1. **Title of the module**

COMP8260 (CO826) Artificial Intelligent (AI) Systems Implementation

1. **Division or partner institution which will be responsible for management of the module**

Division of Computing, Engineering, Mathematical Sciences (CEMS)

1. **The level of the module (e.g. Level 4, Level 5, Level 6 or Level 7)**

Level 7

1. **The number of credits and the ECTS value which the module represents**

15 (7.5 ECTS)

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

Spring

1. **Prerequisite modules**

COMP8250 (CO8825) Introduction to Artificial Intelligence

COMP8270 (CO827) Programming for Artificial Intelligence (AI)

1. **The courses of study to which the module contributes**

Portfolio of Taught Postgraduate Courses in Computing.

1. **The intended subject specific learning outcomes.
On successfully completing the module students will be able to:**
2. Demonstrate a systematic understanding of techniques used to implement AI Systems, and their underpinning principles;
3. Evaluate critically alternative AI approaches according to quality/cost trade-offs;
4. Master the application of AI techniques to solve realistic and real-world problems, using appropriate programming languages and libraries (e.g., Python and Scikit-Learn);
5. Analyse and critically evaluate the obtained results in terms of quality/cost, and devise strategies to improve or replace them.
6. **The intended generic learning outcomes.
On successfully completing the module students will be able to:**
7. Apply and critically assess problem solving skills to achieve a desired technical outcome;
8. Master the development of an AI software system, and critically evaluate the suitability of the design choices;
9. Monitor development progress and modify strategies to achieve objectives, documenting and communicating problems and solutions identified;
10. Evaluate critically the achieved results and present them to technical and non-technical audiences (e.g., using technical reports and presentations);
11. Reflect on the development process and achieved results, suggesting alternative paths that might have improved the eventual outcome.
12. **A synopsis of the curriculum**

Students are presented during lectures with advanced Artificial Intelligence/Machine Learning techniques (such as genetic algorithms, support vector machines (SVMs), deep learning, neural networks, stochastic gradient decent, Q-Learning/Deep Q-learning, ensembles, neuroevolution), including aspects of implementation, hyper parameter tuning, scalability and parallelism.

1. **Reading List (Indicative list, current at time of publication. Reading lists will be published annually)**
* Patrick D. Smith, “Hands-On Artificial Intelligence for Beginners: An introduction to AI concepts, algorithms, and their implementation”, Packt Publishing, 2018
* M. Tim Jones, “Artificial Intelligence: A Systems Approach”, Jones & Bartlett Learning, 2015
* C. Aggarwal. Neural Networks and Deep Learning: a textbook. Springer, 2018.
* Aurélien Géron, “Hands-on Machine Learning with Scikit-Learn and TensorFlow”, O'Reilly, 2017
* Sebastian Raschka, “Python Machine Learning”, 2nd Ed, Packt Publishing, 2017
* Ian Goodfellow, Yoshua Bengio and Aaron Courville. “Deep Learning”, MIT Press, 2016
* Sarah Guido, Andreas C. Müller, “Introduction to Machine Learning with Python”, O'Reilly, 2016
* Tom Mitchell, “Machine Learning”, McGraw Hill, 1997
1. **Learning and Teaching methods**

Contact hours: 31

Hours of private study: 119

Total hours total 150

1. **Assessment methods**

13.1 Main assessment methods

This module will be assessed by 100% coursework.

40% two class exercises or tests (equally weighted, approximately 2 hours each)

60% AI project (approximately 80 hours)

13.2 Reassessment methods

Like-for-like

1. ***Map of Module Learning Outcomes (sections 8 & 9) to Learning and Teaching Methods (section12) and methods of Assessment (section 13)***

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Module learning outcome** | *8.1* | *8.2* | *8.3* | *8.4* | *9.1* | *9.2* | *9.3* | *9.4* | *9.5* |
| **Learning/ teaching method** |  |  |  |  |  |  |  |  |  |
| Lectures | **x** | **x** |  |  | **x** |  | **x** |  |  |
| Practical  | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| Private study | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| **Assessment method** |  |  |  |  |  |  |  |  |  |
| Exercises/Tests 1 | **x** | **x** | **x** | **x** | **x** |  |  |  |  |
| Exercises/Tests 2 | **x** | **x** | **x** | **x** | **x** |  |  | **x** |  |
| AI Project | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |

1. **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

1. **Campus(es) or Centre(s) where module will be delivered:**

Canterbury

1. **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.

**DIVISION USE ONLY**

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Date approved | Major/minor revision | Start date of the delivery of revised version | Section revised | Impacts PLOs( Q6&7 cover sheet) |
|  |  | Starts Spring 2021/22 |  |  |
|  |  |  |  |  |