

Liverpool John Moores University

Title: Accelerated Machine Learning
Status: Definitive
Code: **7145COMP** (127279)
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
Chris Carter	
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 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 Accelerated Machine Learning	40	
Artefacts	AS2	Development of an Accelerated Machine Learning Project	60	

Aims

To develop knowledge of accelerated machine learning at masters level and provide guidance on the purpose, design and development of accelerated machine learning projects.

To provide an understanding of how the range of tools, techniques and algorithms can be applied for accelerated machine learning.

To provide help on establishing accelerated machine learning design and development principles to successfully complete large scale machine learning projects.

Learning Outcomes

After completing the module the student should be able to:

- 1 Describe in depth and detail the theoretical principles and objectives of accelerated Machine Learning (ML) using the Python-based NVIDIA RAPIDS framework
- 2 Demonstrate deep understanding of relevant RAPIDS ML concepts and techniques
- 3 Critically select appropriate RAPIDS ML algorithms to solve particular tasks
- 4 Evaluate RAPIDS ML algorithms to determine their strengths and weaknesses
- 5 Implement and test different RAPIDS ML algorithms using a suitable language, e.g. Python
- 6 Evaluate the suitability of different processing architectures for specific computational tasks (CPU/GPU)

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

1. *GPU Computing*
2. *Introduction to CUDA*
3. *cuDF Analytics*
4. *cuML Machine Learning*
5. *cuGraph Graph Analytics*
6. *Deep Learning*
7. *Visualisation*
8. *Apache Arrow*
9. *Accelerated Data Science*
10. *Applications in Accelerated Machine Learning*
11. *Performance, Validation and Model Interpretation; Future Large Scale Machine Learning*

Learning Activities

Formal lectures will introduce core topics. Tutorials and in-class group activities will

provide exercises to develop skills

Notes

This module provides the key skills required in accelerated machine learning to solve large scale machine learning problems. These skills will help to equip the student with the fundamental principles of accelerated machine learning to support the final degree project. Furthermore, these skills will be practical core requirements for a successful career as a machine learning engineer in industry.