Algorithm Design

Module Information

2022.01, Approved

Summary Information

Module Code	5220COMP
Formal Module Title	Algorithm Design
Owning School	Computer Science and Mathematics
Career	Undergraduate
Credits	20
Academic level	FHEQ Level 5
Grading Schema	40

Teaching Responsibility

LJMU Schools involved in Delivery
Computer Science and Mathematics

Learning Methods

Learning Method Type	Hours
Lecture	22
Seminar	22

Module Offering(s)

Display Name	Location	Start Month	Duration Number Duration Unit
SEP-CTY	CTY	September	12 Weeks

Aims and Outcomes

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.

After completing the module the student should be able to:

Learning Outcomes

Code	Number	Description
MLO1	1	Design algorithms and employ appropriate advanced data structures for solving computing problems efficiently.
MLO2	2	Implement different algorithm paradigms in a high level programming language.
MLO3	3	Analyse the time requirements of particular algorithmic solutions.
MLO4	4	Apply appropriate algorithms to practical situations by taking into account tractable and intractable problems.

Module Content

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.
Module Overview	This module introduces you to the methods for solving computational problems. It covers the modern theory of algorithms, focusing on the themes of efficient algorithms and intractable problems. You will gain an understanding of how to select and design data structures and algorithms to solve computational problems alongside developing an understanding of key concepts of complexity theory, illustrating their relevance to practical problems of algorithm design.
Additional Information	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.

Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Module Learning Outcome Mapping
Report	Assessing sorting algorithms	50	0	MLO1, MLO3
Centralised Exam	Examination	50	2	MLO2, MLO4

Module Contacts

Module Leader

Contact Name	Applies to all offerings	Offerings
Somasundaram Ravindran	Yes	N/A

Partner Module Team

Contact Name	Applies to all offerings	Offerings