# Industry-Oriented MERN Stack Development Training Program

## Duration: 28 Days | 5 Hours/Day

## Objective:

To train participants in building full-stack web applications using the MERN stack (MongoDB, Express.js, React, Node.js), preparing them for industry roles as full-stack JavaScript developers.

## Program Overview

* **Target Audience:** Beginners to intermediate learners, IT professionals, or students aiming to become full-stack developers.
* **Prerequisites:** Basic programming knowledge (e.g., variables, loops, functions); familiarity with JavaScript is a plus.
* **Mode:** Instructor-led (online/offline), hands-on coding, and project-based learning.
* **Tools:** Node.js, MongoDB, Express.js, React, Git, VS Code, Postman, MongoDB Compass.

## Training Schedule

### Week 1: JavaScript Foundations and Backend Basics

**Day 1: Introduction to JavaScript and MERN Stack**

* Overview of JavaScript and MERN Stack
* Setting up the Environment (Node.js, npm, VS Code)
* Writing and Running Your First JavaScript Program
* Hands-On: Simple Console Apps
* Practice: JavaScript Basics Exercises

**Day 2: JavaScript Essentials**

* Variables, Data Types, and Operators
* Control Structures (if-else, loops)
* Functions, Scope, and Closures
* Hands-On: Build a Simple Calculator
* Practice: Solve Coding Challenges

**Day 3: JavaScript Advanced**

* Arrays, Objects, and Destructuring
* ES6 Features: Arrow Functions, Promises, Async/Await
* Working with JSON
* Hands-On: Process Data with Array Methods
* Practice: Fetch Data with Promises

**Day 4: Node.js Basics**

* Introduction to Node.js and Event-Driven Architecture
* Modules and npm (Package Management)
* File System Operations
* Hands-On: Build a File Reader App
* Practice: Create Custom Modules

**Day 5: Express.js Fundamentals**

* Setting up Express.js
* Routing, Middleware, and HTTP Methods
* Serving Static Files
* Hands-On: Create a Simple Express Server
* Practice: Add Routes for a Mock API

**Day 6: MongoDB Basics**

* Introduction to NoSQL and MongoDB
* Setting up MongoDB (Local/Atlas)
* CRUD Operations with MongoDB Shell
* Hands-On: Build a MongoDB Database
* Practice: Query and Update Data

**Day 7: Weekly Review and Mini Project**

* Recap of Week 1 Concepts
* Debugging JavaScript and Node.js
* Mini Project: Build a REST API with Express.js and MongoDB
* Q&A and Peer Review

### Week 2: Backend Development and API Integration

**Day 8: Connecting MongoDB with Node.js**

* Using Mongoose for MongoDB Integration
* Defining Schemas and Models
* Performing CRUD Operations
* Hands-On: Build a User Database
* Practice: Add Validation

**Day 9: Advanced Express.js**

* Error Handling and Validation
* Environment Variables and Configuration
* RESTful API Design Principles
* Hands-On: Enhance an API with Middleware
* Practice: Secure Routes

**Day 10: Authentication with JWT**

* Introduction to Authentication and JWT
* User Registration and Login
* Protecting Routes with JWT
* Hands-On: Add Authentication to an API
* Practice: Test with Postman

**Day 11: HTML and CSS Basics**

* HTML5 Structure and Semantics
* CSS: Flexbox, Grid, and Responsive Design
* Styling Best Practices
* Hands-On: Build a Static Landing Page
* Practice: Make it Responsive

**Day 12: JavaScript in the Browser**

* DOM Manipulation and Events
* Fetch API for HTTP Requests
* Error Handling in Frontend
* Hands-On: Create an Interactive Form
* Practice: Fetch Data from an API

**Day 13: Introduction to React**

* What is React? (Components, JSX)
* Setting up a React Project with Create React App
* Building Functional Components
* Hands-On: Create a Simple React App
* Practice: Add Multiple Components

**Day 14: Weekly Review and Mini Project**

* Recap of Week 2
* Troubleshooting Backend-API Issues
* Mini Project: Build a User Management API with Authentication

### Week 3: Frontend Development with React

**Day 15: React State and Props**

* Managing State with useState
* Passing Data with Props
* Conditional Rendering
* Hands-On: Build a To-Do List App
* Practice: Add Delete Functionality

**Day 16: React Hooks**

* useEffect for Side Effects
* Custom Hooks
* Handling Forms with React
* Hands-On: Fetch Data with useEffect
* Practice: Create a Custom Hook

**Day 17: React Routing**

* Introduction to React Router
* Setting up Routes and Navigation
* Dynamic Routing with Parameters
* Hands-On: Build a Multi-Page App
* Practice: Add Protected Routes

**Day 18: State Management with Context**

* Context API Basics
* Managing Global State
* Avoiding Prop Drilling
* Hands-On: Share State Across Components
* Practice: Add User Authentication State

**Day 19: Connecting React with Backend**

* Consuming REST APIs in React
* Axios for HTTP Requests
* Displaying Data Dynamically
* Hands-On: Connect React to an Express API
* Practice: Add CRUD Functionality

**Day 20: Styling in React**

* CSS Modules and Styled-Components
* Using Bootstrap or Tailwind with React
* Responsive Design in React
* Hands-On: Style a React App
* Practice: Add Animations

**Day 21: Weekly Review and Mini Project**

* Recap of Week 3
* Debugging Frontend-Backend Integration
* Mini Project: Build a Task Manager App with MERN Stack

### Week 4: Full-Stack Integration and Deployment

**Day 22: Version Control with Git**

* Git Basics (commit, push, pull, branch)
* GitHub Workflows and Collaboration
* Resolving Merge Conflicts
* Hands-On: Push a Project to GitHub
* Practice: Collaborate on a Repo

**Day 23: Full-Stack Project – Part 1**

* Planning a MERN Stack Application
* Backend: Express.js with MongoDB
* Setting up API Endpoints
* Hands-On: Build the Backend Structure
* Practice: Test with Postman

**Day 24: Full-Stack Project – Part 2**

* Frontend: React with Routing and State
* Integrating Frontend with Backend APIs
* Real-Time Updates with React
* Hands-On: Connect and Style the Frontend
* Practice: Add User Interactions

**Day 25: Testing and Debugging**

* Unit Testing with Jest (React)
* Testing APIs with Postman
* Debugging Tools and Techniques
* Hands-On: Test a MERN App
* Practice: Fix Bugs

**Day 26: Deployment Basics**

* Preparing a MERN App for Deployment
* Deploying Backend to Heroku
* Deploying Frontend to Netlify
* Hands-On: Deploy a Sample App
* Practice: Configure Environment Variables

**Day 27: Final Project Work**

* Completing the MERN Stack Application
* Code Review, Optimization, and Documentation
* End-to-End Testing
* Hands-On: Finalize and Polish Project

**Day 28: Program Wrap-Up**

* Presentation of Final Projects
* Peer Feedback and Q&A Session
* Certification and Career Guidance

## Learning Outcomes

By the end of this program, participants will be able to:

1. Write modern JavaScript code with ES6+ features.
2. Build RESTful APIs with Node.js, Express.js, and MongoDB.
3. Develop dynamic, responsive frontends with React.
4. Integrate frontend and backend in a full-stack MERN application.
5. Deploy MERN applications to production environments.