

.NET with AI, Microservices, and DSA

Goal:

To transform learners into **industry-ready full-stack .NET developers** with strong foundations in **C#, ASP.NET, Angular, Microservices, AI, & DSA**



Module 1 – C# & .NET Core Foundations

Objective: Build a strong base in C# and modern .NET concepts.

Topics:

- Overview of .NET, Components [CLS, CTS, CLR, and SDK]
 - Data Types, Operators, Control Flow
 - OOP Principles (Encapsulation, Inheritance, Polymorphism, Abstraction)
 - Constructors, Access Modifiers, Static Members
 - Exception Handling and Debugging
 - Collections, Generics, and Iterators
 - Algorithm Analysis (Time & Space Complexity)
 - Arrays, Strings
 - Linked Lists (Singly, Doubly, Circular)
 - Stacks and Queues
 - Recursion and Backtracking
 - Trees (Binary, BST, Heap)
 - Graphs (BFS, DFS, Shortest Path)
 - Sorting & Searching Algorithms
 - Hashing & Maps
 - Dynamic Programming
 - Sliding Window and Two Pointer Techniques
 - Delegates, Events, Anonymous Methods, and Lambdas
 - LINQ, Extension Methods, and Query Syntax
 - Asynchronous Programming (async/await)
 - Modern C# Features (from C#9.0 till 14.0)
 - **Mini Project:** Console-based Employee Management App
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Module 2 – SQL, ADO.NET & ASP.NET Web Forms

Objective: Learn classic .NET development for understanding legacy systems and fundamentals of data-driven web applications.

Part A – SQL & ADO.NET

- SQL Server Setup & Database Design
- DDL, DML, DQL – Where clause, Sub Queries, Joins
- TSQL - Views, Functions, Stored Procedures, Triggers
- ADO.NET Architecture & Components
- Connection, Command, Data Reader
- Disconnected Data Access using Data Adapter, Data Set and Data Table
- Parameterized Queries and Stored Procedures
- **Mini Project:** Student Information Management System

Part B – ASP.NET Web Forms

- Web Forms Architecture and Page Life Cycle
 - Master Pages, User Controls, and Themes
 - Server Controls and Data Controls (Grid View, Repeater, Data List)
 - Validation Controls and Event Handling
 - State Management (View State, Session, Cookies)
 - Authentication and Authorization
 - Configuration (Web.config) and Error Handling
 - Deployment to IIS
 - **Mini Project:** Online Learning Management System
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Module 3 – ASP.NET Core MVC, Web API & Angular (Full Stack)

Objective: Master modern full-stack development using ASP.NET Core and Angular.

Part A – ASP.NET Core MVC

- MVC Pattern, Controllers, and Razor Views
- Model Binding and Data Validation

- Middleware and Routing
- Dependency Injection and Logging
- Filters and Action Results
- Authentication and Authorization
- Configuration, Options Pattern
- **Mini Project:** Employee Management Portal

Part B – ASP.NET Core Web API

- Introduction to REST and Web API Concepts
- Building RESTful APIs with Controllers and Routing
- CRUD Operations with Entity Framework Core
- DTOs, Auto-Mapper, and Dependency Injection
- Securing APIs with JWT Tokens
- Versioning and CORS Configuration
- API Testing using Swagger and Postman
- **Mini Project:** Inventory Management API

Part C – Angular (Frontend Framework)

- Introduction to TypeScript and Angular CLI
 - Components, Templates, and Data Binding
 - Directives, Pipes, and Services
 - Dependency Injection and Lifecycle Hooks
 - Routing and Navigation
 - Forms (Template-driven and Reactive Forms)
 - HTTP Communication with Web API
 - Building Angular Modules and Lazy Loading
 - **Full Stack Project:** Digital Lending Platform (Personal Loan App) (ASP.NET Core + Web API + Angular + SQL Server)
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Module 4 – Microservices with AI

Objective: Build scalable, distributed applications using .NET Microservices.

Part A - Microservices

- Microservices Principles and Design
- REST API Communication
- API Gateway with Ocelot
- Service Discovery using Consul
- Centralized Configuration & Health Checks
- Message Communication using RabbitMQ or Azure Service Bus
- Learning Circuit breaker, CQRS and SAGA Patterns

Part B – Artificial Intelligence Integration with .NET

- Overview of AI and ML Concepts
- Using ML.NET for Predictive Models
- Integrating Azure OpenAI APIs
- Natural Language and Sentiment Analysis
- **Enterprise Project:** AI-Powered Job portal with Support Chatbot to build resume

Module 5 – Cloud, DevOps, and Deployment

Objective: Learn real-world deployment of .NET and AI applications.

Topics:

- Git & GitHub for Version Control
- Docker Basics
- Kubernetes Basics
- Deploying application in Azure
- Learning Project Development Practices
 - Understand BRD, FSD, Work Estimations, Spring Planning
 - Learning Preparing Use case, Flow diagrams, DB diagrams
 - Create Epic, Story, Task & Assing using JIRA

 **Suggested Duration: 5–6 Months**