



Course Name: .NET and SQL Professional Training Program

Course Overview: .NET and SQL Professional Training Program is designed to help learners become proficient in developing applications using .NET technologies and managing databases with SQL. The course will focus on building essential skills for full-stack development and database management, with practical examples to prepare learners for job opportunities in this field.

Course Duration:

12 weeks (3 months)

6-8 hours/week (Theory, hands-on labs, and project work)

Syllabus

Module 1: Introduction to .NET Framework and C# Programming (Week 1-2)

1.1 Overview of .NET Platform

- Introduction to .NET Framework and .NET Core.
- CLR (Common Language Runtime) and .NET Architecture.
- Understanding the role of .NET in full-stack development.

1.2 Introduction to C# Programming

- Basics of C# syntax, data types, and variables.
- Control structures (loops, conditionals).
- Functions and methods in C#.

1.3 Object-Oriented Programming with C#

- Understanding classes, objects, and inheritance.
- Polymorphism, abstraction, and encapsulation.
- Working with interfaces and abstract classes.

Module 2: Advanced C# Concepts (Week 3-4)

2.1 Exception Handling in C#

- Understanding try, catch, finally blocks.
- Creating custom exceptions.
- Best practices for exception handling in applications.

2.2 Working with Collections and LINQ

- Introduction to collections (List, Dictionary, HashSet).
- LINQ (Language Integrated Query) for querying collections.
- Lambda expressions and anonymous methods.

2.3 Multithreading and Asynchronous Programming

- Understanding threading and parallel programming.

- Task Parallel Library (TPL) and async/await in C#.
- Implementing background tasks and concurrency control.

Module 3: Introduction to ASP.NET and Web Development (Week 5-6)

3.1 Overview of ASP.NET Framework

- Understanding ASP.NET MVC and ASP.NET Core.
- Setting up a basic ASP.NET web project.
- MVC (Model-View-Controller) architecture.

3.2 Building Web Applications with ASP.NET

- Creating controllers, views, and models.
- Form handling, validation, and routing in ASP.NET.
- Understanding view engines (Razor) and layouts.

3.3 Dependency Injection and Middleware

- Implementing dependency injection in ASP.NET Core.
- Understanding middleware and its role in request pipelines.
- Creating and configuring custom middleware.

Module 4: Entity Framework and Database Integration (Week 7)

4.1 Introduction to Entity Framework (EF)

- Overview of ORM (Object-Relational Mapping).
- Code-first vs. database-first approach.
- Setting up a project with Entity Framework Core.

4.2 CRUD Operations with Entity Framework

- Creating, reading, updating, and deleting records using EF.
- Writing LINQ queries to interact with databases.
- Handling relationships (one-to-many, many-to-many) in Entity Framework.

Module 5: SQL Fundamentals (Week 8-9)

5.1 Introduction to SQL and Relational Databases

- Overview of RDBMS (Relational Database Management Systems).
- Introduction to SQL Server and T-SQL (Transact-SQL).
- SQL data types, tables, and schemas.

5.2 SQL Queries: Basics to Advanced

- Writing basic SQL queries (SELECT, WHERE, ORDER BY, GROUP BY).
- Joining tables (INNER JOIN, LEFT JOIN, RIGHT JOIN, FULL JOIN).
- Subqueries, nested queries, and views.

5.3 Stored Procedures, Functions, and Triggers

- Creating and using stored procedures in SQL Server.
- Defining user-defined functions (UDFs).
- Understanding and implementing triggers.

Module 6: SQL Performance Optimization (Week 10)

6.1 Query Performance Tuning

- Identifying slow-running queries and bottlenecks.
- Using indexing to optimize query performance.
- Understanding query execution plans.

6.2 Database Normalization and Denormalization

- Normalizing database schemas (1NF, 2NF, 3NF).
- Trade-offs between normalization and performance.
- Denormalization strategies for high-performance applications.

6.3 Data Backup, Restore, and Security

- Backup and restore strategies in SQL Server.
- Implementing data security: User roles, permissions, encryption.
- Auditing and monitoring databases for security.

Module 7: API Development and Integration (Week 11)

7.1 Building RESTful APIs with ASP.NET Core

- Introduction to REST architecture.
- Creating and consuming RESTful services in ASP.NET Core.
- Implementing HTTP methods (GET, POST, PUT, DELETE) in APIs.

7.2 API Authentication and Authorization

- Securing APIs using JWT (JSON Web Token).
- Role-based access control (RBAC) in ASP.NET.
- API versioning and best practices for scalable APIs.

Module 8: Project Work and Job Preparation (Week 12)

8.1 Capstone Project: Full-Stack Application Development

- Build a full-stack web application using ASP.NET Core and SQL Server.
- Integrating the frontend with backend APIs and databases.
- Deploying the application to a cloud environment (e.g., Azure).

8.2 Resume Writing and Interview Preparation

- Writing a resume tailored to .NET and SQL development roles.
- Preparing for technical interviews (common questions and scenarios).
- Mock interviews with focus on coding and problem-solving skills.

Tools & Platforms Covered:

- Development Frameworks: .NET Framework, .NET Core, ASP.NET Core, Entity Framework.
- Programming Languages: C#, T-SQL.
- Database Management Systems: Microsoft SQL Server.
- Tools: Visual Studio, SQL Server Management Studio (SSMS), Git, Postman.
- Cloud Platforms (Optional): Microsoft Azure, AWS for application deployment.



Assessment & Certification:

- Weekly quizzes and coding assignments.
- Final project evaluation (full-stack web application).
- Certificate of completion after passing all modules.

Outcome:

After completing this course, learners will be able to:

- Develop and deploy web applications using .NET and ASP.NET Core.
- Use C# for both backend and frontend logic in applications.
- Design and manage SQL databases efficiently using SQL Server.
- Optimize database queries and ensure secure data management.
- Build and secure RESTful APIs for integrating frontend and backend systems.
- Be job-ready for roles like .NET Developer, Full-Stack Developer, or SQL Database Administrator.

This syllabus prepares learners with practical and theoretical knowledge to handle development tasks using .NET technologies and manage databases with SQL. The capstone project and job-preparation modules are designed to enhance real-world skills and boost job readiness.