



# C# Essentials

**Course #:** VC-211      **Duration:** 2 days

## Prerequisites

The student should be an experienced application developer or architect. Some background in object-oriented programming would be helpful.

## Details

Microsoft .NET is an advance in programming technology that greatly simplifies application development, both for traditional, proprietary applications and for the emerging paradigm of Web-based services. .NET 6 is a unified platform, for browser, cloud, desktop, IoT, and mobile apps. It is based on .NET Core, the package-based implementation that is cross-platform, running on Mac and Linux besides Windows. It completes the unification of the .NET platform begun with .NET 5.

This two-day course is designed for the experienced programmer to help you quickly come up to speed on the C# language. It is current to Visual Studio 2022, .NET 6, and C# 10. Important newer features such as dynamic data types, named and optional arguments, tuples, asynchronous programming keywords, nullable reference types, record types, and top-level statements are covered.

This course concisely covers the essentials of programming using Microsoft's C# programming language. It starts with an overview of .NET architecture and the basics of running C# programs in a .NET environment. The following two chapters cover C# language essentials and object-oriented programming in C#. The next chapter discusses how C# relates to .NET. The following chapter covers delegates and events. The course includes a succinct introduction to creating GUI programs using Windows Forms. The course concludes with a chapter covering the newer features of C#. Appendices provide a tutorial on Visual Studio 2022, an overview of LINQ, and coverage of unsafe code and pointers in C#.

The course is practical, with many example programs and a progressively developed case study. The goal is to quickly bring you up to speed in writing C# programs. The student will receive a comprehensive set of materials, including course notes and all the programming examples.

## Software Needed

Microsoft Visual Studio 2022 and Windows 10 or higher. The free Visual Studio Community 2022 can be used.

## Outline

### C# Essentials

- **Introduction to .NET**
  - What is .NET?
  - .NET Framework, .NET Core, and .NET 6
  - Application Models
  - Managed Code
  - Visual Studio 2022
  - Console Programs and New Console Template

- GUI Programs
- **C# Overview for the Sophisticated Programmer**
  - First C# Console Application
  - Namespaces
  - Data Types
  - Conversions
  - Control Structures
  - Subroutines and Functions
  - Parameter Passing
  - Strings
  - Arrays
  - Implicitly Typed Variables
  - Console I/O
  - Formatting
  - Exception Handling
- **Object-Oriented Programming in C#**
  - Classes
  - Access Control
  - Methods and Properties
  - Asymmetric Accessor Accessibility
  - Static Data and Methods
  - Constant and Readonly Fields
  - Auto-Implemented Properties
  - Inheritance
  - Overriding Methods
  - Abstract Classes
  - Sealed Classes
  - Access Control and Assemblies
- **C# and the .NET Framework**
  - Components
  - Interfaces
  - System.Object
  - .NET and COM
  - Collections
  - IEnumerable and IEnumerator
  - Copy Semantics in C#
  - Generic Types
  - Type-Safe Collections
  - Object Initializers
  - Collection Initializers
  - Anonymous Types
  - Attributes
- **Delegates and Events**
  - Delegates
  - Anonymous Methods
  - Lambda Expressions
  - Random Number Generation
  - Events
- **Introduction to Windows Forms**
  - Creating Windows Applications Using Visual Studio 2022
  - Partial Classes
  - Buttons, Labels, and Textboxes
  - Handling Events
  - Listbox Controls
- **Newer Features in C#**
  - Dynamic Data Type
  - Named and Optional Arguments
  - Variance in Generic Interfaces
  - Asynchronous Programming Keywords
  - New Features in C# 6 and C# 7
  - Nullable Reference Types
  - Record Types
  - Top-Level Statements
- **Using Visual Studio 2022**
  - Signing in to Visual Studio

- Overview of Visual Studio 2022
- Creating a Console Application
- Project Configurations
- Debugging
- Multiple-Project Solutions
- **LINQ**
  - What Is LINQ?
  - Basic Query Operators
  - Filtering
  - Ordering
  - Aggregation