

Programming in C++

Course Overview

This advanced course is designed for students with prior programming experience, ideally in languages such as Python or Java. It delves into the intricacies of C++ programming, emphasizing the transition to C++ syntax, memory management, and enhanced debugging skills. Through a hands-on approach involving projects, students will learn to navigate the complexities of a new programming language, understand its memory handling capabilities, and develop robust debugging techniques.

Course Objectives

- Become familiar with the syntax of C++.
- Apply OOP principles in C++ including classes, inheritance, and polymorphism.
- Utilize the Standard Template Library (STL) for data manipulation.
- Implement advanced debugging and unit testing strategies.
- Apply advanced C++ features such as templates, threads, and memory management techniques including static and dynamic memory allocation.
- Demonstrate proficiency in C++ programming and problem-solving skills by developing a PPM Image Editor.

Unit 1: Basics of C++

Introduce C++ syntax and fundamental programming concepts.

- ☐ Hello World
- ☐ Makefiles - compiling and running C++ programs
- ☐ User I/O
- ☐ ASCII - character encoding
- ☐ Header files
- ☐ Control flow - if statements, while loops, for loops
- ☐ Unit 1 Test

Unit 2: OOP and Data Structures


Explore Object-Oriented Programming (OOP) and data structures in C++.

- ☐ Creating and Using Classes in C++
- ☐ Inheritance
- ☐ Polymorphism
- ☐ STL Containers - Vectors & Maps

- ☐ Advanced Debugging Techniques
- ☐ Unit Testing
- ☐ Exception Handling
- ☐ Unit 2 Test

Unit 3: Advanced Features

Explore advanced C++ programming features and memory management.

- ☐ Typedef (Type Aliasing)
- ☐ Enumerated Types
- ☐ ReadStream
- ☐ Operator Overloading
- ☐ Static vs. Dynamic Memory - Stack, Heap, and Memory Management
- ☐ Pass by Copy, Pass by Reference, Pass by Pointer
- ☐ Video -  you will never ask about pointers again after watching this video
- ☐ Destructors
- ☐ Templates
- ☐ Threads and Mutex
- ☐ Preprocessor and Bitwise Operations
- ☐ Unit 3 Test
- ☐ Final Project: PPM Image Editor