Data Structures and Algorithms

Module Information

2022.01, Approved

Summary Information

Module Code	5550NCCG
Formal Module Title	Data Structures and Algorithms
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
LJMU Partner Taught

Partner Teaching Institution

Institution Name
Nelson and Colne College Group

Learning Methods

Learning Method Type	Hours
Lecture	60

Module Offering(s)

Display Name	Location	Start Month	Duration Number Duration Unit
JAN-PAR	PAR	January	12 Weeks
SEP-PAR	PAR	September	12 Weeks

SEP_NS-PAR	PAR	September (Non-standard start date)	12 Weeks

Aims and Outcomes

Aims	This module introduces students to data structures and how they are used in algorithms, enabling them to design and implement data structures. It introduces the specification of abstract data types and explores their use in concrete data structures. Based on this knowledge, students should be able to develop solutions by specifying, designing and implementing data structures and algorithms in a variety of programming paradigms for an identified need.

After completing the module the student should be able to:

Learning Outcomes

Code	Number	Description
MLO1	1	Examine abstract data types, concrete data structures and algorithms.
MLO2	2	Specify abstract data types and algorithms in a formal notation
MLO3	3	Assess the effectiveness of data structures and algorithms
MLO4	4	Design, implement and test an algorithm to meet a given specification

Module Content

Outline Syllabus	Abstract Data Types. Formal specification of ADTs. Data structures: e.g. Array; set; stack; queue; list; tree; types e.g. active, passive, recursive. Algorithm types and examples. Design specification: Specify ADTs using formal notation, Issues e.g. complexity in software development; design patterns, parallelism; interfaces; encapsulation, information hiding, efficiency. Creation: Pre-conditions, post-conditions, error-conditionsImplementation: Data structures; e.g. multidimensional arrays, linked lists, stacks, queues, trees, hash table, heap, graph Algorithms; sorting, searching, tree traversal, list traversal, hash functions, string manipulation, scheduling and recursive algorithms; using handle, pointer, class, methods; using an executable programming language.Use of data structure libraries; selection of data structures; theoretical analysis; asymptotic analysis; size of N, Big O notation. Algorithm effectiveness: Run time benchmark, compiler/interpreter dependencies, resource usage, degree of parallelism, time, space, power performance, efficiency of garbage collection.
Module Overview	
Additional Information	

Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Module Learning Outcome Mapping
Report	Algorithm Implementation	50	0	MLO4
Exam	Written Exam	50	1.5	MLO1, MLO2, MLO3

Module Contacts

Module Leader

Contact Name	Applies to all offerings	Offerings
Silvester Czanner	Yes	N/A

Partner Module Team

Contact Name	Applies to all offerings	Offerings