MERN STACK Course Syllabus

Total Duration: 180hrs

Module 1

Chapter 1: Web Design Basics (HTML, CSS, JS)

1. HTML5: Structure and Semantic Tags
2. CSS3 Styling: Selectors, Box Model, Flexbox, Grid
3. Responsive Design with Media Queries
4. Introduction to Bootstrap / Tailwind CSS
5. JavaScript Essentials
6. JavaScript ES6+: let/const, Arrow Functions, Destructuring, Spread/Rest, Modules

Chapter 2: React Fundamentals

1. Introduction to React & Single Page Applications (SPA)
2. Environment Setup (Node.js, npm, Create React App)
3. JSX Syntax
4. Functional Components
5. Props, State, and Event Handling
6. useState & useEffect Hooks

Chapter 3: Routing & Forms in React

1. React Router DOM v6
2. Routes, Links, useNavigate
3. Nested and Dynamic Routing
4. Controlled vs Uncontrolled Forms
5. Basic Form Validation Techniques

Chapter 4: Advanced React Concepts

1. useRef, useContext, useReducer
2. Creating Custom Hooks

3. Intro to useMemo and useCallback

4. State Management using Context API

5. UI Notifications with React Toastify

Chapter 5: Styling & UI Design in React

1. CSS Modules and Inline Styling

2. Tailwind CSS Integration

3. Bootstrap / Material UI

4. Creating Reusable UI Components

5. Component-based Layouting

Chapter 6: API Integration & State Management

1. Working with REST APIs using Axios and Fetch

2. useEffect for Data Fetching

3. Error and Loading State Handling

4. Axios Interceptors

5. Introduction to Redux Toolkit (Optional)

Chapter 7: Frontend Major Project

1. Build a Full UI Web App (e.g., Ecommerce Storefront, Job Portal, Admin Dashboard)

2. Responsive Design + API Integration + Forms + Routing

Module 2

Chapter 8: Node.js & Express.js Basics

1. Introduction to Node.js and npm

2. Creating a Basic Node Server

3. Express Setup and Routing

4. Using Middleware & Modular Routes

5. Nodemon, dotenv & Project Structure

Chapter 9: MongoDB & Mongoose

1. Introduction to NoSQL Databases

2. MongoDB Atlas Configuration

3. Creating Schemas & Models in Mongoose

4. CRUD Operations (Create, Read, Update, Delete)

5. Data Validation and Schema Constraints

6. Working with Timestamps & IDs

7. Data Relationships: Referencing vs Embedding

Chapter 10: User Authentication & Authorization

1. User Registration/Login APIs

2. Password Hashing with bcrypt.js

3. JWT: Access & Refresh Tokens

4. Middleware for Route Protection

5. Creating Protected Routes

6. Role-based Access (Admin/User)

Chapter 11: MERN Stack Integration

1. Connecting React with Express API

2. Complete Auth Flow in React

3. Protected Routes in React Frontend

4. State Management using Context or Redux

5. Token Handling and Persistence

Chapter 12: Advanced Features (Optional)

1. File Upload with Multer

2. Email Sending via NodeMailer

3. Filtering, Search & Pagination in APIs

4. Real-time Features using Socket.io

5. REST API Design Best Practices

Chapter 13: Final Full Stack Capstone Project

1. Complete MERN Stack App (e.g., Blog CMS, Admin Dashboard, Inventory System)

2. Functional Auth System with Admin/User Roles

3. Full CRUD Operations with Validations

4. UI Notifications and Routing

5. Optimized Responsive Design + Security Features

Chapter 14: Deployment & Hosting

1. Preparing React App for Production Build

2. Hosting Frontend on Netlify/Vercel

3. Hosting Backend on Render/Railway

4. Connecting to MongoDB Atlas

5. Securing Environment Variables

6. GitHub Deployment Workflow