

COURSE DESCRIPTION

NAME OF INSTITUTION	Lahore Garrison University
PROGRAM (S) TO BE EVALUATED	Computer Science , Spring 2023

Course Description :

Course Code	CSC331																				
Course Title	Data Structure and Algorithms																				
Credit Hours	3+1																				
Prerequisites by Course(s) and Topics	Object Oriented Programming																				
Assessment Instruments with Weights (homework, quizzes, midterms, final, programming assignments, lab work, etc.)	SESSIONAL (Quizzes, Assignments, Presentations) =25 % Midterm Exam =25 % Final Exam = 50%																				
Course Coordinator	Sahar Moin																				
URL (if any)																					
Current Catalog Description																					
Textbook (or Laboratory Manual for Laboratory Courses)																					
Reference Material	□ Nell Dale : C++ Plus Data Structures, Latest Edition, Jones & Bartlett □ Data Structure using C/C++ by Mark Alan. □ Yadiyah Langsam, Moshe J. Augenstein, Aaron M. Tenenbaum: Data Structures using C and C++. □ Dr. Sohail Aslam: Data Structures Handouts. □ Graph Theory & Algorithms by Dr. M. Ashraf Iqbal																				
Course Goals	• Basic and in-depth concepts of Data Structures and Algorithms to solve different software problems. • Selection of appropriate Data Structure and Algorithm for specified application. How appropriate Data Structures and algorithms impact performance of software? • Solve different problems using Arrays, Stacks, Queues, Link Lists, Trees, Heaps, Hash Tables and Graphs. • Use of different sorting techniques and their efficiency. Students will be able to translate Algorithm ideas into working practical applications.																				
Course Learning Outcomes (CLOs):	<table><tr><td>At the end of the course the students will be able to:</td><td>Domain</td><td>BT Level*</td></tr><tr><td>Identify various data structures and their algorithms</td><td>C</td><td>3</td></tr><tr><td>Analyze time and space complexities of data structures and algorithms</td><td>C</td><td>4</td></tr><tr><td>Select appropriate algorithms to use in specific applications.</td><td>C</td><td>3,4</td></tr><tr><td>Compare tradeoffs in the design and implementations of the data</td><td>C</td><td>4</td></tr><tr><td colspan="3">* BT= Bloom's Taxonomy, C=Cognitive domain, P=Psychomotor domain, A= Affective domain</td></tr></table>			At the end of the course the students will be able to:	Domain	BT Level*	Identify various data structures and their algorithms	C	3	Analyze time and space complexities of data structures and algorithms	C	4	Select appropriate algorithms to use in specific applications.	C	3,4	Compare tradeoffs in the design and implementations of the data	C	4	* BT= Bloom's Taxonomy, C=Cognitive domain, P=Psychomotor domain, A= Affective domain		
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Topics Covered in the Course, with Number of Lectures on Each Topic (assume 15-week instruction and one-hour lectures)	Week	Lecture	Topics Covered
	Week 1	1	Course Overview, Introduction to Different Data Structures. Data Types, Primitive Data types, Non – Primitive Data Types
		2	Abstract data types, (ADT's), Data Structures, Lists, ADT List Operations
	Week 2	3	Complexity Analysis & Big Oh Notation
		4	1,2,4
	Week 3	5	Infix, Prefix, Postfix notation, Conversions. Postfix Expression Evaluation
		6	Recursion and analyzing recursive algorithms
	Week 4	7	Sorting algorithms(Selection sort, bubble sort)
		8	Insertion sort , Quick sort
	Week 5	9	Intro. & Implementation of List as Singly Link List
		10	Intro. & Implementation of List as Singly Link List(Insertion and deletion function)
	Week 6	11	Solving stack problems using Link List Implementation of Queue as Singly Link List
		12	Intro. & Applications of Doubly Link List (DLL)
	Week 7	13	Queue / Stack Operations implementation using DLL
		14	Intro. & Applications of Circular Link List (CLL) Queue / Stack Operations implementation using CLL
	Week 8	1 hours	Mid Term
	Week 9	15	Queue , Dequeue & its implementation using arrays
		16	Priority queues, Circular queues using arrays
	Week 10	17	Divide and conquer algorithms
		18	Binary Tree, Strictly Binary Tree, Complete Binary Tree
	Week 11	19	Divide and conquer algorithms,
		20	Binary Tree, Strictly Binary Tree, Complete Binary Tree
	Week 12	21	Implementation of BST
		22	Tree Traversal: Three Tick method
	Week 13	23	AVL Trees, Operations on AVL Tree
		24	Heaps, Min Heaps, Max Heaps
	Week 14	25	Implementation of Heap sort
		26	Min Balanced BST, Max Balanced BST
	Week 15	27	Graphs, Types of Graphs
		28	Adjacency matrix and adjacency list implementations
	Week 16	29	Hashing. Hashing Techniques, Collisions & Collisions Avoidance Methods
		30	Memory management and garbage collection
	Week 17	2 hours	Final Term
Laboratory Projects/Experiments Done in the Course	yes		
Programming Assignments Done in the Course	yes		

Instructor Name Sahar Moin

Instructor Signature

Date