

UCS 049 - : DATA STRUCTURES AND ALGORITHMS

L	T	P	Cr
2	0	2	3.0

Course Objectives: To become familiar with different types of data structures and their applications and learn different types of algorithmic techniques and strategies.

Introduction and Overview: Basic Terminology, Elementary Data Organization, Data Structures, Control Structures, Asymptotic Notations for Algorithms, Big O notation: formal definition and use, Little o, big omega and big theta notation , Arithmetic Expressions, Polish Notations, Arrays, Records, Pointers, Storing Strings, String Operations, Pattern Matching Algorithms, Stacks, Queues, Recursion, Towers of Hanoi.

Searching and Sorting: Linear Arrays, Traversing and Searching in Linear Arrays, Inserting and Deleting, Bubble Sort, Linear Search, Binary Search, Insertion Sort, and Selection Sort.

Non-Linear Data Structures: Trees, Binary Trees, Traversing Binary Trees, Binary Search Trees, Searching and Inserting in Binary Search Trees, Deleting in a Binary Search Tree, Preorder, Postorder and Inorder Traversal, Heaps, Graph, Graph Algorithms, Breadth First Search, Depth First Search.

Linked List: Introduction, Insertion into a linked list, Deletion into a linked list. Stack, Queues, trees using linked list, Hashing, Hash Functions.

Laboratory work: Implementation of Arrays, Recursion, Stacks, Queues, Lists, Binary trees, Sorting techniques, Searching techniques. Implementation of all the algorithmic techniques.

Course learning outcomes (CLOs):

On completion of this course, the students will be able to

1. Implement the basic data structures and solve problems using fundamental algorithms.
2. Implement various search and sorting techniques.

3. Analyze the complexity of algorithms, to provide justification for that selection, and to implement the algorithm in a particular context.

4. Analyze, evaluate and choose appropriate data structure and algorithmic technique to solve real-world problems.

Text Books:

1. *Seymour Lipschutz, Data Structures, TATA McGraw Hill (2016).*

2. *Corman, Leiserson&Rivest, Introduction to Algorithms, MIT Press (2009).*

3. *Narasimha Karumanchi, Data Structures and Algorithms Made Easy (2014).*

Reference Books:

1. *Sahni, Sartaj, Data Structures, Algorithms and Applications in C++, Universities Press (2005).*

Evaluation Scheme:

S.No.	Evaluation Elements	Weightage (%)
1	MST	30
2	EST	45
3	Sessionals (Assignments/Projects/ Tutorials/Quizzes/Lab Evaluations)	25