Data Structures and Algorithms

Module Information

2022.01, Approved

Summary Information

Module Code	5117COMP
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
Computer Science and Mathematics

Learning Methods

Learning Method Type	Hours
Workshop	55

Module Offering(s)

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

Aims and Outcomes

Aims	This is a practical, applied Software Engineering module with the aim of introducing the student to the fundamentals of Abstract Data Types and complexity of operations on ADTs followed by an implementation-based exploration of common data structures and operations, their implementations and applications

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 fundamental algorithms’ complexity as applied to a range of ADT implementations
MLO3	3	Evaluate data structures in a given problem domain
MLO4	4	Implement standard ADTs using both primitive language and library resources
MLO5	5	Synthesise appropriate 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, QueuesNon-Linear ADTs:Trees, Binary Trees, BSTsMaps (ListMaps, BSTMaps, HashMaps)GraphsAlgorithms for structure operations; insert, remove, retrievalAlgorithms for structure navigation; search and sortAlgorithm types: iterative and recursiveRelationship between ADTs and computing fundamentals (e.g. Stack, Queue)Use of Big O notation to specify time complexity for simple algorithmsUsing a program debugger to monitor program state, and halt/control execution as required.Use of a program debugger to inspect the call stack and stack frames
Module Overview	
Additional Information	This module is a technical, skills-focused module. It 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
Report	Implementation of software	40	0	MLO3, MLO4, MLO5
Centralised 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