



## MODULE SPECIFICATION

Part 1: Information			
Module Title	Artificial Intelligence I		
Module Code	UFCFGS-15-1	Level	Level 4
For implementation from	2020-21		
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
<p><b>Overview:</b> This module will introduce students to the fundamental concepts of modern Artificial Intelligent based systems, the underpinning paradigms, and the ethical and wider context within which they operate.</p> <p><b>Educational Aims:</b> This module aims to give the students underpinning knowledge and skills in AI techniques and the vocabulary used to describe them. It also aims to promote a consideration of the ethical issues that arise from their use.</p> <p><b>Outline Syllabus:</b> What is AI?            Different types of problems (optimisation, modelling, prediction) and how they relate to forms of logic abduction/induction/deduction            Ethics of AI: - examples of problems (e.g. discrimination) and also 'hype'            Knowledge Representation: human provided models            rules/facts, e.g. expert system rules, "rule engines", scripted NPCs, simple chatbot            Machine Learning:            Unsupervised &amp; reinforcement learning.            Supervised learning:            Process of model induction: training, and test sets            Different forms of models and their strengths/weaknesses: e.g.            Greedy rule induction,</p>

## STUDENT AND ACADEMIC SERVICES

### MLP with Backprop

Search, and the concept of representations as an abstraction of the real world allowing the use of standard algorithms (3 weeks).

Constructive vs perturbative search

Completeness, optimality, introduce idea of landscapes,

Simple Hill Climber (relating to greedy search in the ML algorithms studied above)

Dijkstra and A\* for route planning

**Teaching and Learning Methods:** The timetabled sessions will include:

Lectures to introduce basic concepts and problem specs. Where appropriate, industry speakers will be invited to illuminate the concepts from their perspective.

Tutorials / Lab sessions in which you will work on a number of practical projects gaining hands-on experience of the techniques introduced in the lectures. Example projects include:

A Chatbot (i.e., human provided knowledge base);

A simple rule induction algorithm for a machine learning problem;

A\* for a pathfinding application (e.g. a NPC controller in a game)

### Part 3: Assessment

The learning outcomes will be formally assessed in two ways.

An end-of-module examination will assess knowledge and understanding of the materials covered, and the ability to apply the techniques studied. This will be of two hours duration, and will typically be conducted as a Blackboard test, taken in controlled conditions. This will enable practical activities to be included, and feedback to be easily and automatically provided.

One coursework element, comprised of two deliverables will be used to assess the student's abilities to apply the technologies they have studied from the two main paradigms of AI. Students will be given problems to solve, and tested on their solutions, alongside their understanding of, and the appropriateness of, the techniques utilised.

Typically each deliverable will take the form of source code submitted via the automated online marking system, to facilitate the provision of prompt and personalised feedback.

The first deliverable will concern the topic of knowledge representation. The second will concern the use of search algorithms to solve either a machine learning or an optimisation problem, chosen annually at the tutors' discretion.

The controlled conditions examination will also contain questions related to the coursework to reduce the likelihood of plagiarism.

The resit attempt will be assessed in the same way as the first attempt.

Weekly formative self-assessments tests on Blackboard will provide the students with opportunities to check their understanding of materials and receive detailed feedback.

First Sit Components	Final Assessment	Element weighting	Description
Examination (Online) - Component A	✓	50 %	Online Exam (2 hours) 24 hour window
Online Assignment - Component B		50 %	Individual Coursework composed of two deliverables, submitted to an online system (DEWIS) for automatic marking and provision of feedback.  Submission 1 – solution to a series of knowledge representation problems

## STUDENT AND ACADEMIC SERVICES

Resit Components	Final Assessment	Element weighting	Description
Examination (Online) - Component A	✓	50 %	Online Exam (2 hours) 24 hour window
Online Assignment - Component B		50 %	Individual Coursework composed of two deliverables, submitted to an online system (DEWIS) for automatic marking and provision of feedback.  Submission 1 – solution to a series of knowledge representation problems Submission 2 – search-based solution to a problem in either machine learning or optimisation

