# C# The programming language Training

Duration: **5 Day**

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info@bilginc.com
bilginc.com

**C# The Programming Language** is a comprehensive five-day course that guides participants from the fundamentals of C# programming through to advanced object-oriented programming techniques and modern .NET application development. The programme is designed to provide developers with the practical skills required to build reliable, maintainable, and scalable applications using the .NET Framework and modern .NET platforms.

Throughout the course, learners progress from C# syntax, data types, control structures, and methods to more advanced topics including object-oriented programming, inheritance, interfaces, delegates, lambda expressions, LINQ, Entity Framework, and structured exception handling.

Hands-on exercises include developing console applications, class libraries, unit testing projects, and database-driven applications using the Entity Framework Database-First approach. Instructor-led demonstrations combined with practical laboratories enable participants to apply each concept immediately in realistic software development scenarios.

By the end of the programme, participants will have the knowledge and practical experience required to develop professional .NET applications using modern C# development practices.

## Prerequisites

Participants are recommended to have:

- Basic programming knowledge equivalent to the **Programming Foundations** course.
- Familiarity with Visual Studio or a similar Integrated Development Environment (IDE).
- Previous object-oriented programming experience is not required, as the course progresses from fundamental concepts to advanced techniques.

## Who Should Attend

This course is designed for:

- Developers who want to learn C# from foundational concepts through advanced programming techniques.
- Professionals beginning their journey in .NET application development.
- Software developers seeking a structured approach to improving their programming skills.
- Programmers looking to expand their existing knowledge with advanced C# features.
- Developers preparing to work on professional enterprise .NET projects.

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## What You Will Learn

Upon successful completion of this course, participants will be able to:

- Develop C# applications using sequence, selection, and iteration programming constructs.
- Declare and manage variables, data types, and operators effectively.
- Create classes, structures, and methods while applying appropriate access modifiers.
- Apply object-oriented programming principles including abstraction, encapsulation, inheritance, and polymorphism.
- Design applications using abstract classes and interfaces.
- Work efficiently with generic collections and lambda expressions.
- Implement delegates, including the built-in delegate types provided by .NET.
- Connect applications to databases using the Entity Framework Database-First approach.
- Query and manipulate data using Language Integrated Query (LINQ).
- Implement structured exception handling, including custom exception types.
- Apply unit testing principles to improve software quality, reliability, and maintainability.

## Training Outline

### Day 1 – C# Foundations

- Introduction to C# and the .NET platform
- Understanding .NET Framework and modern .NET
- Compilation, the Common Language Runtime (CLR), and the Common Type System (CTS)
- Top-level statements, namespaces, and using directives
- Navigating Visual Studio
- Basic debugging techniques
- Variables and data types
- Comments, identifiers, and string handling
- Value types versus reference types
- Scope, access modifiers, operators, casting, and parsing
- Methods, parameters, return types, and method overloading
- Expression-bodied members and C# syntax fundamentals

### Day 2 – Flow Control, Collections, and Unit Testing

- Conditional statements (if, switch, and switch expressions)
- Using the ternary operator
- Working with arrays
- for, foreach, while, and do-while loops
- Generic collections including List and Dictionary
- Collection operations
- Introduction to unit testing
- Test-driven development concepts
- Arrange – Act – Assert methodology
- Unit testing fundamentals

### Day 3 – Object-Oriented Programming

- Object-oriented programming principles

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- Abstraction
- Encapsulation
- Inheritance
- Polymorphism
- Classes and objects
- Reference types and null handling
- Methods, properties, and constructors
- Static versus instance members
- Auto-implemented and calculated properties
- Object initializers
- Using the **this** keyword

### Day 4 – Advanced Object-Oriented Programming

- Advanced inheritance concepts
- Abstract classes
- Virtual and overridden members
- Calling base class functionality
- Type casting techniques
- Creating and implementing interfaces
- Working with multiple interfaces
- Interface-based polymorphism
- Understanding delegates
- Built-in delegate types: Func, Action, and Predicate
- Lambda expressions
- Practical delegate and lambda implementations

### Day 5 – Data Access, LINQ, and Exception Handling

- Database connectivity with Entity Framework
- Object Relational Mapping (ORM) concepts
- Comparing Database-First and Code-First approaches
- Entity models and DbContext configuration
- Managing connection strings
- Querying and updating data
- Understanding IEnumerable and IQueryable
- LINQ syntax and query techniques
- Projections, joins, and aggregations
- Deferred versus immediate execution
- Using the let clause and OfType
- LINQ best practices
- Exception handling using try, catch, finally, and throw
- Creating custom exception types
- Building reliable applications through structured error handling