

Module Title Advanced Computer Architecture	Reference EN4541 SCQF SCQF Level 10 SCQF Points 15 ECTS Points 7.5 Created May 2002 Approved March 2004 Amended August 2011 Version No. 3
Keywords Advanced Computer Architecture, Multiprocessor, Fault Tolerance, Digital Signal Processor	

This Version is No Longer Current

The latest version of this module is available [here](#)

Prerequisites for Module

Computer Architecture
(EN3540) or equivalent.

Corequisite Modules

None.

Precluded Modules

None.

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

Indicative Student Workload

	Full Time	Part Time
<i>Contact Hours</i>		
Assessments	2	2
Lectures	24	24
Tutorials	12	12

Directed Study

Directed Self Study/Practical Exercises	37	37
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Private Study

Private Study	75	75
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Mode of Delivery

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

Assessment Plan

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 alternative architectures.

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, data coherence (problems and solutions - directory based and distributed, broadcast bus, cache snooping).

Memory organisation: interleaved memory, bank phased, two-level caches.

Digital signal processors: architecture and features, applications, multiprocessor

	Learning Outcomes Assessed
Component 1	1
Component 2	1,2,3

Component 2 is a closed book examination. (70% weighting)

Component 1 is a coursework which involves the simulation of computer architecture features. (30% weighting)

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.

support. Data flow computers: control flow and data flow, data flow graphs, data flow architectures (static and dynamic). Fault tolerance: static and dynamic approaches to fault tolerance. Multicore processors, multithreading, storage systems, clusters. Direct Memory Access.