TechLeap Academy

ADVANCED CERTIFICATION PROGRAM IN

Data Structures & Algorithms (C++/Java)

Powered by: **TechLeap Academy**

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UNLOCK YOUR INTELLECTUAL GRACE

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About us:

TECHLEAP ACADEMY
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TechLeap Academy is an EdTech Platform, offers a diverse range of programs designed to match your ambitions and career goals. Whether you're just starting your journey in technology or looking to upskill, our carefully curated courses provide the perfect blend of theory and hands- on experience. From software development and web technologies to digital marketing, data analytics, and emerging tools, our programs are built with industry demand in mind. Each course is led by experienced mentors who guide you through real-world projects, ensuring you gain the confidence and expertise to succeed.

Program Overview

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Phase-1 (Application & Onboarding)

1.----- Application Submission-----2.----- Application Submission

Phase-2 (Journey Begin)

1.----- Basic Quiz----2.-----Self Analysis Drill

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Phase-3 (Let's start mentorship)

1.-----Data Science & Analytics (Basic to advance)

2.-----LIVE sessions + weekly challenges.

3----Guidance of Industry Mentor

Phase-4 (Ready to join the industry)

1.-----Live Projects-----2.-----Phase Test-----
3.-----Internship Opportunities-----4.-----Career Assistance Session-----5.-----Mock Interviews

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TechLeap Certification

1. -----TechLeap Certification
2. -----3+Industrial Expert Guest Sessions
3. -----3+ Advanced Projects

Tools & skills learnt

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- Data types & Operators
- Pointers & Recursion
- Searching & Sorting
- Strings & LinkedLit
- Loops
- Arrays
- Matrix & Hashing
- Stacks, Queue &

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Job Opportunities

C++ Developer
(₹4L – ₹6.5 lakhs per annum)

Software Engineer / Java —
(₹5 – ₹9 Lakh per annum)

Lead / Architect / Specialist
(₹15 – ₹30 lakhs per annum)

Automation Engineer Mid Level:
(₹7 – ₹14 lakhs per annum)

Big Data Developer(Fresher
₹4 – ₹6 lakhs per annum)

Performance Engineer
(₹10 – ₹20 lakhs per annum)

Mid-level / Sr Developer
(₹8 – ₹20 lakhs per annum)

System Design Engineer
(₹12 – ₹22 lakhs per annum)

Curriculum

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Week 1 – Introduction to DSA & Programming Environment • Course overview & expectations • C++/Java refresher: syntax, classes, I/O • Introduction to algorithm analysis (Big O notation) • Arrays vs. Linked structures overview • Practical: Set up IDE (VS Code / IntelliJ / Eclipse), write a sample program.

Week 2 – Complexity Analysis & Recursion • Time & space complexity analysis • Recurrence relations • Recursion basics and stack memory • Tail recursion & recursion vs. iteration • Practical: Implement factorial, Fibonacci recursively and iteratively.

Week 3 – Arrays & Strings • Static vs. dynamic arrays • Multi-dimensional arrays • String operations and manipulation • Common array/string problems (rotation, reversal, palindrome) • Practical: Solve basic array & string problems in C++/Java.

Week 4 – Linked Lists • Singly linked list: operations (insert, delete, traverse) • Doubly linked list • Circular linked lists • Memory management in linked structures • Practical: Implement singly and doubly linked lists.

Week 5 – Stacks & Queues • Stack: LIFO principle, applications (expression evaluation, backtracking) • Queue: FIFO principle, circular queues • Deque & priority queues overview • Stack/Queue implementation using arrays & linked lists • Practical: Implement stack & queue classes in C++/Java.

Week 6 – Recursion Advanced & Backtracking • Recursion tree & complexity • Backtracking fundamentals • Classic problems: N-Queens, Rat in a Maze, Subset generation • Practical: Solve N-Queens & subsets problem using backtracking.

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Week 7 – Trees (Part 1) • Introduction to tree data structure • Binary tree basics: traversal (inorder, preorder, postorder, level order) • Recursive vs. iterative traversal • Applications of binary trees • Practical: Implement binary tree creation & traversals.

Week 8 – Trees (Part 2): BST & Heaps • Binary Search Tree: insert, delete, search • Balanced vs. unbalanced trees • Heaps (min-heap & max-heap), heap operations • Priority queues in C++ STL / Java Collections • Practical: Implement BST and heap operations.

Week 9 – Hashing • Hash tables & hash functions • Collision handling: chaining, open addressing • C++ unordered_map / Java HashMap • Applications of hashing (frequency counting, sets) • Practical: Implement a simple hash table & solve frequency problems.

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Week 10 – Graphs (Part 1): Representation & Traversals • Graph terminology & types (directed/undirected, weighted/unweighted) • Adjacency matrix vs. adjacency list • Depth-first search (DFS) • Breadth-first search (BFS) • Practical: Implement graph with adjacency list & run DFS/BFS.

Week 11 – Graphs (Part 2): Shortest Paths & MST • Dijkstra's algorithm • Bellman-Ford overview • Minimum Spanning Tree (Kruskal & Prim) • Union-Find/Disjoint Set basics • Practical: Implement Dijkstra's algorithm and MST with Union-Find.

Week 12 – Sorting Algorithms • Comparison of sorting techniques • Bubble, Selection, Insertion sort • Merge sort, Quick sort (divide & conquer) • Counting, Radix sort (non-comparison) • Practical: Implement and benchmark sorting algorithms.

Week 13 – Searching & Advanced Data Structures • Binary search & its variants • Ternary search • Introduction to Tries • Segment trees & Fenwick trees (Binary Indexed Trees) overview • Practical: Implement binary search and a Trie for word search.

Week 14 – Dynamic Programming • Introduction to DP vs. recursion • Memoization vs. tabulation • Classic DP problems: Fibonacci, Knapsack, Longest Common Subsequence • Optimizing DP space complexity • Practical: Solve 0/1 Knapsack and LCS using DP.

Week 15 – Interview Patterns & Problem Solving • Sliding window technique • Two-pointer technique • Greedy algorithms overview • Mock coding interview session • Practical: Solve mixed interview-style DSA problems.

Week 16 – Capstone Project & Final Review • Develop a mini-project using multiple data structures (e.g., mini search engine, scheduling system) • Algorithm optimization & presentation • Career tips for coding interviews and competitive programming • Course recap & Q&A; • Practical: Submit and present your final DSA project

Recruitment Partners

Code of Conduct

Program Structure: Skill Development Track: We will focus on enhancing skills and knowledge with LIVE sessions from industry mentors.
Certification: Successful completion of the program, including assessments, projects, and attendance, will lead to gaining Completion Certificate and Project Certificate. Internship Certificate will be provided by the company you'll be interning with, if any. Career Track **(Early Career Opportunities)**: We will provide opportunities for early career development through internships.
Code of Conduct Class Schedule and Attendance: Regular Classes: Classes will be held two times a week on a consistent schedule. Evening Time Slots: Class timings will be in the evening slot between 6:30 PM - 10:00 PM, and each session will last approximately 1-1.5 hours.
Mandatory Attendance: A minimum of 70% attendance in live classes is required. Certification Criteria: Certifications will only be issued to students who maintain the required attendance.

Contact Us

Course starts:

Classes from first week of the month

Program hours:

50+ learning hours
4+ Industrial Projects

For admissions, contact:

+918130058278

support@techleapacademy.org