C++ Syllabus

Unit 1: Introduction to C++

- Introduction to programming and C++
- Setting up development environment
- Basic syntax and structure of C++ programs

Unit 2: Data Types and Operators

- Variables and data types
- Operators and expressions
- Input and output (cin, cout)

Unit 3: Control Structures

- Control structures: if, else if, else, switch
- Loops: while, do-while, for
- Basic debugging techniques

Unit 4: Functions and Arrays

- Functions: declaration, definition, parameters, return types
- Function overloading
- Recursion

Unit 5: Arrays and Pointers

- Arrays: declaration, initialization, accessing elements
- Multi-dimensional arrays
- Pointers and memory management basics

Unit 6: Dynamic Memory Allocation

- Pointers and arrays
- Dynamic memory allocation: new and delete operators

Unit 7: Object-Oriented Programming Basics

- Introduction to OOP concepts
- Classes and objects: declaration, instantiation
- Class members: attributes, methods

Unit 8: Constructors and Destructors

- Constructors and destructors
- Access specifiers: public, private, protected
- Static members and functions

Unit 9: Inheritance and Polymorphism

- Inheritance: single, multiple, multilevel
- Polymorphism: function overriding, virtual functions
- Abstract classes and pure virtual functions

Unit 10: Templates and Standard Template Library (STL)

- Introduction to templates
- Function templates
- Class templates
- Standard Template Library (STL) overview

Unit 11: Advanced Features

- Exception handling
- File handling: reading from and writing to files
- Streams and file manipulation

Unit 12: Advanced Concepts and Project Work

- Smart pointers: unique_ptr, shared_ptr, weak_ptr
- Move semantics and rvalue references
- Lambda expressions
- Standard Library algorithms and iterators
- Multithreading basics

This structured syllabus covers all essential topics in C++, progressing from foundational concepts to advanced features and culminating in project work.