Module Descriptor

Module Code: CS106.3 **Version:** 3/ August 2022

Module Title: Algorithms and Data Structures **Faculty:** Computing

Level: 1

Contact:

Module Leader	Email	VLE
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Delivery Pattern:

Credits	Contact Hours	Independent Study Hours	Total Learning Hours
3	45	105	150

Learning Outcomes:

	Module Learning Outcome (LO)	Award LO
LO1	Recognize and explain the importance of algorithmic design in optimizing use of computing resources	Knowledge & Understanding, Enquiry
LO2	Identify suitable structures and algorithms to implement programming tasks.	Application, Analysis
LO3	Identify and extract the algorithmic basis of any program they have written	Analysis, Enquiry
LO4	Synthesize the solution to a real-world task as a combination of two or more standard algorithms	Application, Analysis

Module Details:

Indicative Content	Understand the concept and practical implementation of the following core areas: Introduction to Data Structures: Arrays, Stacks, Queues, Linked List, Trees, Binary Trees Sorting Algorithms: Bubble, Selection, Insertion and Merge

	Searching Algorithms: Linear Search and Binary Search Recursion: Recursive algorithms Complexity Analysis: Big O Notation, Algorithm comparison using Space and Time analysis
Assessment Details (Subjected to change the assessment strategies)	Continuous Assessments 40% Quiz 01: 10% (Data Structures) Quiz 02: 15% (Algorithms and efficiency measurements) Practical Test: 15% (Implement a suitable algorithm for a given problem) 3 Hour Examination 60%
Learning Strategies	Two hours lectures, one-hour tutorial and two hours practical.
Prospectus Information	Being exposed to different problem-solving techniques and seeing how different algorithms are designed will helps you to take on the next challenging problem that you are given.
Reference Texts	Krishanamoorthy, R. (2010) Data Structures using C.Tata Mcgraw Hill education Private Limited. Available at: https://books.google.lk/books?id=NdVS88muul4C. Weiss, M.A. (1996) Data Structures and Algorithm Analysis in C. 2nd Edn. USA: Addison-Wesley Longman Publishing Co., Inc. Kanetkar, Y. P. (2019) Data Structure Through C. 3rd Edn.India: BPB Publications.
Other Resources	Any IDE

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Session	Lecture	Practical	Tutorial
01	Introduction to Data Structures (DS) and Algorithms Overview and value of DSA concept in programming	Practical 1	Tutorial 1
02	Primitive and Basic Linear DS • Bits/Char/Integers/Long • Arrays	Practical 2	Tutorial 2
03	Stacks – static • Stack as an ADT • Applications - Stack usage for creating a local scope	Practical 3	Tutorial 3
03	Queues • Problems in static implementation • Circular buffers/queues as a solution	Practical 4	Tutorial 4
04	Linked Lists and Trees • Dynamic memory allocation • Trees	Practical 5	Tutorial 5
05	Search Algorithms • Linear Search • Binary Search	Practical 6	Tutorial 6
06	*Quiz 01*	Practical 7	Tutorial 7
07	Sorting Algorithms-Basic • Bubble sort • Selection sort	Practical 8	Tutorial 8
08	Sorting Algorithms-Basic • Insertion sort • Merge sort	Practical 9: Lab Test	Tutorial 9
09	Recursion • Introduce recursion	Practical 10	Tutorial 10
10	Algorithm Complexity • Time and space complexity • Asymptotic analysis • Big-O notation	N/A	Tutorial 11

11	Quiz2	N/A	
12	Algorithm Complexity continued	N/A	Tutorial 12
13	Introduction to trees • Key concepts • Applications	N/A	Tutorial 13
14	BST and Tree Traversal	N/A	Tutorial 14
15	Revision	N/A	Tutorial 15
15	Quiz 3	N/A	

Delivery and assessments may vary according to the level of the students capacity and delivery mode. Thus, strongly recommend keeping in touch with the module delivery.