

# C# & ASP.NET Core – Complete Learning Roadmap

## 1. C# Fundamentals

Variables, data types, control flow, methods, classes, objects, OOP principles (Encapsulation, Inheritance, Polymorphism, Abstraction), Interfaces, Structs, Records, Enums, Exceptions, Async/Await.

## 2. LINQ (Language Integrated Query)

Query syntax vs method syntax, Select, Where, First/FirstOrDefault, Any, All, OrderBy, GroupBy, Join, Deferred execution, LINQ to Objects vs LINQ to Entities.

## 3. Entity Framework Core

DbContext, DbSet, Code-First approach, Migrations, Relationships (One-to-One, One-to-Many, Many-to-Many), Tracking vs No-Tracking, Lazy vs Eager loading, Performance basics.

## 4. ASP.NET Core Fundamentals

Minimal APIs, MVC, Controllers, Routing, Middleware, Dependency Injection, Configuration, Logging, Environment handling.

## 5. Web API Development

REST principles, HTTP verbs, Status codes, DTOs, Validation, Model binding, Filters, Pagination, Versioning, Error handling.

## 6. Security & Auth

Authentication vs Authorization, JWT, Identity, Role-based access, CORS, HTTPS, Secure password hashing.

## 7. Advanced Topics

Caching (Memory, Redis), Background services, SignalR, Testing (Unit & Integration), Clean Architecture, Performance tuning, Deployment basics.

**Final Advice:** Focus on building small projects after each section. ASP.NET Core + EF Core + LINQ + SQL is a strong, job-safe stack.