

## Liverpool John Moores University

Title: ALGORITHM DESIGN  
Status: Definitive  
Code: **5520CSQR** (127394)  
Version Start Date: 01-08-2021

Owning School/Faculty: Computer Science and Mathematics  
Teaching School/Faculty: Oryx Universal College WLL

Team	Leader
Somasundaram Ravindran	Y

**Academic Level:** FHEQ5      **Credit Value:** 20      **Total Delivered Hours:** 57  
**Total Learning Hours:** 200      **Private Study:** 143

### Delivery Options

Course typically offered: Semester 1

Component	Contact Hours
Lecture	33
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 Algorithms	1	3
Exam	2	4

## Outline Syllabus

*Time complexity: the big-O notation.*

*Elementary data structures: Stacks, Queues, Lists and Trees*

*Sorting algorithms*

*Algorithmic paradigms: Divide and conquer. Dynamic Programming, Greedy Method, and Backtracking.*

*Graph and digraph algorithms: Minimum spanning trees, shortest paths, connected components and graph traversals.*

*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.