

Object-Oriented Programming in C# VS2022

Course Description

This thorough and comprehensive course is a practical introduction to programming in C#, utilizing the services provided by .NET. This course emphasizes 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. Supplements provide a tutorial on Visual Studio 2022, an overview of LINQ, and coverage of unsafe code and pointers in C#.

Duration: 5 Days

Cost: Contact us for pricing

Learning Objectives

Acquire a working knowledge of C# programming

Learn how to implement programs using C# and classes from the .NET Framework

Gain an understanding of the object-oriented programming paradigm

Learn how to implement simple GUI programs using Windows Forms

Gain a working knowledge of important newer features in C#

Pre-requisites

Participants should have programming experience in a high-level language. This course is intended to be fully accessible to programmers who do not already have a strong background in object-oriented programming in C-like languages, such as C++ or Java. It is ideal, for example, for procedural programmers who desire to learn C#.

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

First C# Programs

Hello, World

Namespaces

Variables and Expressions

Using C# as a Calculator

Input/Output in C#

.NET Framework Class Library

Data Types in C#

Data Types

Integer Types

Floating Point Types

Decimal Type

Characters and Strings

- Boolean Type
- Conversions
- Nullable Types

Operators and Expressions

- Operator Cardinality
- Arithmetic Operators
- Relational Operators
- Logical Operators
- Bitwise Operators
- Assignment Operators
- Expressions
- Checked and Unchecked

Control Structures

- If Tests
- Loops
- Arrays
- Foreach
- More about Control Flow
- Switch

Object-Oriented Programming

- Objects
- Classes
- Inheritance
- Polymorphism
- Object-Oriented Languages
- Components

Classes

- Classes as Structured Data
- Methods
- Constructors and Initialization
- Static Fields and Methods
- Constant and Readonly

More about Types

- Overview of Types in C#
- Value Types
- Boxing and Unboxing
- Reference Types
- Implicitly Typed Variables

Methods, Properties and Operators

- Methods
- Parameter Passing
- Method Overloading
- Variable-Length Parameter Lists
- Properties

Auto-Implemented Properties
Operator Overloading

Characters and Strings

Characters
Strings
String Input
String Methods
StringBuilder Class
Programming with Strings

Arrays and Indexers

Arrays
System.Array
Random Number Generation
Jagged Arrays
Rectangular Arrays
Arrays as Collections
Bank Case Study—Step 1
Indexers

Inheritance

Single Inheritance
Access Control
Method Hiding
Initialization
Bank Case Study—Step 2

Virtual Methods and Polymorphism

Virtual Methods and Dynamic Binding
Method Overriding
Fragile Base Class Problem
Polymorphism
Abstract Classes
Sealed Classes
Heterogeneous Collections
Bank Case Study—Step 3

Formatting and Conversion

ToString
Format Strings
String Formatting Methods
Bank Case Study—Step 4
Type Conversions

Exceptions

Exception Fundamentals
Structured Exception Handling
User-Defined Exception Classes

Inner Exceptions
Bank Case Study—Step 5

Interfaces

Interface Fundamentals
Programming with Interfaces
Using Interfaces at Runtime
Bank Case Study—Step 6
Resolving Ambiguities

.NET Interfaces and Collections

Collections
Bank Case Study—Step 7
IEnumerable and IEnumerator
Copy Semantics and ICloneable
Comparing Objects
Generic Types
Type-Safe Collections
Object Initializers
Collection Initializers
Anonymous Types
Bank Case Study—Step 8

Delegates and Events

Delegates
Anonymous Methods
Lambda Expressions
Events

Introduction to Windows Forms

Creating Windows Applications
Partial Classes
Buttons, Labels and Textboxes
Handling Events
Listbox Controls

Newer Features in C#

Dynamic Data Type
Named Arguments and Optional Arguments
Variance in Generic Interfaces
Asynchronous Programming Keywords
New Features in C# 6.0 and C# 7.0
Nullable Reference Types
Record Types
Top-level Statements

Electronic file supplements with course materials

Supplement 1. Using Visual Studio 2022
Signing in to Visual Studio
Overview of Visual Studio 2022

Creating a Console Application
Project Configurations
Debugging
Multiple-Project Solutions

Supplement 2. Language Integrated Query (LINQ)
What Is LINQ?
Basic Query Operators
Filtering
Ordering
Aggregation

Supplement 3. Unsafe Code and Pointers in C#
Unsafe Code
C# Pointer Type