Web Development Course Outline

Instructor	Wasiq Noor
Duration	15 weeks
Institute	Information Technology University (ITU)

Week 1: Introduction to Web Development

- **Topics:**
  - Internet Basics
  - Understanding Browsers (Browser engines and APIs)
  - Introduction to HTML and CSS (Brief Review)
  - Basic HTML Tags (Lists / Hyperlinks / Tables)
- **Assignment 1:** Create a simple webpage using basic HTML tags (headings, paragraphs, and lists).

Week 2: Introduction to JavaScript

- **Topics:**
  - JavaScript Basics: Variables, Data Types, and Operators
  - Control Structures (Loops, Conditional Statements)
  - Functions and Scope
  - DOM Manipulation with JavaScript
- **Assignment 2:** Create a JavaScript-based interactive webpage with DOM manipulation.

Week 3: Advanced JavaScript and ES6+ Features

- **Topics:**
  - ES6 Features: Arrow Functions, Destructuring, Spread Operator
  - Asynchronous JavaScript: Promises, Async/Await

    - Modules in JavaScript
    - Event Handling and the Event Loop
- **Assignment 3:** Implement a small project utilizing ES6 features and asynchronous JavaScript.

Week 4: Introduction to React

- **Topics:**
    - Introduction to React: Components, JSX, and Props
    - Components in React (Functional / Class)
    - Introduction to State in React
    - Event Handling in React
- **Assignment 4:** Create a React-based contact form with various input types (text, email, password, etc.) and basic styling.

Week 5: Building Interfaces with React

- **Topics:**
    - React State and Lifecycle
    - Tailwind and React Integration
    - Styling React Components with Tailwind
    - React Routing and Navigation
- **Assignment 5:** Enhance the React contact form by adding more interactivity using React state and applying advanced CSS techniques.

Week 6: Advanced React Concepts

- **Topics:**
    - React Hooks (useState, useEffect)
    - Context API for State Management
    - Code Splitting and Lazy Loading in React
    - Error Boundaries in React
- **Assignment 6:** Refactor the React contact form to use Hooks and Context API for state management.

Week 7: Introduction to NodeJS and NestJS

- **Topics:**
  - Introduction to NodeJS
  - Introduction to NestJS: Controllers, Modules, and Providers
  - Building RESTful APIs with NestJS
- **Assignment 7:** Build a simple REST API with NestJS that handles basic CRUD operations.

Week 8: Database Integration with NestJS

- **Topics:**
  - Introduction to Databases (MySQL/NoSQL)
  - Integrating Databases with NestJS (TypeORM or Mongoose)
  - Implementing CRUD Operations with Database in NestJS
  - Authentication and Authorization in NestJS (using JWT)
- **Assignment 8:** Create a REST API with NestJS that includes database integration and user authentication.

Week 9: Advanced NodeJS and NestJS Concepts

- **Topics:**
  - Middleware in NestJS
  - Validation and Error Handling in NestJS
  - Advanced Authentication Techniques (OAuth, Role-Based Access Control)
  - Testing in NestJS
- **Assignment 9:** Add advanced authentication and error handling to the REST API developed in the previous assignment.

Week 10: Full-Stack Development with NestJS and React

- **Topics:**
  - Connecting React Frontend to NestJS Backend
  - Fetching and Displaying Data from REST API in React

- Handling Forms and User Input in React
- Advanced State Management in React (using Redux or Context API)

- **Project 1 (Start):** Develop a full-stack web application where React communicates with the NestJS API.

Week 11: Advanced Topics in React and NestJS

- **Topics:**
  - Advanced Form Handling in React (Form Validation and Error Handling)
  - Performance Optimization in React
  - Testing and Debugging in NestJS and React
- **Assignment 10:** Add form validation and real-time updates to the full-stack application developed in Project 1.

Week 12: Client-Server Communication and Deployment

- **Topics:**
  - HTTP / TCP Protocol and RESTful Best Practices
  - Deploying NestJS Applications (Heroku, AWS, etc.)
  - Deploying React Applications (Netlify, Vercel, etc.)
  - Full-Stack Project Deployment and Monitoring
- **Project 2 (Start):** Deploy the full-stack application to a cloud provider and ensure it’s fully functional.

Week 13: Introduction to Web Security

- **Topics:**
  - Common Web Security Vulnerabilities (XSS, CSRF, SQL Injection)
  - Security Best Practices in React and NestJS
  - Implementing HTTPS and Secure Headers
  - Data Encryption and Secure Storage
- **Assignment 11:** Implement security features in the full-stack application, including HTTPS and secure data storage.

Week 14: Final Project Development

- **Topics:**
  - Final Project Work: Bringing Together All Concepts
  - Implementing Advanced Features: Caching, Authentication, Role-Based Access Control
  - Performance Tuning and Optimization
  - Ensuring Security in Full-Stack Applications
- **Final Project Work:** Continue developing the final full-stack application with advanced features.

Week 15: Final Project Submission and Course Review

- **Topics:**
  - Final Project Work and Review
  - Course Summary and Key Takeaways
  - Final Project Presentations
  - Q&A Session
- **Final Project Submission:** Complete and submit the full-stack web application developed over the course.