



MODULE SPECIFICATION

Part 1: Information			
Module Title	AI Tools and Techniques [TSI]		
Module Code	UFCFFX-12-2	Level	Level 5
For implementation from	2022-23		
UWE Credit Rating	12	ECTS Credit Rating	6
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		
PSRB Requirements	None		

Part 2: Description	
<p>Educational Aims: This module aims at providing opportunities to, expand your knowledge on Artificial Intelligence techniques; explore their suitability to solving a range of complex problems; and experiment with applying your choices to real world challenges. You will have the opportunity to reflect on the usefulness of the solutions that you've developed and to consider the ethical impact of such solutions on life and society.</p> <p>Outline Syllabus: 1. Optimisation Search spaces and problem types (NP, non-stationary, multi-objective, etc), and local search therein, eg, random hill-climbing, simulated annealing, tabu search; Population-based search - simulated evolution (EAs); Knowledge representations in EAs (linear, trees, graphs) and associated search operators (recombination, mutation, inversion); Other population-based search techniques - artificial swarms' Comparing and contrasting examples such as ant colony and particle swarm with evolutionary algorithms both in terms of search mechanisms and appropriate application domains; Hybridising local and population-based search;</p> <p>2. Modelling</p>	

STUDENT AND ACADEMIC SERVICES

Training and testing – stopping, imbalance, missing variables, bias in data sets, features, pre-processing, etc. That is, the realities of handling data and formulating questions from it.

Supervised Learning :

- Instance-based learning – kNN;
- Decision Trees – C4.5;
- Probabilistic Methods – Bayes/ Fuzzy;
- Neural Networks - MLPs and backprop;
- Deep networks – autoencoding and convolutional;

Reinforcement Learning - Tabular Q learning

Unsupervised Learning – K means, including some aspects of visualisation

Teaching and Learning Methods: Lectures will provide the theoretical underpinning to allow students to explore the potential of AI techniques to solve complex problems. From time to time and where appropriate, industry speakers will illustrate the concepts from their perspective.

Practical sessions and tutorials will facilitate deeper understanding via activities working through the process of applying the techniques covered in the lectures to solve concrete problems. Some such activities may be undertaken as a group, others will be undertaken individually. These will provide students the opportunity to work independently and learn with the support of the tutors and peers.

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 written coursework assignment requires the production of a report, and program code. Tutorials will include the opportunity for one-to-one demonstrations of students' assignment software to tutors, enabling rich formative feedback in addition to the summative feedback element.

The resit will follow the same format, with different tasks used for the practical assignment.

First Sit Components	Final Assessment	Element weighting	Description
Practical Skills Assessment - Component B		50 %	Practical Assignment requiring the production of report and program code. The word count may vary from year to year but will typically be 2500 words.
Examination - Component A	✓	50 %	Examination - Mix of Multiple Choice Questions (MCQ) and short answers, (2 Hours)
Resit Components	Final Assessment	Element weighting	Description
Practical Skills Assessment - Component B		50 %	Practical Assignment requiring the production of report and program code. The word count may vary from year to year but will typically be 2500 words.
Examination - Component A		50 %	Examination - Mix of Multiple Choice Questions (MCQ) and short answers, (2 Hours)

Part 4: Teaching and Learning Methods

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

STUDENT AND ACADEMIC SERVICES

	Module Learning Outcomes		Reference
	Compare and contrast modern Artificial Intelligence techniques, and with those traditionally associated with complex problems		MO1
	Identify the issues associated with the application of modern Artificial Intelligence techniques, including any ethical issues, and evaluate challenges presented		MO2
	Demonstrate the ability to select appropriate paradigms and solve one or more problems with Artificial Intelligence techniques		MO3
Contact Hours	Independent Study Hours:		
	Independent study/self-guided study		96
	Total Independent Study Hours:		96
	Scheduled Learning and Teaching Hours:		
	Face-to-face learning		64
	Total Scheduled Learning and Teaching Hours:		64
	Hours to be allocated		120
	Allocated Hours		160
Reading List	<p>The reading list for this module can be accessed via the following link:</p> <p>https://rl.talis.com/3/uwe/lists/D6BB2676-3D3A-3807-44F4-5AF3AC9BA46E.html?lang=en-gb&login=1</p>		

Part 5: Contributes Towards

This module contributes towards the following programmes of study:

Computer Science and Software Development [Oct][FT][TSI][4yrs] BSc (Hons) 2020-21

Computer Science and Software Development [Oct][PT][TSI][5yrs] BSc (Hons) 2020-21 BSc (Hons) 2020-21

Computer Science and Software Development [Feb][FT][TSI][4yrs] BSc (Hons) 2020-21

Computer Science and Software Development [Feb][PT][TSI][5yrs] BSc (Hons) 2020-21 BSc (Hons) 2020-21