

Data Structures & Algorithms Course Content

1. Programming and Complexity Basics
2. Arrays and Strings (Hands on)
3. Searching and Sorting (Hands on)
4. Linked Lists, Stacks and Queues (Hands on)
5. Hashing
6. Trees (Hands on)
7. Heaps and Graphs (Hands on)
8. Dynamic Programming (Hands on)
9. Greedy and Advanced Techniques
10. Interview Preparation

Programming and Complexity Basics

- Problem Solving Approach, Pseudocode, Dry Runs
- Time and Space Complexity, Big O, Omega, Theta
- Recursion and Backtracking Basics

Arrays and Strings (Hands on)

- Array Operations, Two Pointers, Sliding Window
- Prefix Sum, Kadane's Algorithm
- String Manipulation, Pattern Matching, KMP

Searching and Sorting (Hands on)

- Linear and Binary Search, Search on Answer
- Bubble, Selection, Insertion, Merge, Quick, Heap, Counting Sort

Linked Lists, Stacks and Queues (Hands on)

- Singly, Doubly, and Circular Linked Lists
- Stack and Queue Implementations, Monotonic Stack
- Deque, Priority Queue

Hashing

- Hash Maps, Hash Sets, Collision Handling
- Frequency Counting, Subarray Problems

Trees (Hands on)

- Binary Trees, Traversals, Binary Search Trees
- AVL Trees, Segment Trees, Fenwick Trees
- Tries, Lowest Common Ancestor

Heaps and Graphs (Hands on)

- Heaps, Top-K Problems
- Graph Representation, BFS, DFS
- Shortest Path: Dijkstra, Bellman-Ford, Floyd-Warshall
- Minimum Spanning Tree, Topological Sort, Union-Find

Dynamic Programming (Hands on)

- Memoization and Tabulation
- Knapsack, LCS, LIS, Matrix Chain Multiplication
- DP on Grids, Trees, and Bitmasks

Greedy and Advanced Techniques

- Greedy Algorithms, Interval Problems
- Divide and Conquer, Bit Manipulation
- Backtracking: N-Queens, Sudoku, Subsets, Permutations

Interview Preparation

- Pattern Recognition, LeetCode and HackerRank Practice
- Mock Interviews, Company-Specific Problem Sets
- System Design Basics for Interviews