

Liverpool John Moores University

Title: Advanced Topics in Deep Learning
Status: Definitive
Code: **7146COMP** (127280)
Version Start Date: 01-08-2021

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

Team	Leader
Paul Fergus	Y
Carl Chalmers	
Chris Carter	

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

Delivery Options

Course typically offered: Semester 2

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 Advanced Deep Learning Techniques	40	
Artefacts	AS2	Group Assignment: Develop a Deep Learning Solution using Advanced Deep Learning Constructs	60	

Aims

To develop knowledge of advanced topics in deep learning at masters level and provide guidance on the purpose, design and development of deep learning projects using advanced constructs.

To provide an understanding of the range of tools, techniques and algorithms used in advanced deep learning architectures.

To provide help on establishing advanced 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 deep, systemic understanding of the theoretical principles and objectives of advanced Deep Learning (DL) principles
- 2 Critically evaluate and determine the applicability of a range of advanced DL concepts and techniques.
- 3 Select advanced DL algorithms and architectures to solve particular tasks
- 4 Implement and test different advanced DL algorithms and architectures using a suitable language, e.g. Python and associated frameworks
- 5 Evaluate advanced DL algorithms and architectures to determine their strengths and weaknesses
- 6 Critically evaluate the merits of advanced DL techniques and utilise them appropriately.

Learning Outcomes of Assessments

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

Report	1	2	6
Prototype	3	4	5

Outline Syllabus

GPU-enabled Machine Learning

2. Convolutional Neural Networks – Part 1

3. Convolutional Neural Networks – Part 2

4. Transfer Learning Concepts and Approaches

5. Object Detection

6. Object Segmentation

7. Long-Term Short-Term Deep Neural Networks

8. One Dimensional Convolutional Neural Networks

9. Time Series Deep Learning

10. Natural Language Processing with Deep Learning

11. Real-World Applications of Deep Learning; Future Directions in Deep Learning

Learning Activities

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

Notes

This module provides advanced skills required in deep learning to conduct a wide variety of projects in signal processing, object detection, natural language processing and time series analysis. These skills will help to equip the student with advanced skills in deep learning. These skills will be practical core requirements for a successful career as a deep learning engineer in industry.