Module Specification

Module Summary Information

1	**Module Title**	Artificial Intelligence and Machine Learning
2	**Module Credits**	20
3	**Module Level**	6
4	**Module Code**	CMP6202

5	**Module Overview**

Artificial Intelligence (AI) is a core component of computer science, aiming at developing intelligent agents that mimic human's cognitive capability in learning, reasoning, and problem solving. As a branch of AI, machine learning (ML) allows to create software that adapts and learns (from examples), rather than being explicitly programmed for a particular outcome. Both AI and ML rely on managing, processing and analysis of large datasets, something that Data Science (DS) is concerned with. Many services provided by technology giants such as Google, Microsoft, IBM, Facebook, Amazon, etc. are powered by DS, ML and AI. The recent advances in these subjects have already led to significant industrial applications such as self-driving cars and Industry 4.0.

This module aims to lay the foundation for the students to get into these ever-growing areas by exposing them to a wide range of data pre-processing, analysis, visualisation and machine learning techniques. The students will learn different algorithms to solve regression, classification and clustering tasks representing real life problems and how to program them in Python. Finally, the students will be introduced to Agent Technology and Reinforcement Learning that drive modern AI solutions.

The module will be delivered using both lectures and practical classes on a weekly basis. Additional resources will be available on Moodle and in the library for self-study. A substantial part of the learning process will take place while working on the group coursework, which involves finding a dataset, formulating a research problem related to this dataset, and developing a data analytics solution to address the problem.

6	**Indicative Content**

- Artificial Intelligence, Machine Learning and Data Science overview, concepts and tools
- Programming for AI and ML
- Data pre-processing and visualisation
- Algorithms for classification, regression and clustering
- Building ML predictive models
- Deep Learning
- Agent Technology and Game Theory
- Reinforcement Learning

7	Module Learning Outcomes On successful completion of the module, students will be able to:	
	1	Compare the different aspects involved in the modern Artificial Intelligence, Machine Learning and Data Science.
	2	Critically evaluate and practice a range of Machine Learning algorithms, Data Science tools, and frameworks for developing AI solutions.
	3	Apply the learned algorithms, tools and frameworks to solve real life problems.
	4	Demonstrate skills in formulating research problems and writing technical reports.

8	Module Assessment		
Learning Outcome			
	Coursework	Exam	In-Person
1-4	X		

9	Breakdown Learning and Teaching Activities
Learning Activities	Hours
Scheduled Learning (SL) includes lectures, practical classes and workshops, peer group learning, Graduate+, as specified in timetable	48
Directed Learning (DL) includes placements, work-based learning, external visits, on-line activity, Graduate+, peer learning, as directed on VLE	72
Private Study (PS) includes preparation for exams	80
Total Study Hours:	200