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## MODULE DESCRIPTOR

### Module Title

Advanced Artificial Intelligence

Reference	CMM307	Version	1
Created	February 2019	SCQF Level	SCQF 11
Approved	August 2017	SCQF Points	15
Amended	June 2018	ECTS Points	7.5

### Aims of Module

To improve understanding of modern artificial intelligence (AI) by learning to code, debug and train machine learning algorithms. Students will learn about the theory as well as the implementation of state-of-the-art supervised and unsupervised algorithms. The module will use popular examples to showcase AI applications in reasoning and decision-making, language understanding, image and activity recognition tasks.

### Learning Outcomes for Module

On completion of this module, students are expected to be able to:

- 1 Evaluate the principal theories, concepts, and methods used in the development of complex intelligent systems.
- 2 Through experimentation critically identify, define, conceptualise and analyse complex machine learning algorithms.
- 3 Analyse, apply, and evaluate a wide range of advanced AI models for real-world problems.
- 4 Evaluate techniques used to ensure data quality and understand the ethical and transparency issues related to AI.
- 5 Critically appraise and evaluate relevant literature in AI.

### Indicative Module Content

Fundamentals of logic, reasoning and machine learning. Supervised and unsupervised machine learning including neural nets, support vector machines, decision trees, probabilistic learning, instance-based learners, metric learning and clustering algorithms. Real-World Applications for instance in the areas of classification, Image analysis, Natural language understanding.

### Module Delivery

Key concepts are introduced and illustrated through lectures and directed reading. The understanding of students is tested and further enhanced through interactive tutorials. In the laboratories, the student will progress through a sequence of exercises to develop sufficient knowledge and skills in Artificial Intelligence.

**Indicative Student Workload**

	Full Time	Part Time
Contact Hours	33	N/A
Non-Contact Hours	117	N/A
Placement/Work-Based Learning Experience [Notional] Hours	N/A	N/A
TOTAL	150	N/A
Actual Placement hours for professional, statutory or regulatory body		

**ASSESSMENT PLAN**

If a major/minor model is used and box is ticked, % weightings below are indicative only.

**Component 1**

Type:	Coursework	Weighting:	100%	Outcomes Assessed:	1, 2, 3, 4, 5
Description:	Case study based coursework based on experimental and practical analysis of Machine Learning techniques.				

**MODULE PERFORMANCE DESCRIPTOR****Explanatory Text**

The student must achieve a D in C1.

Module Grade	Minimum Requirements to achieve Module Grade:
<b>A</b>	The student must achieve an A in C1.
<b>B</b>	The student must achieve a B in C1.
<b>C</b>	The student must achieve a C in C1.
<b>D</b>	The student must achieve a D in C1.
<b>E</b>	The student must achieve an E in C1.
<b>F</b>	The student must achieve an F in C1.
<b>NS</b>	Non-submission of work by published deadline or non-attendance for examination

**Module Requirements**

Prerequisites for Module	CM3038 Artificial Intelligence For Problem Solving or equivalent.
Corequisites for module	None.
Precluded Modules	None.

**INDICATIVE BIBLIOGRAPHY**

- 1 Russell and Norvig. Artificial Intelligence: A Modern Approach.
- 2 Raschka. Python Machine Learning. Packt
- 3 N D LEWIS, 2016, Deep Learning Step by Step with Python
- 4 RASHID T, 2016, Make Your Own Neural Network, CreateSpace Publishing
- 5 BISHOP C, 2006 , Pattern Recognition and Machine Learning, Springer
- 6 KOWALSKI R, 2011, Computational Logic and Human Thinking, Cambridge University Press.
- 7 ERTEL W, 2011, Introduction to Artificial Intelligence, Springer