Title:	Computer Architecture APPROVED
Long Title:	Computer Architecture

Module Code:	COMH6002	**Duration:**	1 Semester

Credits:	5
NFQ Level:	Fundamental
Field of Study:	Computer Science
Valid From:	Semester 1 - 2017/18 (September 2017)
Module Delivered in	6 programme(s)
Module Coordinator:	Sean McSweeney
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Module Description:	This module covers such topics as number systems and codes, Boolean algebra, sequential and combinational logic circuits, adders, registers and counters, and fundamental computer organisation. The representation of data in computer systems is outlined. Laboratory exercises help students gain the knowledge necessary to understand number systems and logic circuits.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Explain the basic elements and interconnections that make up a computer.
LO2	Appraise the use of number systems and code in computer systems.
LO3	Describe low-level program execution.
LO4	Examine and implement sequential and combinatorial circuits.
LO5	Describe logic and explain logic circuitry as used in ALU and memory.

Pre-requisite learning
Incompatible Modules *These are modules which have learning outcomes that are too similar to the learning outcomes of this module. You may not earn additional credit for the same learning and therefore you may not enrol in this module if you have successfully completed any modules in the incompatible list.*
No incompatible modules listed
Co-requisite Modules
No Co-requisite modules listed
Requirements *This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed. You may not enrol on this module if you have not acquired the learning specified in this section.*
No requirements listed
Co-requisites
No Co Requisites listed

Module Content & Assessment

Indicative Content
Computer Architecture Overview CPU: arithmetic and logic unit, control unit, central memory, ports, buses (control, data, address), memory, cache.
Low-Level Program Execution Fetch-execute cycle: overview description of a processor (for example, Intel 80X86 family), bits, bytes, words, processing power. Peripherals: uses and operational characteristics.
Information Representation and Number Systems Data representation: binary and hexadecimal notation, character codes (ASCII, EBCDIC), numeric codes (signed and unsigned binary including 1s and 2s complement, BCD, Gray code). Conversion from one data representation to another. Representation of data in software programmes, including integer and floating point variables. Hamming code, using Hamming codes and advantages and limitations.
Computer Logic Boolean algebra, sequential and combinational logic circuits. Basic logic gates, Boolean algebra, Boolean expressions. Simplification, K-Map design, flip flops, shift registers, decoders, memory organisation, 1/2 + Full Adders. Components involved in a simple processor include registers, memory and ALU components (such as ripple carry adder).

Assessment Breakdown	%
Course Work	40.00%
End of Module Formal Examination	60.00%

Course Work

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Multiple Choice Questions	An in-class examination that will require the student to demonstrate understanding of basic elements of a computer, number systems and code in computer systems.	1,2	20.0	Week 4
Practical/Skills Evaluation	A series of laboratory practicals will be undertaken by students who will then produce their findings in a document normally each week, which will be assessed. This will take place from week 5 to week 12.	3,4,5	20.0	Every Week

End of Module Formal Examination

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Formal Exam	End-of-Semester Final Examination	1,2,3,4,5	60.0	End-of-Semester

Reassessment Requirement
Repeat examination *Reassessment of this module will consist of a repeat examination. It is possible that there will also be a requirement to be reassessed in a coursework element.*

The institute reserves the right to alter the nature and timings of assessment

Module Workload

Workload: Full Time				
Workload Type	*Workload Description*	*Hours*	*Frequency*	*Average Weekly Learner Workload*
Lecture	Lecture to deliver the theory that underpins the learning outcomes	2.0	Every Week	2.00
Lab	Lab to support the learning outcomes	2.0	Every Week	2.00
Independent & Directed Learning (Non-contact)	Independent study	3.0	Every Week	3.00
			Total Hours	7.00
			Total Weekly Learner Workload	7.00
			Total Weekly Contact Hours	4.00

Workload: Part Time				
Workload Type	*Workload Description*	*Hours*	*Frequency*	*Average Weekly Learner Workload*
Lecture	Lecture to deliver the theory that underpins the learning outcomes	2.0	Every Week	2.00
Lab	Lab to support the learning outcomes	2.0	Every Week	2.00
Independent & Directed Learning (Non-contact)	Independent Study	3.0	Every Week	3.00
			Total Hours	7.00
			Total Weekly Learner Workload	7.00
			Total Weekly Contact Hours	4.00

Module Resources

Recommended Book Resources

- **Warford J S 2010, *Computer Systems*, 4 Ed., Jones & Bartlett Publishers [ISBN: 9780763771447]**
- **R. C. Detmer 2014, *Introduction to 80X86 Assembly Language and Computer Architecture*, 3 Ed., Jones & Bartlett Publishers [ISBN: 9781284036121]**

This module does not have any article/paper resources

Other Resources

- **Website: *Pep/8 assembler and simulator***
  http://computersystemsbook.com/4th-editi on/pep8/
- **E-Book: David Tarnoff 2011, *Computer Organization and Design Fundamentals* ,**
  http://faculty.etsu.edu/tarnoff/138292/
  http://www.lulu.com/shop/david-tarnoff/c omputer-organization-and-design-fundamen tals/ebook/product-17575586.html

Module Delivered in

Programme Code	Programme	Semester	Delivery
CR_KSDEV_8	Bachelor of Science (Honours) in Software Development	1	Mandatory
CR_KDNET_8	Bachelor of Science (Honours) in Computer Systems	1	Mandatory
CR_KITMN_8	Bachelor of Science (Honours) in IT Management	1	Mandatory
CR_KITSP_7	Bachelor of Science in Information Technology	1	Mandatory
CR_KCOMP_7	Bachelor of Science in Software Development	1	Mandatory
CR_KCOME_6	Higher Certificate in Science in Software Development	1	Mandatory