Examination: 4 hours
Weighting: 50 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2, MO3, MO6

Written Assignment - Component B (First Sit)
Description: Assignment (2500 words)
Weighting: 50 %
Final assessment: No
Group work: No
Learning outcomes tested: MO1, MO2, MO3, MO4, MO5, MO6

Examination (Online) - Component A (Resit)
Description: Online Examination: 4 hours
Weighting: 50 %
Final assessment: Yes
Group work: No
Learning outcomes tested:

Written Assignment - Component B (Resit)
Description: Assignment (2500 words)
Weighting: 50 %

Final assessment: No

Group work: No

Learning outcomes tested:

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Instrumentation and Control Engineering {Foundation} [Feb][FT][GCET][4yrs] BEng (Hons) 2018-19

Instrumentation and Control Engineering {Foundation} [Oct][FT][GCET][4yrs] BEng (Hons) 2018-19

Robotics [Jan][PT][Frenchay][2yrs] MRes 2021-22

Robotics [Jan][FT][Frenchay][1yr] MRes 2021-22

Robotics [Sep][FT][Frenchay][1yr] MRes 2021-22

Robotics [Sep][PT][Frenchay][2yrs] MRes 2021-22

Robotics [Sep][FT][Frenchay][3yrs] BEng (Hons) 2019-20

Automation and Robotics Engineering {Foundation} [Feb][FT][GCET][4yrs] BEng (Hons) 2018-19

Robotics {Foundation} [Sep][FT][Frenchay][4yrs] BEng (Hons) 2018-19

Robotics [Sep][SW][Frenchay][4yrs] BEng (Hons) 2018-19

Automation and Robotics Engineering {Foundation} [Oct][FT][GCET][4yrs] BEng (Hons) 2018-19