# Module Specification

## Artificial Intelligence II

Version: 2021-22, v2.0, 14 Jul 2021

**Contents**

## 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

**Department:** FET Dept of Computer Sci & Creative Tech

**Partner institutions:** None

**Delivery locations:** Frenchay Campus

**Field:** Computer Science and Creative Technologies

**Module type:** Standard

**Pre-requisites:** Artificial Intelligence I 2020-21

**Excluded combinations:** None

**Co-requisites:** None

**Continuing professional development:** No

**Professional, statutory or regulatory body requirements:** None

## Part 2: Description

**Overview:** 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.

**Features:** Not applicable

**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.

**Outline syllabus:** 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.

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:
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

## Part 3: Teaching and learning methods

**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.

**Module Learning outcomes:** On successful completion of this module students will achieve the following learning outcomes.

**MO1** Compare and contrast modern Artificial Intelligence techniques, and with those traditionally associated with complex problems (assessed in component A) On successful completion of this module students will achieve the following learning outcomes.

**MO2** Identify the issues associated with the application of modern Artificial Intelligence techniques, including any ethical issues, and evaluate challenges presented (assessed in component B) On successful completion of this module students will achieve the following learning outcomes.

**MO3** Demonstrate the ability to select appropriate paradigms and solve one or more problems with Artificial Intelligence techniques (assessed in component B)

**Hours to be allocated:** 150

**Contact hours:**

Independent study/self-guided study = 114 hours

Face-to-face learning = 36 hours

Total = 150

**Reading list:** The reading list for this module can be accessed at readinglists.uwe.ac.uk via the following link https://uwe.rl.talis.com/lists/40C3A475-9128-BC5F-CD23-EE5173A067A9.html

## Part 4: Assessment

**Assessment strategy:** The assessment strategy for this module is a combination of an in-class test and a coursework assignment.
The in-class test will be of half an hours duration and comprises questions mapping to the module's learning outcomes. Questions will examine cognate and practical skills from a subset of a range of possible means, including short essays, 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.

**Assessment components:**

**In-class test - Component A** (First Sit)
Description: Controlled conditions (0.5 hours)
Weighting: 25 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2

**Practical Skills Assessment - Component B** (First Sit)
Description: 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.
Weighting: 75 %

Final assessment: No

Group work: No

Learning outcomes tested: MO3

**In-class test - Component A** (Resit)

Description: As per main sit

Weighting: 25 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO1, MO2

**Practical Skills Assessment - Component B** (Resit)

Description: As per main sit

Weighting: 75 %

Final assessment: No

Group work: No

Learning outcomes tested: MO3

## Part 5: Contributes towards

This module contributes towards the following programmes of study:

Computer Science [Sep][FT][Frenchay][3yrs] BSc (Hons) 2020-21

Computer Science [Sep][FT][Frenchay][3yrs] BSc (Hons) 2020-21

Computer Science [Sep][SW][Frenchay][4yrs] BSc (Hons) 2020-21

Computer Science [Sep][SW][Frenchay][4yrs] BSc (Hons) 2020-21