Imperial College London

Module Specification

Basic details

		Earliest cohort	Latest cohort
UID		Cohorts covered	2025-26	

Long title: Accelerated processing for Big Data analysis

New code: PHYS70071

New short title:

Brief description of module *(approx. 600 chars.)*:

This is an elective module for the MRes in Machine Learning and Big Data in the physical Sciences.

The material will include:
- Introduction and overview of accelerators in computing (covering typical architectures, GPU, FPGA... their features and differences)
- Mapping applications to architecture (what architecture best suits the problem/algorithm)
- Performance modelling (making a C++/Excel based model of the algorithm to understand in detail and model implementation in accelerator)
- Implementation (examples of implementation of algorithms, including typical AI cases)

583 characters

Available as a standalone module/ short course? Y

Statutory details

	ECTS	CATS	Non-credit		
Credit value	5	10	N	HECOS codes	

FHEQ level: Level 7

Allocation of study hours

	Hours	
Lectures	10	
Group teaching		*Incl. seminars, tutorials, problem classes.*
Lab/ practical	40	
Other scheduled		*Incl. project supervision, fieldwork, external visits.*
Independent study	75	*Incl. wider reading/ practice, follow-up work, completion of assessments, revisi*
Placement		*Incl. work-based learning and study that occurs overseas.*
Total hours	125	
ECTS ratio	25.00	

Project/placement activity

Is placement activity allowed? No

Module delivery

Delivery mode	Taught/ Campus	Other	
Delivery term	Term 2	Other	

Ownership

Primary department: Physics

Additional teaching departments	
Delivery campus	South Kensington

Collaborative delivery

Collaborative delivery?	N
External institution	N/A
External department	N/A
External campus	N/A

Associated staff

Role	CID	Given name	Surname
Module Leader	CID 233946	Alex	Tapper

Learning and teaching

Module description

Learning outcomes	By the end of this course you will (i) understand the architectures of different accelerators (GPU, FPGA etc.) (ii) be able to choose which architecture is most suitable for a range of common algorithms, including machine learning algorithms (iii) be able to produce performance models for sophisticated algorithms (iv) be able to implement algorithms in accelerators such that they may be used to process large volumes of data efficiently and effectively.
Module content	- Introduction and overview of accelerators in computing (covering typical architectures, GPU, FPGA … their features and differences) - Mapping applications to architecture (what architecture best suits the problem/algorithm etc.) - Performance modelling (making a C++/Excel based model of the algorithm, to understand it in detail and model its implementation in the accelerator etc.) - Implementation (some examples of implementation of interesting algorithms etc. which would include AI)
Learning and Teaching Approach	This course will be taught via a mixture a mixture of taught lectures and hands on lab-based programming.
Assessment Strategy	The course will be assessed entirely through practical test course work. This will be divided into a project report of around 1500 words (forming 70% of the total grade) and an oral presentation (forming 20% of the total grade) at the end of the course, and continuous assesment throughout the course (forming the remaining 10% of the total grade)
Feedback	Feedback will be provided during the course through the lab demonstrators during the practical lab sessions, and directly through feedback on the written report and presentation at the end of the course.
Reading list	

Quality assurance

Date of first approval	
Date of last revision	
Date of this approval	
Module leader	Alex Tapper
Notes/ comments	

Office use only

QA Lead	
Department staff	
Date of collection	
Date exported	
Date imported	

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