

Liverpool John Moores University

Title: MACHINE LEARNING AND ARTIFICIAL INTELLIGENCE
Status: Definitive
Code: **5554NCCG** (129517)
Version Start Date: 01-08-2021

Owning School/Faculty: Computer Science and Mathematics
Teaching School/Faculty: Nelson Campus

Team	Leader
Silvester Czanner	Y
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Academic Level: FHEQ5 **Credit Value:** 20 **Total Delivered Hours:** 60

Total Learning Hours: 200 **Private Study:** 140

Delivery Options

Course typically offered: S1, S2 and NS2 (S2 for Jan)

Component	Contact Hours
Lecture	60

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Report	Seminar	Individual Case Study Seminar Paper	50	
Report	Assignment	Assignment	50	

Aims

This module will introduce the basic theories of machine learning and artificial intelligence. It will consider the most efficient machine learning algorithms and practical implementation of these algorithms. It will cover the main areas of Artificial Intelligence. Students will gain hands-on experience in getting these techniques to solve real-world problems

Learning Outcomes

After completing the module the student should be able to:

- 1 Analyse the theoretical foundation of artificial intelligence, current trends and issues to determine the effectiveness of AI technology.
- 2 Develop an AI or machine learning application using an appropriate programming language or machine learning tool for solving a real-world problem.
- 3 Investigate and discuss a range of emerging AI technologies to determine future changes in industry.

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

Individual Case Study	1	
Seminar		
Assignment	2	3

Outline Syllabus

Definitions and terminologies of machine learning. Types of learning problems. Supervised learning, unsupervised learning, reinforcement learning, semi-supervised learning, deep learning.

Programming languages and tools. Mathematics of machine learning. Machine learning algorithms. Using the programming language or a tool to implement a learning algorithm.

Problem definition. Data analysis. Data preparation

Implementation of an algorithm. Improving models' accuracy. Under-fitting situations. Over-fitting situations.

Discussion of intelligence and artificial intelligence. Strong AI vs. Weak AI. Top-down approach of AI: Knowledge-based system, natural language processing, fuzzy logic. Bottom up approach of AI: Artificial neural networks, evolutionary computing, swarm intelligence.

Applications of AI. Issues of AI.

Investigate and demonstrate an AI or ML technique using a programming language or a tool for at least one of the following: knowledge based system, fuzzy logic system, natural language processing.

Investigate and demonstrate the technique using the programming language or a tool for at least one of the following: artificial neural network: supervised learning algorithms, single perceptron, MLP & backpropagation learning algorithms.

Evolutionary computing: problem model, fitness evaluation, selection method, crossover operator, evolution scheme, observation. Swarm intelligence: swarm intelligent approaches, swarm robotics, team size and composition, team configurability, communication pattern and range.

Learning Activities

Lectures

These will not normally be traditional didactic lectures in which the student plays little active part, but will be delivered in small groups of up to 20 students in which their interaction with their tutor is a key ingredient of their learning experience.

The material of this module requires the development of significant practical skill. This will be taught within the lecture time, making these sessions a blend of lecture and workshop time. The sessions will be timetabled in spaces with physical resources appropriate to the delivered content.

Students will receive approximately 30 hours of taught material, supported by in-class exercises and discussions designed to help student assimilate learning and to provide early informal feedback on their progress.

Seminar

This module includes a seminar exercise where students are given topics to investigate for presentation back to their groups. The seminar forms part of the assessment for this module.

Independent Study

Students are expected to undertake personal reading and research into topic areas that have been stimulated from the lectures and seminars. This reading will enhance their academic work and enable valid contribution to lectures and seminars.

VLE support

This will provide links to academic web-sites and on-line journals, facilitate group discussion outside of the classroom, access to outline lecture notes, and provide students with assessment details.

Notes

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