

# Full C++ Syllabus

## 1. Introduction to C++

- History of C++
- Structure of a C++ program
- Compiling and executing C++ programs
- C++ syntax and keywords
- Comments and input/output

## 2. Basics of C++

- Variables and data types
- Constants and literals
- Operators and expressions
- Type conversion
- Control structures (if, switch, loops)

## 3. Functions

- Function definition and declaration
- Function arguments and return values
- Function overloading
- Inline functions
- Default arguments
- Recursion

## 4. Arrays and Strings

- One-dimensional and multi-dimensional arrays
- Array operations
- Character arrays and C-style strings

- String handling functions
- Introduction to ``std::string``

## **5. Pointers and References**

- Pointer basics
- Pointer arithmetic
- Pointers and arrays
- Pointers to functions
- References and reference variables
- Dynamic memory allocation (``new``, ``delete``)

## **6. Object-Oriented Programming**

- Classes and objects
- Access specifiers
- Constructors and destructors
- Member functions and data
- Static members
- Friend functions and classes

## **7. Advanced OOP Concepts**

- Inheritance (single, multiple, hierarchical, multilevel)
- Polymorphism (compile-time and runtime)
- Function overriding and virtual functions
- Abstract classes and interfaces
- Operator overloading

## **8. Templates and Exception Handling**

- Function templates
- Class templates

- Exception handling basics (`try`, `catch`, `throw`)
- Standard exception classes

## **9. File Handling**

- File streams (`ifstream`, `ofstream`, `fstream`)
- Opening and closing files
- Reading and writing files
- File modes and operations
- Binary files

## **10. Standard Template Library (STL)**

- Introduction to STL
- Containers: vector, list, deque, set, map
- Iterators
- Algorithms
- Function objects and lambda expressions

## **11. Advanced Topics**

- Namespaces
- Preprocessor directives
- Dynamic vs static binding
- Smart pointers (`unique\_ptr`, `shared\_ptr`)
- Multithreading (basics with ``)
- Move semantics and rvalue references (C++11)