

Branch Name:	MCA
Program Code:	CS201
Course Name:	Data Structure
Course Code:	3CS2010202T
Pre-requisite Course:	Basic knowledge of programming language like C, C++

Course Objectives:

1. To extend proficiency in implementation of Data Types.
2. To be able to carry out the study of various Algorithms of Time and Space Complexity.
3. To get a good quality understanding of applications of Data Structures.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				Total
Lecture	Tutorial	Practical	Credit	Theory		Practical		
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	-		3	60	40	-	-	100

Course Contents:

Sr. No	Topic	Total Hours	Weightage (%)
1	Introduction to Data Structures : Data.Information,Data Structures, Classification of Data Structures, Operations of Data Structures, Primitive Data Structures, Non Primitive Data Structures, String Manipulation & Pattern Matching, Storage Representation of Strings ,Text Handling, KWIC Indexing.	8	15
2	Linear Data Structures: Array: Arrays, Storage Structure for Arrays, Arrays with structure. Queue: Simple Queue, D-Queue, Circular Queue, Application of Queue. Stack: Stack and Application of Stack.	10	25
3	Link List: Singly Link List ,Double Link List, Circular Link List , Pointers & Linked Lists, Applications of Linked Linear Lists. Nonlinear Data Structures-Tree Definition of Tree, Representation of Tree, Basic Terminology of Tree, Types of Tree, Binary Tree, Conversion of General Tree to a Binary Tree, Understanding and Implementing Binary Tree Traversal, Constructing a Binary Tree from Traversal Results, Storage Representation and Manipulation of Binary Tree, Applications of Tree, Binary Search Trees, Sparse Matrices.	15	25
4	Nonlinear Data Structures-Graph Matrix Representation of Graphs, Graphic Representation of List Structures, Other Representation of Graphs, Breadth First Search (BFS), Depth First Search (DFS), Garbage Collection.	06	15
5	Sorting & Searching: Linear Search, Binary Search. Sorting Methods, Internal and External Sorting, Bubble Sort, Quick Sort, Merge Sort, Insertion Sort. Hashing Functions, Collision Resolution Techniques.	09	20

Text Books:

1. "An Introduction to Data Structures with Applications", Jean-Paul Tremblay, Paul G. Sorenson, Tata McGraw-Hill, 2nd Edition, (2007).
2. "Data Structures Via C++: Objects by Evolution", A. Michael Berman, , Oxford Univ. Press (2004)
3. "Sorting & Searching - The Art of Computer Programming" D E Knuth, , Vol. 3, Pearson Education (1998).

Reference Books:

1. "Fundamentals of Data Structures in C", Horowitz, Sahni, Anderson-Freed, , University Press (2nd edition-2007)
2. "Data Structures Using C & C++", Tenenbaum, PHI.

List of Open Source Software/learning website:

1. <https://www.w3schools.in/data-structures>
2. https://www.tutorialspoint.com/data_structures_algorithms/index.htm

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

CLO	Description	Bloom's Taxonomy Level
CLO1	To be able to describe and classify fundamental concepts of object-oriented programming, basic and advanced data structures.	2 Understand
CLO2	To choose the best algorithm to solve a problem by considering various problem characteristics, such as the data size, the type of operations, etc.	1 Remember 3 Apply
CLO3	To create the algorithms and program of various operations on Queues, Stacks, Linked Lists, Trees, Graphs, Sorting, Searching, Hash tables.	2 Understand 3 Apply
CLO4	To evaluate algorithms with respect to time and space complexity	3 Apply 2 Understand
CLO5	To be able to design, implement and debug small-to-moderate programs to manipulate and manage data elements while exhibiting the object-oriented programming skills.	7 Create 6 Evaluate 5 Analyze
CLO6	To be able to explain, understand, compare and apply algorithms and principles of object-oriented programming and advanced data structures to a specific situation.	2 Understand 1 Remember

Mapping of CLOs with Pos & PSOs

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

H: High, M: Medium, L: Low