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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 |
| <i>Actual Placement hours for professional, statutory or regulatory body</i> | | |

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: |
|--------------|--|
| A | The student must achieve an A in C1. |
| B | The student must achieve a B in C1. |
| C | The student must achieve a C in C1. |
| D | The student must achieve a D in C1. |
| E | The student must achieve an E in C1. |
| F | The student must achieve an F in C1. |
| NS | Non-submission of work by published deadline or non-attendance for examination |

Module Requirements

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|--------------------------|---|
| 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 |