MODULE SPECIFICATION

Part 1: Information			
Module Title	Intelligent Systems		
Module Code	UFCFB4-30-2	Level	Level 5
For implementation from	2020-21		
UWE Credit Rating	30	ECTS Credit Rating	15
Faculty	Faculty of Environment & Technology	Field	Computer Science and Creative Technologies
Department	FET Dept of Computer Sci & Creative Tech		
Module type:	Standard		
Pre-requisites	Introduction to Artificial Intelligence 2020-21		
Excluded Combinations	None		
Co- requisites	None		
Module Entry requirements	None		

Part 2: Description

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.

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.

Part 3: Assessment
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.
The resit assessment is similarly comprised of two parts:

A written examination.

Coursework:
A written report related to material and topics associated with First Sit Component B1; on a domain topic given to the student. Each student will be assessed on the quality of this exposition and personal research.

A written report related to material and topics associated with First Sit Component B2. This written report will concern the hybridity of algorithms practiced and experimented on during the year. Each student is assessed on the quality of this exposition, personal research, bounded by the extent of their understanding and ability to import the results of practice as necessary to support argument.

First Sit Components	**Final Assessment**	**Element weighting**	**Description**
Portfolio - Component B		25 %	Portfolio of online tests and peer assessment
Presentation - Component B		25 %	Assessed student presentation (10 minutes)
Examination (Online) - Component A	✓	50 %	Online Examination (unseen) 3 hours 24-hour window
Resit Components	**Final Assessment**	**Element weighting**	**Description**
Report - Component B		25 %	Written report related to material and topics associated with First Sit Component B1 (Word length 1000 words). The written report is on a domain topic given to the student.
Report - Component B		25 %	Written report related to material and topics associated with First Sit Component B2 (Word length 1000 words), concerning the hybridity of algorithms practiced and experimented on during the year
Examination (Online) - Component A	✓	50 %	Online Examination (unseen) 3 hours 24-hour window

Part 4: Teaching and Learning Methods

Learning Outcomes

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

Module Learning Outcomes	**Reference**
Understand and critically appraise all the dominant paradigms within artificial intelligence	MO1
Critically evaluate the needs of given problem domains with a view to determining the most suitable AI techniques for their examination and solution	MO2
Engage in types of critical-analytical activity that have both subject specific and generic application	MO3
Complete independent work involving high degrees of autonomy and critical engagement; develops capacities to present ideas to peers and critical audiences	MO4
Be aware of and critically examine those ethical, political, legal, and economic issues that arise from applying.	MO5

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<tr><td></td><td></td></tr>
<tr><td>Contact Hours</td><td>
<table>
<tr><td colspan="2">Independent Study Hours:</td></tr>
<tr><td>Independent study/self-guided study</td><td>228</td></tr>
<tr><td>Total Independent Study Hours:</td><td>228</td></tr>
<tr><td colspan="2">Scheduled Learning and Teaching Hours:</td></tr>
<tr><td>Face-to-face learning</td><td>72</td></tr>
<tr><td>Total Scheduled Learning and Teaching Hours:</td><td>72</td></tr>
<tr><td>Hours to be allocated</td><td>300</td></tr>
<tr><td>Allocated Hours</td><td>300</td></tr>
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<tr><td>Reading List</td><td>The reading list for this module can be accessed via the following link:

https://uwe.rl.talis.com/modules/ufcfb4-30-2.html</td></tr>
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Part 5: Contributes Towards
This module contributes towards the following programmes of study: Computer Science {Foundation} [Sep][SW][Frenchay][5yrs] BSc (Hons) 2018-19 Computer Science {Foundation} [Sep][FT][Frenchay][4yrs] BSc (Hons) 2018-19 Digital Media [Sep][SW][Frenchay][4yrs] BSc (Hons) 2019-20 Digital Media [Sep][FT][Frenchay][3yrs] BSc (Hons) 2019-20 Digital Media [Sep][FT][SHAPE][3yrs] BSc (Hons) 2019-20 Digital Media {Foundation}[Sep][SW][Frenchay][5yrs] BSc (Hons) 2018-19 Digital Media {Foundation}[Sep][FT][Frenchay][4yrs] BSc (Hons) 2018-19