

DTI-PSD-104

MERN Stack Development

Program Information



Nature of the Course
Lecture + Hands-on Labs



Total Hours per Day
2 hours



Course Duration
11 Weeks

Course Summary

The MERN Stack Development program is a comprehensive 110-hour, project-based training designed to equip learners with the skills required to build modern, full-stack web applications. Starting with JavaScript fundamentals, the course progresses through backend development with Node.js, Express.js, and MongoDB, followed by frontend development using React, enabling participants to develop complete web solutions from scratch.

Throughout the training, participants will work on real-world projects while learning industry-standard tools and best practices, including Git/GitHub, REST APIs, authentication, state management, API integration, and application deployment. By the end of the program, learners will have built a fully functional MERN application and gained the practical experience needed to pursue careers as full stack web developers.

Completion Criteria

After fulfilling all of the following criteria, the student will be deemed to have finished the module:

- Has attended 90% of all classes held.
- Has received an average of 80% on all assignments
- Has received an average of 60% in assessments.
- The tutor believes the student has grasped all of the concepts and is ready to go on to the second module.

Prerequisites

- Basic understanding of the Linux command line.
- Fundamental programming knowledge (Python/Java preferred).
- Familiarity with SQL concepts.
- Basic understanding of data structures.

Course Details



Week 1: — JavaScript Fundamentals (10 Hours)

Topics:

- Introduction to JavaScript
 - Variables and Data Types
 - Operators
 - Conditional Statements
 - Loops
 - Functions
 - Arrow Functions
 - Arrays
 - Objects
 - DOM Manipulation
 - Event Handling
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Week 2: — Advanced JavaScript & Git/GitHub (10 Hours)

Topics:

- ES6 Features
 - Destructuring
 - Spread and Rest Operators
 - Modules
 - Callbacks
 - Promises
 - Async/Await
 - Error Handling
 - Git Fundamentals
 - GitHub Workflow
 - Branching
 - Merging
 - Pull Requests
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Week 3: — Security, Ingestion & Spark Intro

Topics:

- Introduction to Node.js
- npm and Package Management
- Express.js Setup
- Routing

- Request and Response Objects
 - REST API Development
 - CRUD Operations
 - MVC Architecture
 - Environment Variables
 - CORS
 - Postman Testing
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Week 4: — MongoDB & Mongoose (10 Hours)

Topics:

- MongoDB Fundamentals
 - Collections and Documents
 - CRUD Operations
 - MongoDB Atlas
 - Mongoose Setup
 - Schemas and Models
 - Data Validation
 - Relationships and References
 - Aggregation Basics
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Week 5: — Authentication & Authorization (10 Hours)

Topics:

- Authentication Concepts
 - Authorization Concepts
 - User Registration API
 - User Login API
 - bcrypt Password Hashing
 - JWT
 - Nodemailer (for sending mail)
 - Role-Based Authorization
 - Protected Routes
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Week 6: — Middleware, Validation & File Handling (10 Hours)

Topics:

- Middleware Fundamentals
 - Custom Middleware
 - Error Handling Middleware
 - Joi Validation
 - File Handling using Multer
 - API Security Best Practices
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Week 7: — React Fundamentals (10 Hours)

Topics:

- Introduction to React
 - JSX
 - Components
 - Props
 - State Management
 - useState
 - Event Handling
 - Conditional Rendering
 - List Rendering
 - Component Communication
 - Virtual DOM
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Week 8: — React Hooks & Lifecycle Methods (10 Hours)

Topics:

- useEffect, Lifecycle Methods
 - useRef
 - useContext
 - useReducer
 - useMemo
 - useCallback
 - Hook Best Practices
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Week 9: — React Router & State Management (10 Hours)

Topics:

- React Router
 - Route Parameters
 - Nested Routes
 - Protected Routes
 - Redux Toolkit (RTK)
 - Global State Management
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Week 10: — Forms & API Integration (10 Hours)

Topics:

- Form Handling
 - Formik
 - Yup Validation
 - Axios
 - GET Requests, POST Requests, PUT Requests, DELETE Requests
 - API Error Handling
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Week 11: — Full MERN Integration & Deployment (10 Hours)

Topics:

- React Toastify
 - SweetAlert2
 - Frontend Authentication
 - Backend Authentication
 - Login Management System
 - User Profile Management
 - Full MERN CRUD Application
 - Deployment Fundamentals
 - Project Optimization
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Practical Assignments

Practical assignments will focus on the practice and mastery of contents covered in the lectures, and introduce critical and fundamental problem solving techniques to the students.

Assignment 1: Responsive Website (HTML & CSS)

- Design and develop a responsive website using HTML5 and CSS3.
- Implement Flexbox, Grid, and Media Queries for multiple screen sizes.

Assignment 2: MongoDB Database Design

- Design and implement a MongoDB database with collections, relationships, and validations.
- Perform CRUD operations using MongoDB and Mongoose.

Assignment 3: Login Management System

- Develop a complete login and registration system with authentication and authorization.
- Implement JWT, bcrypt, middleware, protected routes, and role-based access control.

Assignment 4: Formik & Redux Toolkit (RTK)

- Build login and registration forms using Formik and Yup validation.
- Manage application state and authentication flow using Redux Toolkit (RTK).

Assignment 5: Complete MERN Application

- Develop a full-stack MERN application integrating React, Express.js, and MongoDB.
- Implement API integration using Axios, React Router, React Toastify, and SweetAlert2.

