Course Title: Comprehensive .NET Development

Course Description:

This course offers an in-depth exploration of Microsoft's .NET framework, emphasizing hands-on programming skills in C#, .NET Core, ASP.NET, and related technologies. Students will learn to build robust, scalable, and efficient applications using .NET.

Course Objectives:

- Understand the fundamentals of the .NET ecosystem.
- Gain proficiency in C# programming.
- Develop web applications using ASP.NET.
- Learn about .NET Core and its cross-platform capabilities.
- Create RESTful services and understand web APIs.
- Integrate applications with databases using Entity Framework.
- Deploy .NET applications to various environments.

Prerequisites:

- Basic understanding of programming concepts.
- Familiarity with object-oriented programming is recommended.

Weekly Syllabus Outline:

Week 1: Introduction to .NET and C#

- Overview of the .NET framework and its components.
- Setting up the development environment.
- Introduction to C# programming.

Week 2: Deep Dive into C#

- C# data types, variables, and operators.
- Control structures, loops, and error handling.
- Methods, classes, and interfaces.

Week 3: Advanced C# Features

- Delegates, events, and lambda expressions.
- Working with collections and generics.

- Understanding LINQ for data manipulation.

Week 4: Object-Oriented Programming in C#

- Principles of object-oriented programming: Encapsulation, inheritance, and polymorphism.
- Building classes and interfaces.
- Exception handling and debugging in C#.

Week 5: .NET Core Basics

- Introduction to .NET Core.
- Differences between .NET Framework and .NET Core.
- Building and running cross-platform applications.

Week 6: Web Development with ASP.NET Core

- Overview of ASP.NET Core.
- MVC architecture and its components.
- Developing controllers and views.

Week 7: Advanced ASP.NET Core

- Advanced routing, filters, and middleware.
- Using Razor to create dynamic web pages.
- Building and using API controllers.

Week 8: Front-End Technologies

- Integrating HTML, CSS, and JavaScript with .NET applications.
- Using JavaScript frameworks like Angular or React with ASP.NET.
- Responsive design principles.

Week 9: Data Access with Entity Framework

- Introduction to Entity Framework Core.
- Configuring models and relationships.
- Performing CRUD operations with DbContext.

Week 10: Building RESTful Services

- Understanding REST and API design.
- Creating web APIs with ASP.NET Core.
- API versioning and documentation (Swagger).

Week 11: Authentication and Authorization

- Security fundamentals in .NET applications.
- Implementing authentication and authorization using ASP.NET Identity.
- JWT and OAuth protocols for secure APIs.

Week 12: Microservices with .NET

- Introduction to microservices architecture.
- Building microservices using .NET Core.
- Using Docker to containerize .NET applications.

Week 13: Testing and Deployment

- Unit testing and integration testing in .NET.
- Using xUnit and Moq for testing.
- CI/CD pipelines for .NET applications.

Week 14: Capstone Project

- Planning and design sessions for the capstone project.
- Development of a comprehensive .NET application.
- Applying best practices and patterns learned throughout the course.

Week 15: Project Presentations and Course Wrap-Up

- Presentation of capstone projects.
- Peer reviews and feedback sessions.
- Course review and final assessment.

Assessment Methods:

- Weekly coding assignments and hands-on labs.
- Mid-term and final theoretical exams.
- Capstone project involving real-world application development scenarios.