



GeeksforGeeks

# Master C++ Programming

Complete Beginner to Advanced



Detailed  
Course Syllabus

## C++ BASICS

- Background Introduction
- Why do we need Programming Languages
- C++ Introduction
- C++ Standards and Implementation
- Writing First Code in C++
- Comments in C++
- Practice Problems

## VARIABLES AND DATA TYPES

- Variable in C++ and Naming Rules
- Data Types in C++
- Range of Data Types
- Global variable and scope
- sizeof in C++
- static in C++
- const in C++
- auto in C++
- Literals in C++
- Type Conversion in C++
- Swap two numbers
- Practice Problems

## INPUT OUTPUT IN C++

- Input in C++ (cin)
- Output in C++ (cout)
- Buffering in C++
- Escape Sequence in C++
- IO Manipulation
- Floating Point: Default Print Format, Manipulating Default format, fixed and scientific
- Practice Problems

## OPERATORS

- Arithmetic Operators
- Comparison Operators
- Logical Operators

- Assignment Operators
- Operator Precedence and Associativity
- Bitwise Operators
- Day Before N days
- Sum of N Natural Numbers
- Last Digit of a Number
- **Practice Problems**

## FLOW CONTROL

- If Else
- Nested If Else
- Switch
- Ternary
- Even Odd
- Largest of 3 numbers
- Leap Year
- Calculator Program
- **Practice Problems**

## FUNCTION

- Introduction to function
- Function Definition and Declaration
- Inline function
- Function Overloading
- First Digit of a Number
- Prime Factorization
- **Practice Problems**

## LOOPS

- For Loop
- While Loop
- Do while loop
- Continue
- Break
- Square Pattern
- Triangle Pattern



- Inverted Triangle Pattern
- Pyramid pattern
- Count Digits of a Number
- Factorial of a Number
- Check for Prime
- All Divisors of a Number
- GCD of Two Numbers
- LCM of Two Numbers
- Fibonacci Numbers
- Check for prime
- Table of a Number
- Practice Problems

## ARRAY

- Introduction to Arrays
- Declaration and initialization of an array
- Size of an Array
- Array Traversal
- Check if Array is Sorted
- Count Distinct in an array
- Sum of an array
- Average of an array
- Maximum in an array
- Practice Problems

## REFERENCES

- References in C++
- Function Parameters & References
- Range based for Loop & References
- Const & R value References
- Practice Problems

## POINTERS

- Address and Dereference Operators
- Introduction to Pointers
- Application of Pointers
- Function Pointer

- Array Parameter and Pointers
- Pointers vs Arrays
- Null in C++
- nullptr in C++
- Pointer Arithmetic
- Dynamic Memory Allocation
- Practice Problems

## STRINGS

- Introduction to strings
- C style String in C++
- String class in C++
- Operation on strings
- String Comparison
- getline() in c++
- String Traversal
- Reverse a string
- Palindrome
- Pattern Searching
- Practice Problems

## STRUCTURE AND UNION

- Struct in C++
- Struct vs Class in C++
- Structure (Pointer Array and Argument)
- Structure Alignment and Padding in C++
- Union in C++
- Complex Number using C++
- Practice Problems

## VECTORS

- Introduction to vectors
- Vector Declaration
- Operation on Vectors
- Get Smaller Elements
- Separate Even Odd
- Practice Problems

## MULTIDIMENSIONAL ARRAY

- Multidimensional Array in CPP
- Passing 2D array in as argument in CPP
- Transpose of a Matrix
- Matrix Multiplication
- Practice Problems

## TEMPLATES IN C++

- Template in C++
- Function Template in C++
- Class Template in C++
- Practice Problems

## OBJECT ORIENTED PROGRAMMING IN C++

- Object Oriented Programming in C++
- Constructor and Destructor
- This Pointer
- Static Member in C++
- Inheritance
- Virtual Functions
- Multiple Inheritance
- Operator Overloading
- Friend Function
- Practice Problems

## EXCEPTION HANDLING

- Exception Handling in C++
- Try throw and Catch in Exception Handling
- Stack Unwinding in Exception Handling
- User Defined Exception
- Practice Problems

## ADVANCED

- Smart Pointer Introduction



- unique\_ptr, shared\_ptr and weak\_ptr in C++
- Function Pointers
- Passing function as Parameters
- Lambda Expression
- Lambda Expression Examples
- Capture List in Lambda Expression
- Practice Problems
- Practice Problems

## INTRODUCTION TO STL

- Templates in C++
- Importance of STL
- STL Containers and its Classifications
- Iterators
- Practice Problems

## SIMPLE CONTAINERS

- Pairs
- Practice Problems

## SEQUENCED CONTAINERS

- Vector
- Forward\_list and List
- Dequeue
- Practice Problems

## CONTAINER ADAPTERS

- Stack
- Queue
- Priority Queue
- Practice Problems

## ASSOCIATIVE CONTAINERS

- Set & Multiset
- Map & Multimap
- Unordered\_set
- Unordered\_map
- Practice Problems

## STL ALGORITHMS

- Non-Mutating STL Algorithms
- Mutating STL Algorithms
- Practice Problems

## MISCELLANEOUS

- C++ string Class
- Manipulating STL
- builtin\_popcount(), builtin\_popcountll()
- Practice Problems