Module 2: Computer Architecture and Organisation

Stage	1
Semester	1
Module Title	Computer Architecture and Organisation
Module Number/Reference	2
Module Status (Mandatory/Elective)	Mandatory
Module ECTS credit	5
Module NFQ level (only if applicable)	8
Pre-requisite Module Titles	None
Co-requisite Module Titles	None
Is this a capstone module? (Yes or No)	No
List of Module Teaching Personnel	Dr Faheem Bukhatwa Mr Paddy Fahy

Contact Hours				**Non-contact Hours**			**Total Effort (Hours)**
Lecture	**Practical**	**Tutorial**	**Seminar**	**Assignment**	**Placement**	**Independent work**	
24		12		20		44	100

Allocation of Marks (Within the Module)					
	Continuous Assessment	**Project**	**Practical**	**Final Examination**	**Total**
Percentage contribution	40%			60%	**100%**

Intended Module Learning Outcomes

On successful completion of this module learners will be able to:

1. Understand the basic architecture and operation (processing, storage and communication) of a micro-processor based system
2. Describe the operation of basic processors and explain the concepts of interrupts and I/O operations
3. Identify and describe the internal hardware architecture and system software of a computer and illustrate how these components interact

4. Demonstrate a knowledge of the main types of memory, storage and peripheral devices
5. Describe the operation of basic processors an explain the concepts of interrupts and I/O operations
6. Demonstrate the ability to convert numerical data from one format to another
7. Design and simplify logic circuits using Boolean algebra

Module Objectives

This module provides the learner with the knowledge of how computers work. There are two main strands to the module. Computer Architecture addresses how the individual components work together. The second strand concentrates on the Operating System, the software that allows all the components to communicate, and manage data so that the user can concentrate on high level problems.

Module Curriculum

Introduction to Computer Hardware

- Von Neumann model. Processor overview and construction
- CPU components and configuration
- Memory: RAM, ROM, cache

Number Systems and Computer Arithmetic

- Binary, Octal and Hexadecimal number bases and their use.
- Conversion between different bases.
- Data Representation: integer, character & floating point.
- Arithmetic: binary maths, one's complement, two complement, signed numbers.

Digital Logic

- Logic gates and truth tables
- Boolean logic and Karnaugh maps
- Basic logic circuits. Half and full adder circuits. Flip-flop circuits

I/O and Storage

- Types of I/O and protocols
- Storage issues. HDD, Interleaving, RAID

Reading lists and other learning materials

Recommended reading

Stallings, W., *Computer Organisation and Architecture (8th 'Edition),* Prentice Hall, 2010

Secondary reading

Tanenbaum A. S., *Structured Computer Organisation (5th Edition)*, Prentice Hall, 2006

Sobell M. G., *A Practical Guide to Linux(R) Commands,* Prentice-Hall, 2005

Module Learning Environment

Accommodation

Lectures are carried out in class rooms / lecture halls in the College. Lab tutorials are carried out in computer labs throughout the Campus. Practical work is carried in a dedicated hardware lab.

Library

All learners have access to an extensive range of physical and electronic (remotely accessible) library resources. The library monitors and updates its resources on an on-going basis, in line with the College's Library Acquisition Policy. Lecturers update reading lists for this course on an annual basis as is the norm with all courses run by Griffith College.

Module Teaching and Learning Strategy

The module is delivered through a combination of lectures, tutorials and practical lab programming sessions. Learners study how the different parts of a modern computer system need to communicate and work together. The practical functionality of the computer architecture and operating systems are addressed. The emphasis is on how to apply theory to practice to ensure functioning systems in a modern computing environment.

Module Assessment Strategy

The module assessment consists of a series of continuous assignments and a final examination.

Element No	Weighting	Type	Description	Learning Outcome Assessed
1	30%	Worksheets	A series of weekly worksheets	1-4
2	10%	Assignment	Short research paper on some aspect of the Architecture	1,4-6
3	60%	Closed Book Examination	End of module examination	1-7

The worksheets are based on assessing material covered in the weekly tutorial sessions. The second element of assessment is a reflective assignment in which the learner has to do some research in relation to an aspect of Computer Architecture and write a paper outlining their research, evaluation and conclusions. The end of module exam assesses the learners overall understanding of the material.