

# **.NET Application Development with Web APIs and Agentic AI Foundations**

**Duration:** 5 days/ 40 hours

**Prerequisites:** Basic programming knowledge and understanding of web applications is helpful.

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## **Day 1: C# Programming Fundamentals**

### **Topics**

- .NET ecosystem overview
- Visual Studio / VS Code setup
- C# syntax and structure
- Variables, data types, operators
- Conditional statements and loops
- Methods
- Arrays and strings
- Introduction to debugging
- Coding standards

### **Labs**

- Create a console-based calculator
- Build a basic employee salary calculation program
- Debug and fix common C# errors

### **Outcome**

Participants will be able to write and debug basic C# programs.

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## **Day 2: Object-Oriented Programming and Collections in C#**

### **Topics**

- Classes and objects
- Constructors
- Properties and fields
- Encapsulation
- Inheritance
- Polymorphism
- Abstract classes and interfaces
- Collections in C#
- List, Dictionary, Queue, Stack
- Exception handling
- File handling basics

### **Labs**

- Build an OOP-based employee management application
- Store and process employee data using collections
- Implement custom exception handling

### **Outcome**

Participants will be able to create object-oriented C# applications using collections and exception handling.

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## **Day 3: ASP.NET Core Web API Development**

### **Topics**

- Introduction to ASP.NET Core
- Web API project structure
- Controllers and actions
- Routing
- HTTP methods
- Model binding
- Dependency Injection
- Configuration management
- JSON request and response
- API testing using Postman / Swagger

### **Labs**

- Create an ASP.NET Core Web API project
- Build CRUD APIs for product or employee management
- Test APIs using Swagger and Postman

### **Outcome**

Participants will be able to create and test REST APIs using ASP.NET Core.

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## **Day 4: Entity Framework Core, Security, Logging, and Testing**

### **Topics**

- Introduction to Entity Framework Core
- Code First approach
- Database migrations
- CRUD operations using EF Core
- Repository and service layer
- Validation and exception handling
- Logging in ASP.NET Core
- Authentication and authorization basics
- JWT overview
- Unit testing basics

## Labs

- Connect ASP.NET Core API with SQL Server
- Implement CRUD operations using EF Core
- Add validation and centralized exception handling
- Secure APIs using basic JWT authentication
- Write basic unit tests

## Outcome

Participants will be able to build database-driven, secure, and maintainable .NET Web APIs.

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## Day 5: Agentic AI for .NET Developers and Capstone Project

### Topics

- Introduction to Generative AI and Agentic AI
- AI agents in enterprise applications
- Agentic AI components:
  - Prompt
  - Planning
  - Tool calling
  - Memory
  - Context
  - Response generation
- Using AI tools in .NET development
- AI-assisted coding and debugging
- AI-assisted API documentation
- Integrating .NET applications with AI services
- Responsible AI and secure API usage

### Labs

- Use AI to generate API documentation and test scenarios
- Create a .NET service that sends user prompts to an AI endpoint
- Build a simple AI-assisted support ticket API
- Capstone: Develop a .NET Helpdesk API with AI-generated response suggestions

## Outcome

Participants will understand how Agentic AI can be used in .NET applications and complete a mini project.

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