

KOENIG SOLUTIONS • COURSE OUTLINE

Programming in C# with Unit Testing

Learn to build Windows applications in C# and .NET 6, from syntax and classes to unit testing with MSTest.

5 Days

DURATION

13

MODULES

74

TOPICS

COURSE OVERVIEW

This is a five-day course that teaches developers how to create Windows applications using the C# language. The course covers the basics of C# program structure, language syntax, and implementation details. Throughout the week, students consolidate their knowledge by building an application that incorporates several features of the .NET 6.0.

WHO THIS COURSE IS FOR

The course is designed for experienced developers who already have programming experience in languages like C, C++, JavaScript, Objective-C, Microsoft Visual Basic, or Java and understand object-oriented programming concepts. It's not intended for beginners in programming, but targets professional developers with at least one month of experience in an object-oriented programming environment.

PREREQUISITES

- At least one month of experience in an object-oriented programming environment
- Programming experience in languages like C, C++, JavaScript, Objective-C, Microsoft Visual Basic, or Java
- Understanding of object-oriented programming concepts

TOOLS AND REQUIREMENTS

- C#
- .NET 6.0
- Visual Studio 2022

LEARNING OBJECTIVES

- Explain C# syntax, data types and language constructs
- Apply methods, overloading and exception handling
- Create structs, enums, collections and events
- Define custom types using classes, interfaces and generics
- Implement inheritance, polymorphism and custom exceptions
- Query and access data using Entity Framework and LINQ
- Access web services using REST, OData and ASP.NET Core MVC
- Apply test-driven development and unit testing with MSTest

13 Modules, 74 Topics

01

C# Syntax

Microsoft .NET 6 provides a comprehensive development platform that you can use to build, deploy, and manage applications and services. By using .NET, you can create visually compelling applications, enable seamless communication across technology boundaries, and provide support for a wide range of business processes. In this module, you'll learn about some of the core features provided by .NET and Microsoft Visual Studio. You'll also learn about some of the core C# constructs that enable you to start developing .NET applications.

LESSONS

- Lesson 1: Writing Applications in C# and .NET
- Lesson 2: Types of Data and Expressions
- Lesson 3: C# Language Constructs

AFTER COMPLETING THIS MODULE, STUDENTS WILL BE ABLE TO

- Write Applications in C# and .NET
- Explain types of Data and Expressions
- Understand C# Language Constructs

02

C# Language Concepts

Applications often consist of logical units of functionality that perform specific functions, such as providing access to data or triggering some logical processing. C# is an object-orientated language and uses the concept of methods to encapsulate logical units of functionality. Although a good practice is to have methods that do just one thing, they can be as simple or as complex as you like. It is also important to consider what happens to the state of your application when an exception occurs in a method.

LESSONS

- Lesson 1: Methods
- Lesson 2: Method Overloading
- Lesson 3: Exception Handling
- Lesson 4: Monitoring

03

C# Structures, Collections and Events

To create effective applications you must first learn some fundamental C# constructs. You need to know how to create simple structures to represent the data items you are working with. You need to know how to organize these structures into collections, so that you can add items, retrieve items, and iterate over your items. Finally, you need to know how to subscribe to events so that you can respond to the actions of your users.

LESSONS

- Lesson 1: Structs
- Lesson 2: Enums
- **Lesson 3: Built-in Collections**
- Lesson 4: Events

AFTER COMPLETING THIS MODULE, STUDENTS WILL BE ABLE TO

- Create and use structs and enums
- Organize data into collections
- Create and subscribe to events

04

C# Classes

In this module, you'll learn how to use interfaces and classes to define and create your own custom, reusable types. You'll also learn how to create and use enumerable type-safe collections of any type.

LESSONS

- **Lesson 1: Creating Classes**
- Lesson 2: Interfaces
- **Lesson 3: Understanding Generics in C#**

AFTER COMPLETING THIS MODULE, STUDENTS WILL BE ABLE TO

- Use interfaces and classes to define and create custom, reusable types
- Create and use enumerable type-safe collections of any type

05

C# Inheritance

In this module, you'll learn how to use inheritance to create class hierarchies and to extend .NET types.

LESSONS

- **Lesson 1:** Hierarchies of Classes
- Lesson 2: Polymorphism
- **Lesson 3:** Extending Classes

AFTER COMPLETING THIS MODULE, STUDENTS WILL BE ABLE TO

- Use inheritance to factor common functionality into a base class
- Implement polymorphism by using an abstract method
- Create a custom exception class

06

Database Access

In this module, you'll learn how to use Entity Framework and how to query many types of data by using Language-Integrated Query (LINQ).

LESSONS

- **Lesson 1:** Entity Framework
- Lesson 2: LINQ

AFTER COMPLETING THIS MODULE, STUDENTS WILL BE ABLE TO

- Use Entity Framework
- Learn how to query many types of data by using Language-Integrated Query (LINQ)

07

Using the Network

In this module, you'll learn how to use the request and response classes in the System.Net namespace to directly manipulate remote data sources. You'll also learn about REST and OData and look briefly at ASP.NET Core MVC.

LESSONS

- **Lesson 1:** Web Services
- **Lesson 2:** REST and OData
- **Lesson 3:** ASP.NET Core MVC

AFTER COMPLETING THIS MODULE, STUDENTS WILL BE ABLE TO

- Send data to remote web services
- Access remote data over web services
- Understand REST and OData

08

Application Performance

In this module, you'll learn how to improve the performance of your applications by distributing your operations across multiple threads.

LESSONS

- Lesson 1: Multitasking
- Lesson 2: Asynchronous Calls
- Lesson 3: Dealing with Conflicts

AFTER COMPLETING THIS MODULE, STUDENTS WILL BE ABLE TO

- Improve performance by distributing operations across multiple threads
- Use the `async` and `await` keywords to implement asynchronous methods
- Use events and user controls to provide visual feedback during long-running operations

09

C# Interop

In this module, you'll learn how to interoperate with unmanaged code in your applications and how to ensure that your code releases any unmanaged resources.

LESSONS

- Lesson 1: Dynamic Objects
- Lesson 2: Managing Resources

AFTER COMPLETING THIS MODULE, STUDENTS WILL BE ABLE TO

- Interoperate with unmanaged code in applications
- Ensure that code releases any unmanaged resources
- Get information about assemblies

10

Double Your Coding Speed with Visual Studio

LESSONS

Visual Studio Tips and Tricks · Version Control System (VCS) · ReSharper

11

Test-Driven Development

TOPICS

What Is Test-Driven Development (TDD)? · Functional Tests / Customer Tests · Unit Tests / Programmer Tests · Test Automation · Simple Design · Refactoring · A Visual Studio Test Drive · TDD with Legacy Code

12

Visual Studio Unit Testing Fundamentals

TOPICS

Structure of Unit Tests · Unit Testing Framework · Assertions · Test Cases · Test Classes · Test Runners · Ignoring Tests · Initialization and Cleanup

13

More about MSTest Framework

TOPICS

Expected Exceptions · Custom Asserts · Playlists · Debugging Unit Tests · Command-line Test Runner · Refactoring

WHAT IS INCLUDED

Everything You Need to Succeed

- Koenig course material for every module
- Delivery by certified instructors and subject matter experts
- Hands-on exercises throughout the course
- Course completion certificate from Koenig

Who We Are

Established in 1993, Koenig Solutions is a globally recognised training provider with 35+ technology partnerships, 5,000+ training programmes and a network of certified instructors and subject matter experts, supporting individuals and enterprise teams worldwide.

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