Module Title				Module Number		JACS Subject Code(s) and % of each subject		ASC Category(ies)	
Data Structures and Algorithms				CSE5010		I320		6	

Level (3 to 8)		Credits	ECTS Credit	Module Value (1=20 credits)		% Taught in Welsh	Module Type	
5		15	7.5	0.75		0%	Taught	

Teaching Period (Term/Semester)			Pre-requisites	
Semester: 3			CSE4006	

Module Leader		School(s)		Campus	
Sathananthy Velautham		School of Technologies		ICBT	

Assessment Methods

Assessment Code and Method	Duration/Length of Assessment Method	Weighting of Assessment	Threshold	Approximate Date of Submission
EXAM1- (Closed Book)	3 Hours (3000 words equivalent)	100 %	1	End Semester

Rationale for Assessment and Opportunity for Feedback – This field is optional.

Examination – MCQs and Structured questions include problem solving for high complexity computational issues relevant algorithms and analysis of different data structures.

Aim(s)

To provide skills and knowledge in problem solving with algorithms in various data structures to become familiar with linear and non-linear data types by focus on the performance of the implementations (time and space complexity) and to recognize problem properties where the diverse data structures are appropriate.

Learning Outcomes

On successful completion of this module, students should be able to:

- Explain the fundamentals of variety of data structures
- Explain the fundamentals of various common algorithms
- Evaluate algorithms and data structures in terms of time and space complexity
- Apply algorithms and data structures to solve programming problems

Learning and Teaching Delivery Methods

Method	Rationale	Type of Contact (scheduled/ guided independent study/placement)	Total hours
Lecture	Key method of delivering the indicative content of the module.	SCHEDULED	30

Workshops / Labs	To allow exploration of all aspects of module content (knowledge, understanding, skills & other attributes) in data structures using various algorithms and evaluate the performance of them on the basis of time and space.	SCHEDULED	30
Independent Study	To improve knowledge and skills and to prepare for examination. Students are provided with real world computational problems for further reading around topic areas.	NON - CONTACT	90
Total			150

Indicative Content

Introduction: Data Structures and Algorithms
Analysis of Algorithms: Complexity -Big o Notation, Greedy algorithms, Divide and Conquer algorithm, Dynamic programming
Sorting algorithms: Bubble sort, selection sort, insertion sort
Searching Algorithms: Binary Search, Linear Search
Arrays and Linked List: Arrays, Simple Linked List, Doubly Linked List
Stacks and Queue: ADT, Stack, Queue, Double Ended Queue
Recursion: Fibonacci, Tower of Hanoi, Tail Recursion, Merge sort
Binary Tree: Terminology, Binary Search Tree
Advanced Searching Algorithms: Quick sort, Shell Sort, radix sort
Heap: Priority queues, Heap Sort
Hash Tables: Hashing, Open Addressing, Separate chaining, Hash Functions, Hashing Efficiency
Graph: Depth first and breadth first search, Weighted Graphs.

Required Reading

Goodrich M, Tamassia R, 2010. Data Structures and Algorithms in Java. 5th edition. London: Wiley

Recommended Reading

Melhorn K, Sanders P, 2008. Algorithms and Data Structures: The Basic Toolbox. London: Springer   ISBN-N0: 3540779779

Access to Specialist Requirements

None