

Diploma in MERN Stack Development

Duration: 6 Months

Course Overview

The **Diploma in MERN Stack Development** is designed to prepare learners for a career in full-stack web development using the **MERN stack (MongoDB, Express.js, React.js, Node.js)**. This course focuses on developing scalable, efficient, and dynamic web applications by combining front-end and back-end technologies. Students will learn how to build user-friendly interfaces, design and manage databases, create RESTful APIs, and integrate front-end with back-end for complete project deployment.

Course Objectives

1. To build strong fundamentals in **front-end development with React.js**.
 2. To train learners in **server-side programming using Node.js and Express.js**.
 3. To provide knowledge of **MongoDB for NoSQL database design and management**.
 4. To teach **RESTful API development and integration**.
 5. To introduce **security and authentication** techniques for web applications.
 6. To guide learners in **building scalable and real-world full-stack applications**.
 7. To enable students to **deploy MERN applications on cloud platforms**.
 8. To enhance problem-solving, teamwork, and project management skills through **real-world projects**.
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Course Outcomes

After successful completion of the course, students will be able to:

- Develop **interactive front-end applications** using React.js.
- Create **scalable back-end applications** with Node.js and Express.js.
- Design, query, and manage **MongoDB databases**.
- Build and consume **RESTful APIs** for client-server communication.
- Implement **user authentication and authorization**.
- Integrate **front-end and back-end** to build full-stack apps.

- Deploy **MERN stack applications** on cloud hosting services.
 - Work as **Full Stack Developers, Front-End Engineers, or Back-End Engineers.**
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Course Syllabus

Module 1: Introduction to Full Stack Development & MERN

- Overview of Web Development & Full Stack Concepts
 - Introduction to MERN Stack (MongoDB, Express.js, React.js, Node.js)
 - Setting up Development Environment (Node, npm, MongoDB, Git, VS Code)
 - Understanding MVC Architecture
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Module 2: Front-End Development with React.js

- Introduction to React.js & JSX
 - Components, Props, and State
 - Event Handling & Conditional Rendering
 - React Hooks (useState, useEffect, useContext)
 - Forms & Controlled Components
 - React Router – Navigation & Dynamic Routing
 - State Management (Context API, Redux basics)
 - Fetching Data from APIs (Axios/Fetch)
 - Building a React Project (To-do/Blog App)
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Module 3: Back-End Development with Node.js & Express.js

- Introduction to Node.js & npm
- Modules, Events, and File System
- Building HTTP Servers with Node.js
- Introduction to Express.js – Setup & Middleware
- Routing in Express.js
- REST API Design with Express

- Error Handling in Express
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Module 4: Database Management with MongoDB

- Introduction to NoSQL & MongoDB
 - CRUD Operations (Create, Read, Update, Delete)
 - MongoDB Data Models & Schema Design
 - Indexing & Aggregation
 - Using Mongoose for ODM (Schema & Models)
 - Connecting Express.js with MongoDB
 - Building CRUD APIs with MongoDB + Express
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Module 5: RESTful APIs & Integration

- REST Architecture & Best Practices
 - Building REST APIs with Express & MongoDB
 - Testing APIs with Postman
 - API Error Handling & Validation
 - Consuming REST APIs from React Front-End
 - Mini Project – Employee Management System
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Module 6: Authentication & Security

- Authentication vs Authorization
 - JSON Web Tokens (JWT) & Sessions
 - Password Hashing with bcrypt
 - Role-Based Access Control (RBAC)
 - Securing APIs (CORS, Helmet, Rate Limiting)
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Module 7: Front-End & Back-End Integration

- Connecting React Front-End with Express Back-End

- Axios in React for API Calls
 - Handling Authentication in React (Login/Signup)
 - Building a Full MERN App (CRUD Example)
 - Real-Time Communication with Socket.io (Optional)
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Module 8: Deployment & Version Control

- Git & GitHub for Version Control
 - Environment Variables & Configurations
 - Deploying React Apps (Netlify, Vercel)
 - Deploying Node.js Apps (Heroku, Render, AWS)
 - MongoDB Atlas (Cloud Database)
 - Deploying Full MERN Stack Applications
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Module 9: Final Project & Assessment

- Planning & Designing a Full MERN Application
 - Possible Projects:
 - E-commerce Application
 - Online Learning Platform
 - Job Portal
 - Social Media App
 - Project Development (Frontend + Backend + Database + API Integration)
 - Final Deployment & Presentation
 - Course Assessment & Certification
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☒ This syllabus ensures students **gain hands-on industry skills** in both **frontend (React.js)** and **backend (Node.js, Express, MongoDB)**, making them fully capable of working as **MERN Stack Developers**.