

COURSE DESCRIPTION

NAME OF INSTITUTION	Lahore Garrison University
PROGRAM (S) TO BE EVALUATED	Computer Science , Spring 2022

Course Description :

Course Code	CSC331																				
Course Title	Data Structure and Algorithms																				
Credit Hours	3+1																				
Prerequisites by Course(s) and Topics	Programming Fundamentals																				
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	Muhammad Ali Dildar																				
URL (if any)																					
Current Catalog Description																					
Textbook (or Laboratory Manual for Laboratory Courses)	Data Structures and Algorithms in C++ by Adam Drozdek																				
Reference Material	1. Data Structures and Algorithms in C++ by Adam Drozdek 2. Data Structures and Abstractions with Java by Frank M. Carrano & Timothy M. Henry 3. Data Structures and Algorithm Analysis in C++ by Mark Allen Weiss 4. Java Software Structures: Designing and Using Data Structures by John Lewis and Joseph Chase																				
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>Implement various data structures and their algorithms, and apply them in implementing simple applications.</td><td>C</td><td>2,3</td></tr><tr><td>Analyze simple algorithms and determine their complexities.</td><td>C</td><td>4,5</td></tr><tr><td>Apply the knowledge of data structures to other application domains.</td><td>C</td><td>3</td></tr><tr><td>Design new data structures and algorithms to solve problems.</td><td>C</td><td>6</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*	Implement various data structures and their algorithms, and apply them in implementing simple applications.	C	2,3	Analyze simple algorithms and determine their complexities.	C	4,5	Apply the knowledge of data structures to other application domains.	C	3	Design new data structures and algorithms to solve problems.	C	6	* 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, Abstract Data Types (ADT). Linear vs Non-Linear Data Structures.
		2	Abstract data types, (ADT's), Data Structures, Lists, ADT List Operations
	Week 2	3	Complexity Analysis & Big Oh Notation
		4	ADT Stacks, ADT Stack Operations and implementation
	Week 3	5	Infix, Prefix, Postfix notation, Conversions. Postfix Expression Evaluation.
		6	Queue , Dequeue & its implementation using arrays
	Week 4	7	Priority queues, Circular queues using arrays
		8	Recursion and analyzing recursive algorithms
	Week 5	9	Sorting algorithms (Selection sort)
		10	Insertion sort , Bubble Sort
	Week 6	11	Intro. & Implementation of List as Singly Link List
		12	Intro. & Implementation of List as Singly Link List(Insertion and deletion function)
	Week 7	13	Intro. & Implementation of List as Singly Link List(Search and Sorting function)
		14	Solving stack problems using Link List
	Week 8	1 hours	Mid Term
	Week 9	15	Intro. & Applications of Doubly Link List
		16	Queue / Stack Operations implementation using DLL
	Week 10	17	Intro. & Applications of Circular Link List
		18	Queue / Stack Operations implementation using CLL
	Week 11	19	Introduction and Applications of Doubly Linked List
		20	Implementation of Doubly Linked List
	Week 12	21	Implementation of Doubly Linked Lisr
		22	Queue/Stack operations using DLL
	Week 13	23	Introduction and Applications of Circular Linked List
		24	Implementation of Circular Linked List
	Week 14	25	Divide and Conquer Algo
		26	Binary Trees and its types & implementation of BST
	Week 15	27	Tree Traversal
		28	AVL trees and their operations
	Week 16	29	Heap and its types
		30	Balanced BST
	Week 17	2 hours	Final Term
Laboratory Projects/Experiments Done in the Course	Student oriented Project		
Programming Assignments Done in the Course	4 Assignments		

Instructor Name Muhammad Ali Dildar

Instructor Signature

Date