Full Stack React Application Development with .NET 8

Course Duration: 40 Hours **Course code: FSRAD-NET8**

1. Course Overview

This course introduces learners to Angular 17, the latest version of Google's popular frontend framework. It covers fundamental concepts like components, templates, directives, services, and routing, while also introducing Angular 17's new features such as the modern control flow (@if, @for, @switch), Signals for reactivity, and deferrable views for lazy loading UI elements. Learners will also practice building real-world applications and prepare for junior Angular developer roles by mastering HTTP communication, forms, and state management basics.

2. What you'll learn?

By the end of this course, you will be able to:

- Understand full stack architecture with React frontend + .NET 8 backend.
- Build responsive React applications with modern state management.
- Develop RESTful APIs using ASP.NET Core 8.
- Integrate Entity Framework Core 8 with SQL Server for database operations.
- Implement Authentication & Authorization using JWT in .NET 8 and React.
- Handle CRUD operations end-to-end (UI ↔ API ↔ Database).
- Apply React Router v6 for navigation and protected routes.
- Use Redux Toolkit or Context API for global state management.
- Integrate APIs with Axios/Fetch in React.
- Manage errors, validation, and logging in both frontend and backend.
- Deploy full stack applications to Azure / AWS / Docker.

3. Target Audience

- Developers who want to master full stack web development.

- React developers seeking to add backend expertise with .NET 8.
- Backend developers wanting to expand to modern frontend (React).
- Students and professionals aiming for Full Stack Developer roles.

4. Pre-Requisites

Familiarity with:

- Basic HTML, CSS, and JavaScript/TypeScript
- Fundamentals of React (components, props, hooks)
- Basic understanding of C# and .NET Core (optional but helpful)
- SQL basics

5. Course content

Day 1: Introduction to React and .NET 8

Lecture:

- Overview of Full Stack Development
- Understanding React and .NET 8
- Setting up the Development Environment (Node.js, .NET SDK, VS Code/Visual Studio)
- Introduction to TypeScript for React
- Overview of REST APIs and MVC architecture in .NET 8

Lab:

- Install Node.js, .NET 8 SDK, and required dependencies
- Create a simple React app using Vite or Create React App
- Set up a .NET 8 Web API project

Day 2: React Basics and State Management

Lecture:

- JSX and Components in React
- Props and State in React

- React Hooks: useState, useEffect
- Component Lifecycle
- Basic State Management with Context API

Lab:

- Create functional components in React
- Implement state management with hooks
- Build a simple counter app using useState and useEffect

Day 3: .NET 8 Web API Fundamentals

Lecture:

- Understanding .NET 8 Minimal APIs
- Dependency Injection in .NET
- Controllers vs Minimal APIs
- Working with EF Core and Database Connections
- CRUD Operations in .NET 8

Lab:

- Set up Entity Framework Core with SQLite/PostgreSQL
- Create a Minimal API with GET, POST, PUT, DELETE endpoints
- Test APIs using Postman or Swagger

Day 4: Connecting React with .NET 8 API

Lecture:

- Fetching Data from .NET API in React
- Using Fetch API & Axios
- Handling Async Operations and Errors
- CORS and Cross-Origin Communication

Lab:

- Consume the .NET API in a React app
- Display data using React state and hooks
- Implement error handling for API calls

Day 5: Advanced React Concepts

Lecture:

- React Router for Navigation
- Forms and Form Handling in React
- Validation with React Hook Form
- Optimizing Performance with React.memo and useCallback

Lab:

- Implement a multi-page app using React Router
- Create a form with validation for user input
- Optimize components using React.memo

Day 6: Authentication & Authorization

Lecture:

- Introduction to JWT Authentication
- Securing APIs with Authentication & Authorization in .NET 8
- Implementing User Login & Registration in React
- Using React Context for Authentication State

Lab:

- Implement JWT-based authentication in .NET 8
- Secure API endpoints with authentication
- Create login and registration UI in React
- Store and manage authentication tokens

Day 7: Full Stack CRUD Application

Lecture:

- Creating a Full Stack CRUD app (React + .NET 8)
- Managing State with Redux Toolkit (Optional)
- Optimizing API Calls with React Query

Lab:

- Implement a full CRUD app (Users/Products Management)
- Use Redux Toolkit or React Context for state management
- Optimize API interactions with React Query

Day 8: Deployment & Testing

Lecture:

- Unit Testing in .NET 8 with xUnit
- Testing React Components with Jest & React Testing Library
- CI/CD Basics for React & .NET Apps

Lab:

- Write and run unit tests in .NET and React
- Deploy the React app and .NET API to cloud platforms
- Set up CI/CD pipeline using GitHub Actions

Day 9: Real-Time Features & Advanced Topics

Lecture:

- WebSockets with SignalR for Real-Time Communication
- Implementing Background Jobs with Hangfire
- Optimizing Performance in React and .NET 8

Lab:

- Implement a real-time notification system with SignalR
- Optimize API performance using caching techniques

Day 10: Capstone Project

Lecture:

- Project Planning & Architecture
- Best Practices for Scalable Full Stack Applications
- Code Review & Deployment Strategies

Lab:

- Build and present a final project (e.g., Task Management App)
- Implement best practices for security and performance