1. KentVision Code and title of the module

COMP5280 - Introduction to Artificial Intelligence

COMP8250 - Introduction to Artificial Intelligence

## Division and School/Department or partner institution which will be responsible for management of the module

Division of Computing, Engineering, Mathematical Sciences (CEMS)

## The level of the module (Level 4, Level 5, Level 6 or Level 7)

COMP5280 (Level 5)

COMP8250 (Level 7)

## The number of credits and the ECTS value which the module represents

15 credits (7.5 ECTS)

## Which term(s) the module is to be taught in (or other teaching pattern)

Autumn or Spring

## Prerequisite and co-requisite modules and/or any module restrictions

For COMP5280 (Level 5):

Pre-requisite: COMP5200: Further Object-Oriented Programming

or COMP5230: Fundamentals of Programming and Logic

or COMP3590: Programming for Artificial Intelligence

For COMP8250 (Level 7):

Co-requisite: COMP8710 Advanced Java for Programmer

or COMP8270 Programming for Artificial intelligence

## The course(s) of study to which the module contributes

Compulsory to the following courses:

BSc Artificial Intelligence with and without Year in Industry

BSc Data Science with and without Year in Industry

BSc Computing with and without Year in Industry.

MSc Artificial Intelligence with and without Year in Industry

MSc Computer Science (Artificial Intelligence) with and without Year in Industry

Optional to the following courses:

MSc Computer Science with and without Year in Industry

MSc Computer Science (Cyber Security) with and without Year in Industry

MSc Networks and Security with and without Year in Industry

## The intended subject specific learning outcomes.

## On successfully completing the Level 6 module students will be able to:

8.1 Explain the motivation for designing intelligent machines, their implications and associated philosophical issues, such as the nature of intelligence and learning.

8.2 Describe and apply the main kinds of state-space search algorithms, considering their strengths and limitations.

8.3 Explain the main concepts and principles associated with different kinds of knowledge representation, such as logic, case-based representations, and subsymbolic/connectionist representations.

8.4 Explain the differences between the major kinds of machine learning problems – namely supervised learning, unsupervised learning and reinforcement learning – and describe and implement the basic ideas of algorithms for solving those problems.

8.5 Describe the main concepts and principles of major kinds of biologically-inspired algorithms, and understand and implement one such technique.

8.6 Describe how various intelligent-system techniques have been used in the context of several case studies, and compare different techniques in the context of those case studies.

## On successfully completing the Level 7 module students will be able to:

8.1 Demonstrate knowledge and understanding of the motivation for designing intelligent machines, their implications and associated philosophical issues, such as the nature of intelligence and learning.

8.2 Demonstrate systematic understanding, critical awareness and application of the main kinds of state-space search algorithms, considering their strengths and limitations.

8.3 Understand and explain the main concepts and principles associated with different kinds of knowledge representation, such as logic, case-based representations, and subsymbolic/connectionist representations.

8.4 Understand and explain the differences between the major kinds of machine learning problems – namely supervised learning, unsupervised learning and reinforcement learning – and describe and implement the fundamental ideas of algorithms for solving those problems.

8.5 Demonstrate mastery of the main concepts and principles of major kinds of biologically-inspired algorithms, and understand the implementation and evaluation of one such technique.

8.6 Demonstrate comprehensive understanding of how various intelligent-system techniques have been used in the context of several case studies, and critically compare different techniques in the context of those case studies.

## The intended generic learning outcomes.

## On successfully completing the Level 6 module students will be able to:

9.1 Discuss and give examples of the role of analogy and metaphor in science and engineering;

9.2 Apply mathematical and computational skills in solving problems;

9.3 Compare different strategies for problem solving, choose a strategy and justify that choice;

9.4 Assess the strengths and weaknesses of hypotheses and techniques;

9.5 Use the library and appropriate internet resources in support of learning.

## On successfully completing the Level 7 module students will be able to:

9.1 Discuss and give examples of the role of analogy and metaphor in science and engineering;

9.2 Apply and critically evaluate mathematical and computational skills in solving problems;

9.3 Evaluate and compare different strategies for problem solving, choose a strategy and justify that choice;

9.4 Critically assess and justify the strengths and weaknesses of hypotheses and techniques;

9.5 Make use the library and appropriate internet resources in support of learning in order to advance their knowledge and understanding.

