Liverpool John Moores University

Title: ADVANCED DATA STRUCTURES AND ALGORITHMS
Status: Definitive
Code: **7063COMP**   (120320)
Version Start Date: 01-08-2014

Owning School/Faculty: Computing and Mathematical Sciences
Teaching School/Faculty: Computing and Mathematical Sciences

Team	emplid	Leader
Somasundaram Ravindran		Y

Academic Level:	FHEQ7	**Credit Value:**	20.00	**Total Delivered Hours:**	38.00
Total Learning Hours:	200	**Private Study:**	162		

Delivery Options
Course typically offered: Semester 1

Component	Contact Hours
Lecture	12.000
Tutorial	24.000

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Artefacts	AS1	Algorithm implementation task	40.0	
Exam	AS2	Examination	60.0	2.00

Aims

Apply various computational techniques to solve many common problems.
Develop an understanding of key concepts of complexity theory and illustrate their relevance to practical problems of algorithm design.
Understand the difference between a tractable and intractable problem and apply the implications to practical situations.

Learning Outcomes

After completing the module the student should be able to:

1   Design algorithms and employ appropriate advanced data structures for solving computing problems efficiently.
2   Implement different algorithm paradigms in a high level programming language.
3   Analyse the time requirements of particular algorithmic solutions.
4   Apply appropriate algorithms to practical situations by taking into account of tractable and intractable problems.

Learning Outcomes of Assessments

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

Algorithm implementation	1	2
Examination	3	4

Outline Syllabus

Time complexity, the big-O notation.
Elementary data structures, hash tables, binary search trees, red-black trees.
Advanced data structures: B-trees, Binomial Heaps, Fibonacci Heaps.
Sorting algorithms: Sequential and parallel algorithms, comparison of performance
Algorithmic paradigms: Divide and conquer. Dynamic Programming, Greedy Method, and Backtracking.
Graph Algorithms
Tractable and intractable problems: P&NP problems, NP-complete problems.
Approximation algorithms

Learning Activities

Lectures followed by tutor-led tutorial/practical sessions.

Notes

This course covers the modern theory of algorithms, focusing on the themes of efficient algorithms and intractable problems.