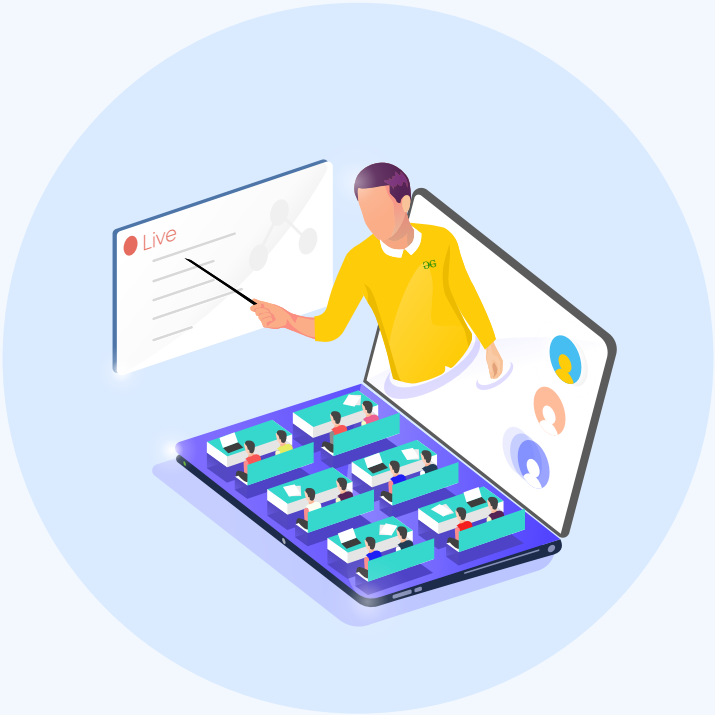
GeeksforGeeks

Geeks Classes
Live



Detailed
Course Syllabus

Week1

a. **Analysis of Algorithm**
   i. Background analysis through a Program and its functions.
b. **Asymptotic Notations**
   i. Best, Average and Worst case explanation through a program.
c. **Arrays**
d. **Introduction and Advantages**
e. **Types of Arrays**
   i. Fixed-sized array
   ii. Dynamic-sized array
f. **Operations on Arrays**
   i. Searching
   ii. Insertions
   iii. Deletion
   iv. Arrays vs other DS
   v. Reversing - Explanation with complexity
g. **Important problems in Arrays**
h. **Basic Recursion**

Week2

a. **Basic Bit Manipulation**
b. **Bitwise Operators in C++**
   i. Operation of AND, OR, XOR operators
   ii. Operation of Left Shift, Right Shift and Bitwise Not
c. **Bitwise Operators in Java**
   i. Operation of AND, OR
   ii. Operation of Bitwise Not, Left Shift
   iii. Operation of Right Shift and unsigned Right Shift
d. **Problem: Check Kth bit is set or not**
e. **Problem: Count Set Bits**

f. **Problem: To check whether a number is a power of 2 or not**
g. **Problem: Odd occurrences in an array.**
h. **Problem: Two numbers having odd occurrences in an array.**
i. **Problem: Generate power set using bitwise operators.**
j. **Hashing**
k. **Introduction and Time complexity analysis**
l. **Application of Hashing**
m. **Discussion on Direct Address Table**
n. **Working and examples on various Hash Functions**
o. **Introduction and Various techniques on Collision Handling**
p. **Chaining and its implementation**
q. **Open Addressing and its Implementation**
r. **Chaining V/S Open Addressing**
s. **Double Hashing**
t. **C++**
    i. Unordered Set
    ii. Unordered Map
u. **Java**
    i. HashSet
    ii. HashMap
v. **Important problems in basic Bit Manipulation**

• Week3

a. **Strings**
b. **Discussion of String DS**
c. **Important problems in Strings**
d. **Linked Lists**
e. **Introduction**
    i. Implementation in CPP
    ii. Implementation in Java
    iii. Comparison with Array DS
f. **Doubly Linked List**
g. **Circular Linked List**
h. **Loop Problems**

- **Week4**
  a. **Linked List**
  b. **Problems**
  c. **Middle of Linked List**
  d. **Nth node from the end of linked list**
  e. **Deleting a Node without accessing Head pointer of Linked List**
  f. **An iterative method to Reverse a linked list**
  g. **Recursive method to reverse a linked list**
  h. **Segregating even-odd nodes of linked list**
  i. **The intersection of two linked list**
  j. **Pairwise swap nodes of linked list**
  k. **Clone a linked list using a random pointer**
  l. **LRU Cache Design**
  m. **Stacks**
  n. **Understanding the Stack data structure**
  o. **Applications of Stack**
  p. **Implementation of Stack in Array and Linked List**
    i. In C++
    ii. In Java
  q. **Important problem in Linked Lists**
  r. **Queues**
  s. **Introduction and Application**
  t. **Implementation of the queue using array and LinkedList**
    i. In C++ STL
    ii. In Java
    iii. Stack using queue
  u. **Important problem in Linked Lists**

- **Week5**
  a. **Binary Tree**
  b. **Introduction**
    i. Tree
    ii. Application
    iii. Binary Tree
    iv. Tree Traversal

c. **Implementation of:**
    i. Inorder Traversal
    ii. Preorder Traversal
    iii. Postorder Traversal
    iv. Level Order Traversal (Line by Line)
    v. Tree Traversal in Spiral Form
d. **Important problems in Binary Tree**
e. **Binary Search Tree**
f. **Background, Introduction and Application**
g. **Implementation of Search in BST**
    i. In CPP
    ii. In Java
h. **Insertion in BST**
    i. In CPP
    ii. In Java
i. **Deletion in BST**
    i. In CPP
    ii. In Java
j. **Floor in BST**
    i. In CPP
    ii. In Java
k. **Self Balancing BST**
l. **AVL Tree**
m. **Red Black Tree**
n. **Set in C++ STL**
o. **Map in C++ STL**
p. **TreeSet in java**
q. **TreeMap in Java**
r. **Important problems in Binary Tree**

• Week6

a. **Heaps**
b. **Introduction & Implementation**
c. **Binary Heap**
    i. Insertion
    ii. Heapify and Extract
    iii. Decrease Key, Delete and Build Heap
d. **Heap Sort**

e. **Priority Queue in C++**
f. **PriorityQueue in Java**
g. **Important problems in Heaps**
h. **Graph Algorithms**
i. **Introduction to Graph**
j. **Graph Representation**
    i. Adjacency Matrix
    ii. Adjacency List in CPP and Java
    iii. Adjacency Matrix VS List
k. **Breadth-First Search**
    i. Applications
l. **Depth First Search**
    i. Applications

• Week7

a. **Graph Algorithms**
b. **Important problems in Graph Algorithms**
c. **Shortest Path in Directed Acyclic Graph**
d. **Greedy Algorithms**
e. **Introduction**
f. **Activity Selection Problem**
g. **Fractional Knapsack**
h. **Job Sequencing Problem**

• Week8

a. **Dynamic Programming**
b. **Introduction**
c. **Dynamic Programming**
    i. Memoization
    ii. Tabulation
d. **Important problems in Dynamic Programming**