

.NET Technology (C#)

COURSE OF CONTENT



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Course Overview

This course provides a comprehensive introduction to **.NET Development** using the Microsoft .NET platform. It covers the fundamentals of application development with C#, including object-oriented programming concepts, data structures, and exception handling.

Students will learn to build modern desktop, web, and API-based applications using frameworks such as ASP.NET and ASP.NET Core. The course also introduces database integration with SQL Server, along with hands-on experience in developing, debugging, and deploying real-world applications. By the end of the course, learners will have the skills required to design scalable, secure, and efficient .NET-based solutions aligned with industry standards.

Module 1: Introduction to ASP.NET

- Introduction to C# programming fundamentals
- Overview of ASP.NET Framework and .NET Core
- Difference between ASP.NET Core and .NET Framework
- Setting up the ASP.NET development environment
- Understanding web forms and MVC architecture

Module 2: Web Application Development with ASP.NET

- Creating dynamic web applications using ASP.NET
- Understanding ASP.NET MVC architecture and its benefits
- Working with Razor Pages and View components
- Implementing HTML helpers, layout views, and partial views
- Handling HTTP requests, responses, and routing



Module 3: Database Integration with Entity Framework

- Introduction to Entity Framework (EF Core)
- Setting up and connecting SQL Server databases
- Performing CRUD (Create, Read, Update, Delete) operations using LINQ
- Using migrations for database versioning
- Implementing data validation and constraints

Module 4: Authentication and Authorization

- Implementing user authentication with ASP.NET Identity
- Role-based and claims-based authorization
- Integrating OAuth and JWT authentication for APIs
- Implementing session management and security best practices
- Secure login/logout implementation with token-based authentication

Module 5: Web API Development

- Introduction to ASP.NET Web API
- Building RESTful APIs with ASP.NET Core
- Handling API requests, responses, and error handling
- Implementing versioning and security best practices for APIs
- Using Swagger for API documentation and testing

Module 6: Advanced ASP.NET Features

- Working with Asynchronous programming (async & await)
- Implementing Dependency Injection (DI) in ASP.NET Core
- Caching strategies to improve performance and scalability
- Implementing SignalR for real-time communication (chat applications, live notifications)
- Using logging and monitoring tools (Serilog, NLog, Application Insights)

Module 7: Deployment & DevOps Integration

- Deploying ASP.NET applications using **Internet Information Services (IIS)** on Windows Server
- Managing application hosting with IIS features (Application Pools, Sites, Security settings)
- Monitoring performance and logs with Windows tools (Event Viewer, Performance Monitor) and ensuring security with SSL and firewall rules

Module 8: Testing and debugging in ASP.NET

- Implementing unit testing with NUnit and xUnit
- Debugging techniques using Visual Studio and Application Insights
- Performance testing and load balancing for high-traffic applications

Module 9: Docker, Kubernetes, and DevOps in .NET

- Introduction to Containerization using Docker
- Running .NET Applications in Docker Containers
- Understanding Kubernetes for Orchestrating .NET Applications
- CI/CD Automation using Jenkins, GitHub Actions



Module 10: Project Work and Final Project

- Developing a full-stack ASP.NET Core web application
- Integrating databases, APIs, authentication, and cloud deployment
- Implementing real-world case studies for hands-on experience
- Final project evaluation and feedback from industry experts
- Deploying the Application
- Performance Testing and Optimization