

DSA in C++ from Scratch - Full Syllabus

Phase 0: C++ Foundation (7–10 Days)

Day	Topic	Practice Exercises
1	Hello World, Variables, I/O	Add 2 numbers, Swap
2	If-else, Loops	Even/Odd, FizzBuzz
3	Functions	Prime Check, Factorial
4	Arrays	Reverse, Max, Sum
5	Strings	Palindrome, Count Vowels
6	Pointers & References	Swap using pointer
7	OOP Basics	Student Class, Bank Account
8	STL Intro	vector, map, set

Phase 1: Core DSA Beginner Level (12–15 Days)

Day	Topic	Task/Problem
1	Time & Space Complexity	Dry run loops
2	Recursion	Fibonacci, Factorial
3	Searching	Linear & Binary Search
4	Sorting 1	Bubble, Insertion
5	Sorting 2	Selection, Merge Sort
6	2D Arrays	Transpose, Spiral Print
7	Sliding Window	Max sum of size K
8	Hashing	Frequency of elements
9	Two Pointer	Pair Sum, Move Zeros
10	Prefix Sum	Subarray sum
11	Math	GCD, LCM, Sieve
12	STL Deep	priority_queue, unordered_map

Phase 2: Core Data Structures (21–25 Days)

Structure	Topic	Problems
Linked List	Singly LL	Insert, Delete, Print
	Reverse LL	Iterative & Recursive
	Loop Detection	Floyd's Cycle
	Doubly & Circular	Implementations
Stack	Array/LL	Push, Pop
	Infix to Postfix	Balanced Parentheses
	Stock Span	Min Stack
Queue	Normal/Circular	Enqueue, Dequeue
	Deque, Priority Queue	Using STL
Tree	Binary Tree	Traversals
	BST	Insert, Delete, Search
	LCA, Check BST	Tree Problems
Graph	Adj List/Matrix	Directed/Undirected
	BFS/DFS	Connected Components
	Cycle Detection	BFS/DFS based
	Topo Sort	Kahn's Algorithm
	Shortest Path	Dijkstra, Bellman Ford
	DSU	Union-Find

Phase 3: Algorithms & Advanced DSA (20 Days)

Type	Topic	Problems
Recursion	Subsets, Permutations	Backtracking
Greedy	Activity Selection	Huffman Coding
Divide & Conquer	Merge Sort, Quick Sort	Binary Search
DP 1	Fibonacci, 0/1 Knapsack	LCS
DP 2	LIS, Matrix Chain	Coin Change
Graph Algo	Dijkstra, Floyd-Warshall	Topo Sort
MST	Kruskal, Prim	DSU

Mini Projects

Phase	Project	Concepts Used
Phase 0	Student Report Card	Class + File I/O
Phase 1	Number Cruncher	Recursion + Arrays
Phase 2	Contact Manager	Linked List
	Expression Calculator	Stack
	File Upload Queue	Queue
	Family Tree Viewer	Tree
Phase 3	City Navigator	Graph + BFS/DFS
	DSA Visualizer	All DSA