Data Structures and Algorithms

Module Information

2022.01, Approved

Summary Information

Module Code	5503SDLBHG
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
Beaconhouse Group

Learning Methods

Learning Method Type	Hours
Online	44

Module Offering(s)

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

Aims and Outcomes

Aims	To introduce the student to the fundamentals of Abstract Data Types (ADTs) and complexity of operations on ADTs followed by an implementation-based exploration of common data structures and operations, their implementations and applications.To expose students to the development and optimisation of software based on both theoretical and applied evaluations.

After completing the module the student should be able to:

Learning Outcomes

Code	Number	Description
MLO1	1	Explain a range of fundamental data structures and their operations
MLO2	2	Analyse the complexity of various algorithms' as applied to ADTs
MLO3	3	Implement standard ADTs using both primitive language constructs and extant resources, and evaluate their performance for a specified problem domain
MLO4	4	Synthesise algorithms and data structures to fulfil a problem specification

Module Content

Outline Syllabus	Abstract Data Types and common implementation strategies: Linear ADTs: Lists (Arrays, Linked Lists) Stacks, Queues Non-Linear ADTs: Trees, Binary Trees, BSTs Maps (ListMaps, BSTMaps, HashMaps) Algorithms for structural operations; insert, remove, retrieval Algorithms for structure navigation; traversal, searchSorting AlgorithmsAlgorithm types: iterative and recursive Relationship between ADTs and computing fundamentals (e.g. Stack, Queue) Use of Big O notation to specify time complexity for simple algorithms Use of a program debugger to inspect the call stack and stack framesUse of software instrumentation to measure performance and inspect root/causal method calls
Module Overview	
Additional Information	This module is a technical, skills-focused module. It is an applied study of Data Structures and Algorithms; as such will require previous experience in programming. It will build on existing programming-based skills such as problem / functional decomposition and the use of an IDE to develop and test programs. Basic operational familiarity with a debugger will be assumed but reinforced and built on during this module.

Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Module Learning Outcome Mapping
Artefacts	Software versions	40	0	MLO3, MLO4
Exam	Examination	60	2	MLO1, MLO2

Module Contacts

Module Leader

Contact Name	Applies to all offerings	Offerings
David Lamb	Yes	N/A

Partner Module Team

Contact Name	Applies to all offerings	Offerings