

Branch Name:	MCA
Program Code:	CS201
Course Name:	Data Structures and Algorithms Practical
Course Code:	4CS2010103P
Pre-requisite Course:	Basic knowledge of Programming Languages like C, C++

Course Objectives:

1. To understand and apply linear data structures such as arrays, stacks, queues, and linked lists.
2. To analyze and implement non-linear data structures like trees and graphs.
3. To develop efficient algorithms for sorting techniques including bubble, insertion, merge, and quick sort.
4. To implement and evaluate searching algorithms such as linear and binary search.
5. To select and use appropriate data structures and algorithms for solving real-world problems efficiently.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
-	-	4	2	-	-	25	25	50

Practical List:

1. Implement array operations: insert, delete, search, traverse
2. Demonstrate static vs. dynamic memory allocation using pointers
3. Implement stack using array (push, pop, peek, isFull, isEmpty)
4. Convert and evaluate infix, postfix, and prefix expressions using stack
5. Implement linear queue using array and linked list
6. Implement circular queue using array
7. Implement dequeue (Double Ended Queue)
8. Implement singly, doubly, and circular linked lists with all basic operations
9. Create and traverse a binary tree (Inorder, Preorder, Postorder - recursive)
10. Implement Binary Search Tree with insert, delete, and search)
11. Represent graphs using adjacency matrix and adjacency list
12. Implement DFS and BFS for graph traversal
13. Implement basic sorting algorithms: bubble, selection, insertion
14. Implement advanced sorting: merge sort and quick sort

Text Books:

1. Fundamentals of Data Structures in C **Authors:** Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed
Publisher: Silicon Press **Year of Publication:** 2008 **Number of Pages:** 617 **ISBN:** 978-0-929306-40-7
2. Data Structures Using C **Author:** Reema Thareja **Publisher:** Oxford University Press **Year of Publication:** 2018 (2nd Edition) **Number of Pages:** 560 **ISBN:** 978-0198099307

3. Data Structures Through C **Author:** Yashavant Kanetkar **Publisher:** BPB Publications **Year of Publication:** 2023 (5th Edition) **Number of Pages:** 310 **ISBN:** 978-9355515612
4. Advanced Algorithms and Data Structures **Author:** Marcello La Rocca **Publisher:** Manning Publications **Year of Publication:** June 2021 **ISBN:** 978-1617295485

Reference Books:

1. *A Common-Sense Guide to Data Structures and Algorithms* (2nd Edition) **Author:** Jay Wengrow **Publisher:** Pragmatic Bookshelf **Year of Publication:** September 2020 **Number of Pages:** 508 **ISBN:** 978-1680507225
2. Advanced Data Structures and Algorithms **Authors:** Abirami A, Priya R L **Publisher:** BPB Publications **Year of Publication:** March 2023 **Number of Pages:** 194 **ISBN:** 978-9355517937
3. *Introduction to Algorithms* (4th Edition) **Authors:** Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein **Publisher:** The MIT Press **Year of Publication:** April 2022 **Number of Pages:** 1312 **ISBN:** 978-0262046305

List of Open-Source Software/learning website:

<https://www.geeksforgeeks.org>

<https://www.w3schools.com>

<https://jquery.com/>

<https://www.tutorialspoint.com>

<https://getbootstrap.com/>

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Define and classify data structures; describe their significance in problem-solving.	2. Understand
CLO2	Explain and illustrate memory allocation strategies and the role of pointers in data handling.	2. Understand 3 Applying,
CLO3	Implement linear data structures (arrays, stacks, queues, linked lists) and perform basic operations.	3 Applying 5. Analyze
CLO4	Analyse non-linear data structures (trees, graphs) for different applications and traverse them efficiently.	5. Analyze 6. Evaluate
CLO5	Compare and evaluate searching and sorting algorithms based on their time and space complexity.	6. Evaluate 3 Applying,
CLO6	Design and develop data structure-based solutions for real-world problems using appropriate algorithms.	7 Create 3 Applying 5. Analyze

Mapping of CLOs with Pos & PSOs

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes (PSOs)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CLO1	H	M	-	-	-	-	L	-	-	-	-	-	H	M
CLO2	H	H	M	-	M	-	L	-	-	-	-	-	H	M
CLO3	H	H	H	L	M	-	L	-	-	-	-	L	H	H
CLO4	H	H	H	M	M	-	L	-	-	-	-	L	H	H
CLO5	H	H	M	L	M	-	M	-	-	-	-	M	M	H
CLO6	H	H	H	M	H	L	M	M	M	L	M	H	H	H

H:High, M:Medium, L:Low