## A synopsis of the curriculum

This module covers the basic principles of machine learning and the kinds of problems that can be solved by such techniques. Students will learn about the philosophy of AI, how knowledge is represented and algorithms to search state spaces. The module also provides an introduction to both machine learning and biologically inspired computation.

## Reading list

## The University is committed to ensuring that core reading materials are in accessible electronic format in line with the Kent Inclusive Practices.

## The most up to date reading list for each module can be found on the university's [reading list pages](https://kent.rl.talis.com/index.html).

S.J. Russell & P. Norvig, “Artificial Intelligence: A modern approach”, 4th Edition. Pearson, 2020. (main textbook)

S. Pinker. “How the Mind Works”, W.W. Norton & Company, 1999.

A. Cawsey, “The Essence of Artificial Intelligence”, Prentice-Hall, 1998.

P. Bentley. “Digital Biology: How Nature Is Transforming Our Technology and Our Lives”, Simon & Schuster, 2007.

S. Marsland, "Machine Learning: An Algorithmic Perspective", CRC Press, Taylor and Francis, 2nd Edition, 2014.

E. K. Burke & G. Kendall, "Search Methodologies: Introductory Tutorials in Optimization and Decision Support Techniques", 2nd Edition, Springer, 2014.

S. Haykin, “Neural Networks and Learning Machines”, 3rd Edition. Pearson, 2009.

R.L. Haupt & S.E. Haupt, “Practical Genetic Algorithms”, 2nd edition, Wiley, 2004.

## Contact Hours

Total contact hours: 28

Private study hours:122

Total study hours: 150

## Assessment methods

* 1. Main assessment methods

A1 – Practical assignment (25%)

A2 – Practical assignment (25%)

2 hour unseen written examination (50%)

13.2 Reassessment methods

Like for like.

## Map of module learning outcomes (sections 9 & 10) to learning and teaching methods (section 13) and methods of assessment (section 14)

**Module learning outcomes against learning and teaching methods:**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Module learning outcome** | *8.1* | *8.2* | *8.3* | *8.4* | *8.5* | *8.6* | *9.1* | *9.2* | *9.3* | *9.4* | *9.5* |
| **Learning/ teaching method** |  |  |  |  |  |  |  |  |  |  |  |
| *Private Study* |  |  |  |  |  | x | x | x | x | x | x |
| *Lectures* | x | x | x | x | x | x | x |  | x |  |  |
| *Classes*  |  | x |  | x | x |  |  | x | x | x | x |

**Module learning outcomes against assessment methods:**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment method** |  |  |  |  |  |  |  |  |  |  |  |
| *Assignment 1* | x | x | x | x | x | x |  | x |  | x | x |
| *Assignment 2* | x | x |  | x | x | x |  | x |  | x | x |
| *Examination* | x | x | x | x | x | x | x |  | x |  |  |

## Inclusive module design

The Division recognises and has embedded the expectations of current equality legislation, by ensuring that the module is as accessible as possible by design. Additional alternative arrangements for students with Inclusive Learning Plans (ILPs)/declared disabilities will be made on an individual basis, in consultation with the relevant policies and support services.

The inclusive practices in the guidance (see Annex B Appendix A) have been considered in order to support all students in the following areas:

a) Accessible resources and curriculum

b) Learning, teaching and assessment methods

## Campus(es) or centre(s) where module will be delivered

Canterbury

## Internationalisation

The topics addressed by this module relate to a field which is of international importance, given the global role of computers in today's technological innovation.
The topics covered by this module are international in nature, being identical worldwide and independent of traditional spoken language.

**DIVISIONAL USE ONLY**

**Module record – all revisions must be recorded in the grid and full details of the change retained in the appropriate committee records.**

| Date approved | New/Major/minor revision | Start date of delivery of (revised) version | Section revised(if applicable) | Impacts PLOs (Q6&7 cover sheet) |
| --- | --- | --- | --- | --- |
|  | Major | September 2022 | 1, 6, 7, 8, 9, 14 | No |
|  |  |  |  |  |