ROBERT GORDON UNIVERSITY ABERDEEN

MODULE DESCRIPTOR

Module Title

Advanced Computer Architecture

Reference	EN4541	Version	6
Created	June 2017	SCQF Level	SCQF 10
Approved	March 2004	SCQF Points	15
Amended	September 2017	ECTS Points	7.5

Aims of Module

To enable the student to study the architecture of high performance computer systems and to examine alternative architectures for computer systems designed to meet specific requirements.

Learning Outcomes for Module

On completion of this module, students are expected to be able to:

1	Analyse and critically assess the design of advanced computer systems.
2	Design key features of advanced processing and memory systems.
3	Develop solutions to computing problems using computational intelligence based architectures.
4	Implement and test solutions of computational intelligence based architectures using computer simulation.

Indicative Module Content

Advanced techniques for processor design: pipelined and superpipelined processors, branch prediction, very long instruction word (VLIW) processors, superscalar processors. Vector processors: architecture and instruction sets, vector length and stride, vector chaining. Multiprocessors: parallel processor classification, topologies. Supercomputer architecture: clusters, highly parallel systems, cloud computing, graphic processors. Memory: interleaved, bank phased. Cache memory: associative, mapping techniques, multi-level caches, support for multiprocessors (snooping, MESI). Floating point processing. Digital signal processors: architecture and features, applications, multiprocessor support. Multicore processors, multithreading, storage systems. Alternative architectures: artificial neural networks (biological basis, perceptron, back-propagation, feedback), fuzzy logic (fuzzification, inference engine, defuzzification), evolutionary artificial neural networks, other current methods.

Module Delivery

The module is taught using a structured programme of lectures, tutorials and student-centred learning.

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Indicative Student Workload	Full Time	Part Time
Contact Hours	39	39
Non-Contact Hours	111	111
Placement/Work-Based Learning Experience [Notional] Hours	N/A	N/A
TOTAL	150	150
Actual Placement hours for professional, statutory or regulatory body		

ASSESSMENT PLAN

If a major/minor model is used and box is ticked, % weightings below are indicative only.

Component 1

Type:	Coursework	Weighting:	30%	Outcomes Assessed:	4
Description:	Component 1 is a coursework which involves the development of software related to computational intelligence based architectures.				

Component 2

Type:	Examination	Weighting:	70%	Outcomes Assessed:	1, 2, 3
Description:	Component 1 a closed book examination.				

MODULE PERFORMANCE DESCRIPTOR

Explanatory Text

To pass the module, you must achieve at least a 40% weighted average mark in the exam and coursework. In addition you need to achieve at least 35% in both the individual exam and coursework Components.

Module Grade	Minimum Requirements to achieve Module Grade:
A	=>70%
B	60-69%
C	50-59%
D	40-49%
E	35-39%
F	0-34%
NS	Non-submission of work by published deadline or non-attendance for examination

Module Requirements

Prerequisites for Module	Microprocessors and Microcontrollers (EN2540) or equivalent.
Corequisites for module	None.
Precluded Modules	None.

INDICATIVE BIBLIOGRAPHY

1	J.L. HENNESSY and D.A. PATTERSON, Computer Architecture: A Quantitative Approach, 5th ed. San Francisco: Morgan Kaufmann, 2011.
2	K. L. Du and M. N. S. Swamy, Neural Networks in a Soft Computing Framework, Springer, 2006.
3	S. Haykin, Neural Networks and Learning Machines: A Comprehensive Foundation, Pearson, 3rd edition, 2008.
4	M. Negnevitsky, Artificial Intelligence: A Guide to Intelligent Systems, Addison Wesley, 2nd edition, 2002.