

CSE253:.NET PROGRAMMING

L:3 T:0 P:2 Credits:4

Course Outcomes: Through this course students should be able to

CO1 :: understand the .NET ecosystem, architecture, development tools, project structure, and package management, and develop basic .NET applications using C#.

CO2 :: apply C# programming concepts including data types, control structures, collections, methods, file handling, exception handling, and object-oriented programming principles to develop structured and maintainable applications

CO3 :: analyze application requirements and implement advanced C# features such as LINQ, generics, delegates, events, asynchronous programming, dependency injection, and software design principles to build reusable and efficient applications.

CO4 :: demonstrate and develop web applications using ASP.NET Core MVC by applying controllers, views, model binding, validation, state management, and configuration techniques.

CO5 :: develop database-driven applications using SQL Server and Entity Framework Core by implementing data access, CRUD operations, middleware, authentication, authorization, and identity management.

CO6 :: build database-driven applications using SQL Server and Entity Framework Core by implementing data access, CRUD operations, middleware, authentication, authorization, and identity management.

Unit I

Introduction to .NET and C# : Introduction to .NET and its features, Difference between .NET Framework, .NET Core and .NET, .NET SDK and Runtime, Common Language Runtime (CLR), .NET Class Library, Setting up development environment using Visual Studio and VS Code, Introduction to .NET CLI and commonly used CLI commands, Project structure in .NET applications, NuGet Package Manager, Building and executing .NET applications, Introduction to C#, C# program structure, Introduction to Git and GitHub for source code management.

Unit II

C# Programming Fundamentals : Variables and Data Types, Input and Output Operations, C# Hello World Program, Conditional Statements, Loops, Jump Statements, Arrays, Strings and String Methods, Collections in C#, Methods and Parameter Passing, Classes and Objects, Constructors, Access Modifiers, Object-Oriented Programming Concepts-Encapsulation, Abstraction, Inheritance, Polymorphism, Exception Handling, File Handling and Debugging Fundamentals

Unit III

Advanced C# Programming : Language Integrated Query (LINQ), LINQ to Collections, Delegates and Events, Interfaces, Generics in C#, Asynchronous Programming using Async and Await, SOLID Principles: Single Responsibility Principle (SRP), Open/Closed Principle (OCP), Liskov Substitution Principle (LSP), Interface Segregation Principle (ISP), and Dependency Inversion Principle (DIP).

Unit IV

Backend Development Using ASP.NET Core : Building Web Applications using ASP.NET Core, MVC Architecture and Model-View-Controller Communication, Handling Requests and Responses, Controllers and Actions, Razor View Engine and Razor Syntax, Layouts, Sections and View Start, Data Passing Techniques- ViewBag, ViewData and TempData, Models, Session and State Management, ASP.NET Core Forms, Model Binding, Tag Helpers, Form Validations – Server Side and Client Side

Unit V

ASP.NET Core MVC, Entity Framework Core and Security : Middleware Request Pipeline, Built-In Middleware and Custom Middleware, Dependency Injection in ASP.NET Core, Introduction to Entity Framework Core, DbContext and Entity Configuration, Code First Approach, Database First Approach, Database Migrations, CRUD Operations using Entity Framework Core, Authentication and Authorization in Web Applications

Unit VI

SQL Server and ASP.NET Core Web API : Introduction to SQL Server, SQL Commands, SQL Server Tables, Constraints, Joins, Introduction to REST Architecture, HTTP Protocol and HTTP Methods, HTTP Status Codes, Introduction to ASP.NET Core Web API, Building and Configuring Web APIs, API Controllers, Routing using Convention and Attribute Routing, Data Transfer Objects (DTOs), CRUD Operations using Web API, Swagger/OpenAPI Documentation, Testing Web APIs using Postman

List of Practicals / Experiments:

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- Develop a C# Console-based Student Course Management System to perform student registration, course enrollment, and grade calculation using variables, arrays, methods, and object-oriented programming concepts.
- Enhance the Student Course Management System by implementing inheritance, encapsulation, exception handling, and file handling to securely store and retrieve student records.
- Develop a Student Analytics Module for the Student Course Management System using LINQ, Delegates, Events, and Asynchronous Programming to generate course-wise reports, notify students about new course registrations, and improve application responsiveness.
- Develop an ASP.NET Core MVC-based Student Course Management Portal implementing secure login, role-based authentication, dependency injection, middleware, and routing for students and administrators.
- Implement database-driven modules for Student, Course, Faculty, and Enrollment Management using Entity Framework Core and SQL Server, supporting complete CRUD operations through the MVC application.
- Develop RESTful Web APIs for Student, Course, Faculty, and Enrollment modules using ASP.NET Core API Controllers, HTTP methods, routing, and CRUD operations to support mobile and web applications.
- Develop secure RESTful Web APIs for an Online Shopping System by implementing Data Transfer Objects (DTOs), JSON serialization/deserialization, model validation, and exception handling for Product, Customer, and Order modules, and test all API endpoints using Swagger and Postman.
- Integrate SQL Server with the Online Book Store Web API to perform complete CRUD operations and test all REST endpoints using Swagger and Postman.
- Implement Authentication, Authorization, Middleware, and Dependency Injection in the Employee Leave Management System to provide secure access for employees and administrators.
- Develop an Online Student Result Analysis Module using LINQ, Delegates, Events, and Asynchronous Programming to generate topper lists, subject-wise statistics, and student notifications.

Text Books:

1. BUILDING A WEB APP WITH BLAZOR AND ASP .NET CORE BY JIGNESH TRIVEDI, BPB PUBLICATIONS by JIGNESH TRIVEDI, BPB PUBLICATIONS

References:

1. ASP.NET: THE COMPLETE REFERENCE by MATTHEW MACDONALD, MC GRAW HILL