Module Specification

Intelligent and Adaptive Systems

Version: 2023-24, v2.0, 25 Jan 2023

Contents

Part 1: Information

Module title: Intelligent and Adaptive Systems

Module code: UFME7K-15-M

Level: Level 7

For implementation from: 2023-24

UWE credit rating: 15

ECTS credit rating: 7.5

Faculty: Faculty of Environment & Technology

Department: FET Dept of Engineering Design & Mathematics

Partner institutions: None

Field: Engineering, Design and Mathematics

Module type: Module

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: The syllabus includes:

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.

Compound Architectures: Neuro-fuzzy Systems. Behaviour-based systems. Agentbased systems. Multi-agent and swarm systems.

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.

Part 3: Teaching and learning methods

Teaching and learning methods: Lectures will introduce the fundamental concepts. Tutorial sessions will be used for two purposes: they will be used to expose students to demonstrations of the basic architectures in action as well as to discuss real implementations of these new techniques. Tutorials are 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.

Contact hours will include lectures (1 hour per week) and practical tutorial sessions (2 hours per week).

Contact hours: 36
Self-study hours: 54
Coursework Preparation hours: 36

Examination Preparation hours: 24

Total hours: 150

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

MO1 Demonstrate a thorough understanding of the important features of intelligent and adaptive systems using both basic and compound architectures

MO2 Critically compare the performance characteristics of the advanced new techniques covered in this module with traditional approaches to selected problems in signal processing, classification and control

MO3 Apply the principles covered in this module in a practical robotics application

MO4 Study independently where necessary for the understanding of new advancements in the field

MO5 Transfer these advanced new techniques from the research sector to industrially-relevant applications

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/ufme7k-15-m.html

Part 4: Assessment

Assessment strategy: The module is concerned with the study of innovative technological approaches to intelligent control and adaptive systems in robotics. The assessment strategy reflects this, encouraging independent learning and research

where the assignment is designed to elaborate and extend experiences gained in laboratory sessions and exercises.

The controlled conditions assessment is a written exam, designed to assess understanding of important features in the architecture of intelligent and adaptive systems and for students to critically compare the performance characteristics of the advanced new techniques covered in this module with traditional approaches.

Assessment tasks:

Examination (First Sit)

Description: Examination

Weighting: 50 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO1, MO2, MO4, MO5

Written Assignment (First Sit)

Description: Written assignment (4000 words)

Weighting: 50 %

Final assessment: No

Group work: No

Learning outcomes tested: MO2, MO3, MO4, MO5

Examination (Resit)

Description: Examination

Weighting: 50 %

Final assessment: Yes

Group work: No

Learning outcomes tested:

Written Assignment (Resit)

Description: Written assignment (4000 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:

Mechanical Engineering [Sep][PT][Frenchay][2yrs] - Not Running MSc 2022-23