MODULE SPECIFICATION

Part 1: Information			
Module Title	BioComputation		
Module Code	UFCFY3-15-3	Level	Level 6
For implementation from	2019-20		
UWE Credit Rating	15	ECTS Credit Rating	7.5
Faculty	Faculty of Environment & Technology	Field	Computer Science and Creative Technologies
Department	FET Dept of Computer Sci & Creative Tech		
Module type:	Standard		
Pre-requisites	None		
Excluded Combinations	None		
Co- requisites	None		
Module Entry requirements	None		

Part 2: Description

Educational Aims: See Learning Outcomes

Outline Syllabus: The syllabus includes:

Introduction:

Overview of the different learning algorithms and knowledge representations to be considered – intelligence at the level of populations/multiple agents, individuals/agents, and within agent components. Example applications and, as in all discussions of applications throughout the course, any potential wider societal implications will be highlighted and considered.

Population-level Intelligence:

Natural and simulated evolution. Knowledge representations (linear, trees, graphs) and search operators (recombination, mutation, inversion). Applications.

Natural and artificial swarms. Contrast examples, e.g., ants, flocks, bees, with related evolutionary computing topics (as above). Collective robotics (and subsumption architecture). Applications.

Multi-agent systems. Concept of agency and extension to problem solving through communication and cooperation. Communication languages (KIF, KQML, etc.). Interaction types (auctions, negotiations, etc.). Applications - highlighting use with evolutionary and/or swarm schemes.

Individual-level Intelligence:

Natural and artificial neural networks. Neuron representations (threshold, dynamic) and learning algorithms (gradient descent, population-based), including reinforcement learning (temporal difference learning). Applications.

Natural and artificial immune systems. Contrast clonal selection approaches with evolutionary computing and network approaches with neural computing. Applications.

Cell-level Intelligence:

Natural cells and genetic regulatory networks. Membrane computing. Learning algorithms (evo, swarm, etc.). Use of living cellular substrates in computing, including neuronal computing, physarum, bacteria. Applications.

And/or other suitable topics at the discretion of the module team.

Teaching and Learning Methods: Scheduled learning includes lectures, seminars, tutorials, project supervision, demonstration, practical classes and workshops.

Independent learning includes hours engaged with essential reading, case study preparation, assignment preparation and completion, etc. These sessions constitute an average time per level. Scheduled sessions may vary slightly depending on the module choices you make.

This module will involve 6 hours contact time per fortnight. The time will be more or less equally divided between lecture sessions and laboratory sessions.

Activity:
Contact time: 36 hours
Assimilation and development of knowledge: 72 hours
Exam preparation: 21 hours
Coursework preparation: 21 hours
Total study time: 150 hours

Part 3: Assessment

The assessment strategy for this module is a combination of written examination and coursework assignment.

The written examination is of two hours duration and comprises questions mapping to the module's learning outcomes. Questions examine cognate and practical skills via a range of essay, multi-choice questions (MCQs), and appropriate problem solving exercises.

The coursework assignment involves one-to-one demonstrations of students' assignment software to tutors, enabling rich formative feedback in addition to the summative feedback element. The demonstration requires articulation and presentation skills appropriate for Level 3, and includes a critical evaluation of students' own contribution.

First Sit Components	**Final Assessment**	**Element weighting**	**Description**
Practical Skills Assessment - Component B		50 %	Practical Assignment requiring the production of program code.
Examination - Component A	✓	50 %	Examination (2 hours)

Resit Components	Final Assessment	Element weighting	Description
Practical Skills Assessment - Component B		50 %	Practical Assignment requiring the production of program code.
Examination - Component A	✓	50 %	Examination (2 hours)

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
Identify the range and theory of modern Artificial Intelligence techniques	MO1
Compare and contrast such techniques, also with those traditionally associated with complex problems	MO2
Identify the issues associated with the application of modern Artificial Intelligence techniques, including any ethical issues	MO3
To apply an appropriate technique(s) to a given problem	MO4
Formulate a problem such that it is amenable to modern Artificial Intelligence techniques	MO5
Appraise the usefulness of various techniques for particular situations	MO6

Contact Hours

Independent Study Hours:	
Independent study/self-guided study	114
Total Independent Study Hours:	114
Scheduled Learning and Teaching Hours:	
Face-to-face learning	36
Total Scheduled Learning and Teaching Hours:	36
Hours to be allocated	150
Allocated Hours	150

Reading List

The reading list for this module can be accessed via the following link:

https://uwe.rl.talis.com/modules/ufcfy3-15-3.html

Part 5: Contributes Towards

This module contributes towards the following programmes of study: