Liverpool John Moores University

Title:	Algorithm Design
Status:	Definitive
Code:	**5220COMP** (127996)
Version Start Date:	01-08-2021

Owning School/Faculty:	Computer Science and Mathematics
Teaching School/Faculty:	Computer Science and Mathematics

Team	Leader
Somasundaram Ravindran	Y
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Academic Level:	FHEQ5	**Credit Value:**	20	**Total Delivered Hours:**	46
Total Learning Hours:	200	**Private Study:**	154		

Delivery Options

Course typically offered: Semester 1

Component	Contact Hours
Lecture	22
Seminar	22

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Report	AS1	Assessing the relative methods of different sorting algorithms.	50	
Exam	AS2	Examination	50	2

Aims

Gain an understanding of how to select and design data structures and algorithms to solve computational 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 tractable and intractable problems.

Learning Outcomes of Assessments

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

Assessing sorting algorithms	1	3
Examination	2	4

Outline Syllabus

Time complexity: the big-O notation.
Elementary data structures: Stack, Queue, List and Tree.
Priority Queue and Heap
Algorithmic paradigms: Divide and conquer. Dynamic Programming, Greedy Method, and Backtracking.
Sorting algorithms, Stable Marriage Problem and Counting Inversion.
Graph and digraph algorithms: Minimum spanning trees, shortest paths, connected components and graph traversals.
Information Networks and WWW: The structure of the Web and Link Analysis and Web Search.
Tractable and intractable problems: P&NP problems, NP-complete problems.

Learning Activities

Lectures are supported by more informal seminars.

Notes

This module introduces the methods for solving computational problems. It covers the modern theory of algorithms, focusing on the themes of efficient algorithms and intractable problems.