Part 4: Teaching and Learning Methods													
Learning Outcomes	<p>On successful completion of this module students will achieve the following learning outcomes:</p> <table border="1"> <thead> <tr> <th>Module Learning Outcomes</th> <th>Reference</th> </tr> </thead> <tbody> <tr> <td>Apply the basic concepts, uses and processes of AI to new tasks, identifying: the type of problem; what technologies or algorithms would be appropriate to apply; and suitable representations for candidate solutions. (Assessed in Component A)</td> <td>MO1</td> </tr> <tr> <td>Recognise the differences between “Knowledge-based” paradigms of AI (inspired by the mind) and “Computational Intelligence” (e.g. inspired by the brain), and select appropriate paradigms according to the needs of a specific problem or application. (Assessed in Component A)</td> <td>MO2</td> </tr> <tr> <td>Identify potential legal and ethical issues - such as privacy and unintentional bias-associated with the deployment of AI-based systems, and suggest actions to mitigate undesirable effects. (Assessed in Component A)</td> <td>MO3</td> </tr> <tr> <td>Design and implement basic optimisation, expert system and machine learning systems. (Assessed in Component B)</td> <td>MO4</td> </tr> </tbody> </table>	Module Learning Outcomes	Reference	Apply the basic concepts, uses and processes of AI to new tasks, identifying: the type of problem; what technologies or algorithms would be appropriate to apply; and suitable representations for candidate solutions. (Assessed in Component A)	MO1	Recognise the differences between “Knowledge-based” paradigms of AI (inspired by the mind) and “Computational Intelligence” (e.g. inspired by the brain), and select appropriate paradigms according to the needs of a specific problem or application. (Assessed in Component A)	MO2	Identify potential legal and ethical issues - such as privacy and unintentional bias-associated with the deployment of AI-based systems, and suggest actions to mitigate undesirable effects. (Assessed in Component A)	MO3	Design and implement basic optimisation, expert system and machine learning systems. (Assessed in Component B)	MO4		
Module Learning Outcomes	Reference												
Apply the basic concepts, uses and processes of AI to new tasks, identifying: the type of problem; what technologies or algorithms would be appropriate to apply; and suitable representations for candidate solutions. (Assessed in Component A)	MO1												
Recognise the differences between “Knowledge-based” paradigms of AI (inspired by the mind) and “Computational Intelligence” (e.g. inspired by the brain), and select appropriate paradigms according to the needs of a specific problem or application. (Assessed in Component A)	MO2												
Identify potential legal and ethical issues - such as privacy and unintentional bias-associated with the deployment of AI-based systems, and suggest actions to mitigate undesirable effects. (Assessed in Component A)	MO3												
Design and implement basic optimisation, expert system and machine learning systems. (Assessed in Component B)	MO4												
Contact Hours	<table border="1"> <thead> <tr> <th colspan="2">Independent Study Hours:</th> </tr> </thead> <tbody> <tr> <td>Independent study/self-guided study</td> <td>114</td> </tr> <tr> <td><b>Total Independent Study Hours:</b></td> <td><b>114</b></td> </tr> <tr> <th colspan="2">Scheduled Learning and Teaching Hours:</th> </tr> <tr> <td>Face-to-face learning</td> <td>36</td> </tr> <tr> <td><b>Total Scheduled Learning and Teaching Hours:</b></td> <td><b>36</b></td> </tr> </tbody> </table>	Independent Study Hours:		Independent study/self-guided study	114	<b>Total Independent Study Hours:</b>	<b>114</b>	Scheduled Learning and Teaching Hours:		Face-to-face learning	36	<b>Total Scheduled Learning and Teaching Hours:</b>	<b>36</b>
Independent Study Hours:													
Independent study/self-guided study	114												
<b>Total Independent Study Hours:</b>	<b>114</b>												
Scheduled Learning and Teaching Hours:													
Face-to-face learning	36												
<b>Total Scheduled Learning and Teaching Hours:</b>	<b>36</b>												

## STUDENT AND ACADEMIC SERVICES

	<b>Hours to be allocated</b>	150
	<b>Allocated Hours</b>	150
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/3E2EB393-DBA8-2DB6-2F00-BCA5939FED2D.html">https://uwe.rl.talis.com/lists/3E2EB393-DBA8-2DB6-2F00-BCA5939FED2D.html</a></p>	

### Part 5: Contributes Towards

This module contributes towards the following programmes of study:

- Computing {Dual} [Mar][SW][Taylors][4yrs] BSc (Hons) 2020-21
- Computing [Sep][SW][Frenchay][4yrs] BSc (Hons) 2020-21
- Computer Science [Sep][SW][Frenchay][4yrs] BSc (Hons) 2020-21
- Computer Science [Sep][FT][Frenchay][3yrs] BSc (Hons) 2020-21
- Computing {Dual} [Aug][SW][Taylors][4yrs] BSc (Hons) 2020-21
- Computing [Sep][FT][Frenchay][3yrs] BSc (Hons) 2020-21
- Computing {Dual} [Aug][FT][Taylors][3yrs] BSc (Hons) 2020-21
- Computing {Dual} [Mar][FT][Taylors][3yrs] BSc (Hons) 2020-21