



## MODULE SPECIFICATION

Part 1: Information			
Module Title	Artificial Intelligence II		
Module Code	UFCF9S-15-2	Level	Level 5
For implementation from	2021-22		
UWE Credit Rating	15	ECTS Credit Rating	7.5
Faculty	Faculty of Environment & Technology	Field	
Department	FET Dept of Computer Sci & Creative Tech		
Contributes towards	Computer Science BSc (Hons) 2020-21		
Module type:	Standard		
Pre-requisites	Artificial Intelligence I 2020-21		
Excluded Combinations	None		
Co- requisites	None		
Module Entry requirements	None		

Part 2: Description	
<p>Overview of the different AI approaches to be considered – particularly the separation between optimisation and modelling. Familiar example applications for such techniques will be highlighted (recommender, recognition, etc) and, as in all discussions of applications throughout the course, any potential wider societal implications will be highlighted and considered.</p> <p><b>Educational Aims:</b> 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><b>Outline Syllabus:</b> • 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). -</p>	

## STUDENT AND ACADEMIC SERVICES

- o Knowledge representations in EAs (linear, trees, graphs) and associated search operators (recombination, mutation, inversion).
- o 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.
- Modelling  
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 -
  - o Instance-based learning – kNN,
  - o Decision Trees – C4.5
  - o Probabilistic Methods – Bayes/ Fuzzy
  - o Neural Networks - MLPs and backprop
  - o 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 %	Exam (2 hours)
Resit Components	Final Assessment	Element weighting	Description
Practical Skills Assessment - Component B		50 %	As per main sit
Examination - Component A	✓	50 %	As per main sit

STUDENT AND ACADEMIC SERVICES

<b>Part 4: Teaching and Learning Methods</b>																			
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Reading List	<p><i>The reading list for this module can be accessed via the following link:</i></p> <p><a href="https://uwe.rl.talis.com/lists/40C3A475-9128-BC5F-CD23-EE5173A067A9.html">https://uwe.rl.talis.com/lists/40C3A475-9128-BC5F-CD23-EE5173A067A9.html</a></p>																		