

Liverpool John Moores University

Title: Deep Learning Concepts and Techniques
Status: Definitive
Code: **7144COMP** (127278)
Version Start Date: 01-08-2021

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

Team	Leader
Carl Chalmers	Y
Michael Mackay	
Paul Fergus	

Academic Level: FHEQ7 **Credit Value:** 20 **Total Delivered Hours:** 33
Total Learning Hours: 200 **Private Study:** 167

Delivery Options

Course typically offered: Semester 1

Component	Contact Hours
Lecture	11
Practical	11
Tutorial	11

Grading Basis: 50 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Report	AS1	Theoretical Principles of Deep Learning	40	
Artefacts	AS2	Development of Deep Learning Project	60	

Aims

To develop knowledge of effective and academic understanding of deep learning at masters level and provide guidance on the purpose, design and development of deep learning projects.

To provide an understanding of how the range of tools, techniques and algorithms can be most appropriately applied.

To provide help on establishing best practice deep learning design and development principles to successfully complete a deep learning project.

Learning Outcomes

After completing the module the student should be able to:

- 1 Demonstrate a critical understanding of the theoretical principles and objectives of Deep Learning (DL)
- 2 Critically assess and select a range of DL concepts and techniques.
- 3 Critically select appropriate DL algorithms and architectures to solve particular tasks
- 4 Implement and test different DL algorithms and architectures using Python and associated frameworks
- 5 Evaluate DL algorithms and architectures to determine their strengths and weaknesses

Learning Outcomes of Assessments

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

Report	1	2		
Prototype	3	4	5	

Outline Syllabus

1. *Introduction to Deep Learning*
2. *Multi-Layer Perceptrons*
3. *Gradient Descent and Backpropagation*
4. *Hyper-parameter optimisation*
5. *Supervised Learning (Artificial Neural Networks)*
6. *Unsupervised Learning (Stacked Autoencoders)*
7. *Convolutional Neural Networks*
8. *Training, Evaluation and Regularisation*
9. *Optimisation*
10. *Deployment and Hosting*
11. *Applications in Deep Learning; Limitations and New Frontiers*

Learning Activities

Formal lectures will introduce core topics. Tutorials and in-class group activities will provide exercises to develop skills

Notes

This module provides fundamental skills required in deep learning to conduct a wide variety of projects from signal processing to object detection and segmentation. These skills will help to equip the student with the key principles of deep learning to support advanced topics taught in the course. Furthermore, these skills will be practical core requirements for a successful career as a deep learning practitioner in industry.