

# Module Information

Module Identifier	<b>CS26110</b>
Module Title	<b>The Artificial Intelligence Toolbox Part 1: How to Find Solutions</b>
Academic Year	<b>2015/2016</b>
Co-ordinator	<b><u>Dr Richard Jensen (mailto:rkj@aber.ac.uk?subject=CS26110)</u></b>
Semester	<b>Semester 1</b>
Pre-Requisite	<b><u>CS12320 (?m=CS12320)</u></b>
Other Staff	<b><u>Dr Richard Jensen (mailto:rkj@aber.ac.uk?subject=CS26110)</u></b>

## Course Delivery

<b>Delivery Type</b>	<b>Delivery length / details</b>
Lecture	18 Hours.

## Assessment

<b>Assessment Type</b>	<b>Assessment length / details</b>	<b>Proportion</b>
Semester Exam	2 Hours STANDARD 2 HOUR WRITTEN EXAMINATION	70%
Semester Assessment	WRITTEN ASSIGNMENT BASED ON COURSE MATERIAL	30%
Supplementary Exam	2 Hours Supplementary Exam Resit failed examination and/or resubmission of failed/non-submitted coursework components or ones of equivalent value	100%

## Learning Outcomes

1. Write simple programs in Java to search for solutions using the AI techniques discussed in the module.
2. Demonstrate an appreciation of a least one application of each AI method studied.
3. Demonstrate an understanding of the learning methods discussed in this module.

## Brief description

This module begins with a motivational section on the use of AI in computer games programming: one of the cutting-edge applications of AI in use today. It then focuses on the foundational issue of search (finding solutions to problems) and introduces some basic, but important, learning methods.

## Content

### 1. An introduction to AI via Games AI [2 lectures]

What is required to get computers to produce games AI?

Using AI and agents as a principle for this module.

Applications of AI such as bioinformatics, business, robotics.

Using minimax as an example of simplified game playing.

### 2. Uninformed Search [3 lectures]

Depth- and breadth-first search.

### 3. Informed Search [3 lectures]

Greedy/best-first search, A\* search.

### 4. Evolutionary Computation for Search and Optimisation [3 lectures]

Genetic algorithms and the four GA operators:

- evaluation and the fitness function
- selection (tournament and roulette wheel selection)
- crossover (various types)
- mutation.

### 5. Clustering [4 lectures]

K-means clustering.

Hierarchical clustering.

Overview of other clustering methods (Gaussian, fuzzy etc.)

### 6. Case-based reasoning and k-nearest neighbour [3 lectures]

Introducing the idea of learning from data, (transductive learning, not inductive learning).

Choosing the value of k.

Weighting the k members' contribution.

## Module Skills

Skills Type	Skills details
Application of Number	Central to the module.
Communication	During the seminars, students will be encouraged to provide their own answers to problems , and to communicate their thoughts between themselves and with the lecturer.
Improving own Learning and Performance	The rationale of the module is to develop research skills and therefore develops the students' abilities in learning to learn and in personal performance monitoring.
Information Technology	Use of IT will be vital for the completion of this module.
Personal Development and Career planning	The module helps to promote personal development and helps students to plan for a career in research and industry.
Problem solving	The assignment will require students to apply their newly gained AI knowledge to a problem. Only the outline of the solution will be given, so that the student must solve the details of the problem themselves.
Research skills	Required to solve the problem in the assignment by first deiscovering the key missing information and then sourcing that information on their owm.

**Skills Type****Skills details**

Subject Specific Skills

Advanced Artificial Intelligence skills.

Team work

This module will require pair or small-group working as part of the assignment.

**Notes**

This module is at CQFW (<http://wales.gov.uk/topics/educationandskills/qualificationsinwales/creditqualificationsframework/?lang=en>) Level 5