

C & C++ Syllabus

1. Introduction to C and C++

- Overview of C and C++
- Differences between C and C++
- Applications of C and C++
- Setting up the Development Environment (GCC, Clang, MinGW, Visual Studio)
- Writing and Running Your First C/C++ Program

2. Basics of C Programming

- Structure of a C Program
- Data Types and Variables
- Constants and Literals
- Operators (Arithmetic, Logical, Bitwise, Assignment, Relational)
- Input and Output (`printf()`, `scanf()`)

3. Control Flow in C

- Conditional Statements (`if-else`, `switch-case`)
- Loops (`for`, `while`, `do-while`)
- `break` and `continue` Statements

4. Functions in C

- Defining and Calling Functions
- Function Prototypes and Declarations
- Function Arguments and Return Values
- Recursion in C

5. Arrays and Strings in C

- One-Dimensional Arrays
- Multi-Dimensional Arrays
- String Manipulation Functions (`strlen()`, `strcpy()`, `strcat()`, `strcmp()`)
- Relationship Between Arrays and Pointers

6. Pointers and Dynamic Memory Allocation in C

- Introduction to Pointers
- Pointer Arithmetic
- Passing Pointers to Functions
- Dynamic Memory Allocation (`malloc()`, `calloc()`, `realloc()`, `free()`)

7. Structures, Unions, and Enums in C

- Defining and Using Structures
- Passing Structures to Functions
- Differences Between Structures and Unions
- Enumerations (`enum`)

8. File Handling in C

- File I/O Operations (`fopen()`, `fclose()`, `fread()`, `fwrite()`)
- Text Files vs. Binary Files
- Reading and Writing Data to Files

9. Introduction to C++

- Differences Between C and C++
- Basic Syntax of C++
- `cin` and `cout` for Input/Output
- Namespaces in C++

10. Object-Oriented Programming (OOP) in C++

- Understanding Classes and Objects
- Constructors and Destructors
- Encapsulation and Data Hiding
- Static Members and Functions

11. Inheritance in C++

- What is Inheritance?
- Types of Inheritance (Single, Multiple, Multilevel, Hierarchical, Hybrid)
- Virtual Base Classes

12. Polymorphism in C++

- Function Overloading
- Operator Overloading
- Runtime Polymorphism (Virtual Functions)

13. Abstraction and Interfaces in C++

- Abstract Classes
- Pure Virtual Functions
- Interfaces in C++

14. Pointers in C++

- Pointer Basics in C++
- `this` Pointer
- Pointer to Objects

15. Memory Management in C++

- `new` and `delete` Operators
- Smart Pointers (`unique_ptr`, `shared_ptr`, `weak_ptr`)

16. Standard Template Library (STL) in C++

- Introduction to STL
- Containers (`vector`, `list`, `map`, `set`, `queue`, `stack`)
- Iterators and Algorithms

17. File Handling in C++

- File Streams (`fstream`, `ifstream`, `ofstream`)
- Writing to Files
- Reading from Files

18. Exception Handling in C++

- Try, Catch, and Throw Statements
- Handling Multiple Exceptions

19. Multithreading in C++

- Thread Basics in C++ (`std::thread`)
- Thread Synchronization (`mutex`, `lock_guard`)

20. Advanced C++ Concepts

- Lambda Functions
- Move Semantics and R-value References
- Template Meta-Programming

Project

- Core Project
- Live Project

Certificate