Liverpool John Moores University

Title:	Algorithms, Programming and Computing
Status:	Definitive faculty appr change
Code:	**3000FND** (120960)
Version Start Date:	01-08-2016
Owning School/Faculty:	Computer Science
Teaching School/Faculty:	Computer Science

Team	Leader
Hulya Francis	Y
Angelos Marnerides	
Gyu Myoung Lee	
Hui Cheng	
Brett Lempereur	

Academic Level:	FHEQ3	**Credit Value:**	20	**Total Delivered Hours:**	72
Total Learning Hours:	200	**Private Study:**	128		

Delivery Options
Course typically offered: Standard Year Long

Component	**Contact Hours**
Lecture	24
Practical	48

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Test	AS1	Computer Architecture	25	
Portfolio	AS3	Programming Labs	50	
Test	AS2	Decision Mathematics	25	

Aims

This module aims to provide students with an introduction to technical computing and the application of computers in the implementation of simple algorithms. This is *supported by a syllabus which covers the key elements of decision mathematics and an introduction to computer programming. It is intended to be of use to students who wish to study a range of degree level engineering or technology degree programmes.*

Learning Outcomes

After completing the module the student should be able to:

1 Demonstrate an understanding of standard computer hardware architectures, the role of an operating system, the file system, networking and standard hardware interfaces.

2 Demonstrate an understanding of the fundamental principles of decision mathematics to describe the characteristics of an algorithm, and show knowledge of some useful common algorithms and their practical applications.

3 Demonstrate an understanding of the fundamental principles of computer programming, and apply this knowledge to write simple procedural programmes using an interpreted language such as Python.

4 Apply their knowledge of computer programming to implement a simple algorithm.

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

Computer Architecture	1	
Programming Labs	3	4
Decision Mathematics	2	

Outline Syllabus

The list below provides an indicative list of topics which may be covered in this module:

Computers

- *General Hardware Architecture*
- *Operating Systems*
- *File Systems*
- *Networks*
- *Hardware I/O Interfaces*

Decision Mathematics

- *Introduction to Algorithms*
    Correctness
    Finiteness
    Generality
    Stopping Conditions

- *Describing Algorithms*
  - *Flow Charts*
  - *Pseudo Code*
- *Example Algorithms*
  - *Sorting (Bubble, Shuttle, Shell, Quick)*
  - *Searching*
- *Graphs and Networks*
- *Linear Programming*

Computer Programming with Python

. *Procedural Programming*

- *Interpreted vs Compiled Languages*
- *Setting up a Python 2.x programming environment*
- *Python Scripting Fundamentals*
  - *Producing a script*
  - *Formatting a script*
  - *Python variables*
  - *Python data types*
  - *Input to Python scripts*
- *Arithmetic in Python*
  - *Mathematical operators*
  - *Division, floors and truncation*
  - *Mathematics module*
  - *NumPy Libraries*
- *Program Control*
  - *If statements*
  - *Else, and Elif statements*
  - *Checking conditions*
- *Loops*
  - *For Loops*
  - *While Loops*
  - *Nesting loops*
- *Lists and Tuples*
- *Dictionaries and Sets*
- *Strings*
- *File Handling*
- *Functions*
- *Interfacing with External Hardware*
  - *GPIO*
  - *I2C*

Learning Activities

Lectures and practical exercises

Notes

This module will use the Raspberry Pi 2 Model B as a platform for teaching the fundamentals of computers, computing and programming.

Initially, practical sessions will involve completing guided exercises based upon what students will have learned by following the first 12 hours' worth of material from the reference text (following the reference text is expected to be done as an independent study activity). After this, students will have some working knowledge of the programming language, and will be in a position to complete practical exercises where they apply what they have learned to solve a series of tasks.