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**Learning Style: Virtual Classroom**

**Technology:**

**Difficulty: Beginner**

**Course Duration: 5 Days**

## **Introduction to Programming and C++ Basics for Non-Developers (TTCP2000)**



### **About This Course:**

Introduction to Programming and C++ Basics for Non-Developers is a five-day, basic-level training course geared for IT candidates who have little or no prior experience in computer programming. You'll gain light hands-on programming

experience, while you begin your journey to develop a programmer's mindset. Throughout this gentle introduction to programming and C++, students will learn to create applications and libraries using C++ using best practices and sound OO development techniques for writing object-oriented programs in C++. Special emphasis is placed on object-oriented concepts and best practices throughout the training.

Becoming a modern software developer is like learning a new language; it requires study, practice, and dedication well beyond this course to apply your new skills effectively. While this five-day program won't transform you into an experienced developer, it will lay a solid foundation in coding basics using C++, while teaching you to think like a programmer. Although this course is technical in nature, our instructors will guide you every step of the way, providing a supportive environment for you to explore, ask questions, and prepare for your next learning milestones.

### **Course Objectives:**

- Learn about basic computer architecture (memory, CPU, IO)
- Gain basic knowledge of the C++ programming language, features and functions in today's development initiatives
- Gain hands-on practice using C++ basic syntax and functions to build basic software applications
- Learn about Object Oriented development and best practices
- Learn and apply core development functions such as dynamic memory, inheritance, value type / reference types, exceptions and more
- Get a light introduction to the C++ Standard Library
- Gain skills required to exit the course with a foundation in basic programming skills and C++ knowledge to carry forward to additional study and practice.

### **Audience:**

Although this course is geared for non-developers, it is helpful for attendees to have a somewhat technical background and to be comfortable working with computers, having the ultimate goal of becoming a C++ software developer.

Attendees might include:

- Technically-oriented attendees who want or who want to begin the process of becoming an OO application developer
- Technical team members from non-development roles, re-skilling to move into software and application development roles within an organization

- Recent college graduates looking to apply their college experience to programming skills in a professional environment, or perhaps needing to learn the best practices and standards for programming within their new organization

## **Prerequisites:**

- Ability to use computers to start programs, open and save files, navigate application menus and interfaces
- Ability to understand logical concepts such as comparisons
- Understand number theory
- Ability to create, understand, and follow structured directions or step-by-step procedures
- Ability to understand and apply abstract concepts to concrete examples

## **Course Outline:**

### Getting Started

- Overview of computing
- Understanding data types

### Programming Tools

- Overview of tools used in C++ programming
- Explain why we use various tools when programming

### Programming Basics

- C++ Syntax fundamentals
- Basic program elements
- Primitive data types in C++
- Literal types and variables
- Auto variables

- C++ Source files - headers, compile units
- Program flow
- If/else
- Loops
- Intro Functions

## Data Structures

- Structures
- Arrays

## Functions

- Return types
- Parameters
- Calling functions
- Overloaded functions

## Pointers & Memory

- Understanding pointers
- Taking an address
- Dereferencing pointers
- Pointer operations
- Pass by Value/Passing pointers
- Default argument values
- Inline functions

## Namespaces

- Overview

- The problem
- Defining a namespace
- Using a namespace
- Aliases
- Nested Namespaces in C++ 20

## Strings

- Overview
- Using strings
- String methods
- String operators
- Strings and char\*

## Input and Output

- Overview
- ostream and istream
- Reading and writing to the console
- Reading and writing files
- Manipulators

## Getting Started with OO / Object-Orientation

### Intro Object-Oriented Features

- Overview of O-O concepts
- Defining a class in C++
- Encapsulation
- Class members

- Member functions
- Class organization
- Inline
- Friends
- this
- Class vs type

## Dynamic Memory

- Memory concepts
- References
- Passing by value or reference
- new
- delete
- Construction/Destruction
- Initializer lists
- Copy constructor
- const & constexpr

## A Practical Example

- Planning an application
- Defining an algorithm
- Implementing a solution

## Templates

- Overview
- Using function templates
- Using class templates

## Inheritance

- Base Classes
- Derived Classes
- Overriding members
- Abstract members and classes

## Exceptions

- Throwing
- Catching
- Defining custom exceptions

## Survey of C++ library components

### Intro C++ Standard Library

- I/O classes
- Collections
- Utility