



TEACHING PLAN

Course Title:	Data Structures And Algorithms		
Course Code:	CSC-221		
Credit Hours:	3		
Contact Hours:	3 hours lecture per week		
Prerequisite(s):	Computer Programming (CSC-113)		
Semester:	3		
Instructor(s):	Lubna Siddiqui		
Course material available	University LMS		
Objectives:	The primary objective of the course is to help students understand the importance of data structures and well-designed algorithms for efficient management of computing resources while programming. Popularly employed linear and nonlinear data structures are described from the perspective of their specification, application, and implementation. Several sorting and searching techniques are also discussed to help students design efficient solutions for real life problems. Basic knowledge of algorithm's complexity analysis is also provided for identification of time costly processes.		
Course Learning Outcomes	After successful completion of this course, the students should be able to:	PLO	BT Level
	1. Explain and compare different data structures and their applications	1	C2
	2. Apply appropriate data structures according to the given scenarios and application domain	2	C3
	3. Analyze time complexity of different algorithms	2	C4
	4. Design efficient algorithm(s) to solve real-world problems.	4	C6

Course Contents:	Abstract Data Types (ADTs) , Linear data structures (Stacks, Queues, Linked list), Non-linear data structures (Trees, Graphs), Recursion and recursive algorithms, Sorting Algorithms (Bubble, Insertion, Selection, Quick, Merge, Shell, Heap), Searching (Linear, Binary, Depth First, Breadth First, Shortest Path, Minimum Spanning Trees), Hashing and Collision resolution techniques (Open Addressing, Separate Chaining, Double Hashing), Data Compression (Huffman's Code), Complexity Analysis of Algorithms (Big-O notation)
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Lecture Plan

WEEK	TOPICS/SUBTOPICS	Lab	QUIZZES/ASSIGNMENTS	REMARKS
01	<u>Introduction Class</u> Course overview Linear array Operations (Insertion, Deletion, Traversing)	Lab 1:Array insertion, Deletion and Traversing		
02	<u>Searching algorithm</u> <ul style="list-style-type: none"> Linear Search Binary Search 	Lab:2 Implementation of linear search and Binary search		
03	<u>Sorting algorithms</u> Insertion Sort Selection Sort Bubble Sort	Lab:3Implementation of sorting algorithms		
04	<u>Algorithm Analysis</u> <ul style="list-style-type: none"> Computational And Asymptotic Complexity BIG-O Notation Big-O Properties Omega and Theta Notations 	Lab:4Algorithm analysis	Quiz 1 Assignment01	
05	<u>Abstract Data Types</u> <ul style="list-style-type: none"> Stack Stack concepts and its applications Infix to post fix conversion	Lab:5Implementation of Stack		

	Post fix evaluation			
06	<u>Abstract Data Types</u> Queue Queue concepts and its applications Circular Queue	Lab:6 Implementation of Queue	Quiz 2	
07	<u>Abstract Data Types</u> Single Link list Concepts and its applications Single Linked list operations Concept of circular queue	Lab 7:Implementation of single link list	Assignment 2	
08	<u>Abstract Data Types</u> Double Link list Concepts and its applications Double Link list operations	Lab Exam 1		
09	Midterm Exam			15 to 21 Apr 24
10	<u>Recursion</u> <ul style="list-style-type: none"> • Concepts • Type of Recursion Merge sort Quick sort	Lab 8:Implementation of double link list		
11	Binary Tree Expression tree Depth first traversal Breadth first traversal Introduction to binary search tree- Insertion ,traversal	Lab 9:Implementation Merge sort & Quick sort		Labour Day 1-May-24 Wednesday

12	Binary Search Tree Deletion, Balanced Tree AVL Tree Single rotation Double rotation	Lab 10:Implementation of binary search tree	Assignment03	
13	Heap Min heap & max heap Heap sort	Lab 11:Implementation of Heap	Quiz 3	
14	<u>Hashing</u> Hash function Hash Table Collision Resolution <ul style="list-style-type: none"> • Separate Chaining • Open Addressing 	Lab 12:Implementation of Hashing		
15	<u>Graph</u> <ul style="list-style-type: none"> • Introduction • Graph representation <ul style="list-style-type: none"> ○ Adjacency Matrix ○ Adjacency List Undirected Graph <ul style="list-style-type: none"> • Breadth First Search 	Lab 13:Implementation of Graphs	Quiz 4	
16	Directed Graph <ul style="list-style-type: none"> • Topological sort Depth First Search	Open Ended Lab		
17	Single source Shortest path <ul style="list-style-type: none"> • Dijkstra Algorithm Minimum spanning tree <ul style="list-style-type: none"> • Prim's Algorithm 	Project Submission		
18	Final Exam			21 Jun to 03 Jul 24

COURSE EVALUATION:

Type of Assessment	Percentage (%)	Remarks
Quizzes & Assignments	30	4 Quizzes (10 Marks) 3 Assignments (20 Marks)
Mid-Term Exam	20	
Final Exam	50	

TEXT BOOKS:

Main	Data Structures and Algorithms in C++, by Drozdek Adam, 6th Edition, 2020.
Reference	<ol style="list-style-type: none"> 1. Data Structures and Algorithm Analysis in C++, by Mark Allen Weiss, 7th Edition, Published by Addison-Wesley, 2019. 2. Data Structures and Algorithms using C & C++, Augenstein & Tenenbaum, 2019. 3. C++ Plus Data Structures, 7th Edition, Nell Dale, Jones and Bartlett Learning, 2020. 4. Data Structures using C++, Varsha H. Patil, 6th Edition, Oxford University Press, 2018.

GRADING SCHEME:

Grade	Grade Point	LL %	UL %
A	4.00	≥ 85	-
A-	3.67	≥ 80	< 85
B+	3.33	≥ 75	< 80
B	3.00	≥ 71	< 75
B-	2.67	≥ 68	< 71
C+	2.33	≥ 64	< 68
C	2.00	≥ 60	< 64
C-	1.67	≥ 57	< 60
D+	1.33	≥ 53	< 57
D	1.00	≥ 50	< 53
F	0.00	-	< 50
W	Withdrawn		

COURSE POLICY:

Homework (Assignments)	<ul style="list-style-type: none">• Late homework will not be accepted,• All works have to be done independently,• Students handing in similar homework will receive a grade of 0 (ZERO) and face possible disciplinary actions.
Makeup Exams	In accordance with university regulations, i.e. students should bring a valid excuse authenticated through valid channels immediately within first week after the exam. Otherwise they will be considered absent and no makeup exam for them.
Attendance	<ul style="list-style-type: none">• Students are expected to attend all classes• Attendance is compulsory and will be taken regularly.• Attendance for less than 75% of the lectures will result in students being barred from taking the Final Exam.
Code of Conduct	Copying of another student's work or code, even if changes are subsequently made, is inappropriate, and such work or code will not be accepted . The University has very clear guidelines for academic misconduct, and they will be enforced in this class.
Cell Phone	Cell phones are restricted during class. Cell phones must be turned off during the lecture. If your cell phone rings during class, you may be asked to leave.

Lubna Siddiqui

Signature of Course Instructor

Date: 12/02/2024

Validated by Head of Department

Date: