



Codevensiva Academy

AI-Powered MERN Stack Program

Detailed Course Syllabus

Duration: 2.5 Months (10 Weeks)

Mode: Online Training

Level: *Beginner → Advanced → Industry Ready*

1. Course Overview

AI-Powered MERN Stack Engineering Program is a comprehensive, industry-oriented training designed to transform beginners, students, and working professionals into job-ready Full Stack Developers with expertise in Artificial Intelligence integration. The program covers modern frontend development with React.js, scalable backend development using Node.js and Express.js, database engineering with MongoDB, application security, cloud deployment, and AI-assisted software development.

2. Learning Objectives

Upon successful completion of this program, learners will be able to:

- Build full-stack web applications using the MERN Stack.
- Develop modern, responsive, and scalable user interfaces with React.js.
- Create secure REST APIs using Node.js and Express.js.
- Design and manage databases using MongoDB.
- Implement authentication, authorization, and security best practices.
- Integrate AI capabilities using OpenAI and modern AI tools.
- Use ChatGPT, Cursor AI, and GitHub Copilot for AI-assisted development.
- Build and deploy real-world industry projects.
- Manage code using Git and GitHub.
- Create a professional portfolio and prepare for technical interviews.

Outcome: Become an Industry-Ready Full Stack AI Developer capable of building, deploying, and maintaining modern web applications.

3. Who Should Join?

This program is ideal for:

- Students aspiring to build a career in Software Development.
- Freshers seeking job-ready Full Stack Development skills.
- Frontend Developers looking to upgrade to MERN Stack Development.
- Working professionals planning a career transition into Web Development.
- JavaScript developers aiming to master modern application development.
- Entrepreneurs and freelancers interested in building scalable web applications.
- Developers who want to leverage AI tools for faster and smarter software development.

No prior full-stack experience required — only basic programming knowledge and a passion for learning.

4. Prerequisites

To enroll in this program, learners should have:

- Basic understanding of computers and internet usage.
- Fundamental knowledge of HTML and CSS.
- Basic programming or JavaScript knowledge (preferred but not mandatory).
- A laptop/desktop with internet connectivity.
- Passion for learning modern web development and AI technologies.

5. Detailed Curriculum

Week 1 – Building the Core Foundation for Full Stack Development

Objective:

Establish a strong foundation in JavaScript, the core programming language of modern web development, enabling learners to confidently progress into React.js, Node.js, and Full Stack application development.

Topics Covered

JavaScript Fundamentals

- Introduction to JavaScript
- Variables, Data Types, and Operators
- Conditional Statements (if, else, switch)
- Loops (for, while, do-while)
- Functions and Function Expressions
- Scope, Hoisting, and Closures

Working with Data

- Objects and Arrays
- Array Methods: map(), filter(), reduce(), find()
- Object Manipulation Techniques
- JSON Fundamentals

Modern JavaScript (ES6+)

- let and const
- Arrow Functions
- Template Literals
- Destructuring
- Spread and Rest Operators
- Optional Chaining
- Modules and Imports/Exports

Asynchronous JavaScript

- Callbacks
- Promises
- Async/Await
- Error Handling
- Fetch API and API Consumption

Browser Storage

- Local Storage
- Session Storage
- Data Persistence Concepts

Hands-On Activities

- JavaScript Coding Challenges
- DOM Manipulation Exercises
- API Data Fetching Practice
- Problem-Solving Assignments

Mini Projects

- Student Grade Calculator
- Expense Tracker (JavaScript Version)
- Weather Information App using Public API

Learning Outcome

By the end of Week 1, learners will be able to write modern JavaScript code, work with APIs, manage application data, and build interactive browser-based applications, forming a strong foundation for React.js and Full Stack Development.

Week 2 – Building Modern User Interfaces with React

Objective:

Learn the fundamentals of React.js and understand how modern Single Page Applications (SPAs) are built using component-based architecture.

Topics Covered

Introduction to React.js

- What is React?
- Why React is the Industry Standard
- React Ecosystem Overview
- Understanding Single Page Applications (SPA)

Development Environment Setup

- Node.js & npm Basics
- Introduction to Vite
- Creating and Running React Applications
- Project Structure and Best Practices

React Core Concepts

- JSX Fundamentals
- Components and Component Architecture
- Functional Components
- Reusable Components
- Component Composition

React Data Flow

- Props and Prop Drilling
- State Management with useState
- Event Handling
- Dynamic Rendering

Rendering & UI Development

- Conditional Rendering
- Lists and Keys
- Dynamic Data Display
- Basic Styling Techniques

React Developer Tools

- React DevTools Introduction
- Debugging React Applications

Hands-On Activities

- Setting up React Projects using Vite
- Creating Reusable UI Components
- Managing State and User Interactions
- Dynamic Rendering Exercises

Mini Projects

- Counter Application
- Dynamic Greeting Application
- User Profile Card
- Simple Product Catalog

Learning Outcome

By the end of Week 2, learners will be able to build interactive user interfaces using React.js, create reusable components, manage application state, and develop dynamic Single Page Applications following modern frontend development practices.

Week 3 – Building Interactive and Dynamic Applications

Objective: Master React Hooks, form handling, and component communication to build dynamic applications.

Topics Covered

- React Hooks: useState, useEffect, useRef
- useMemo and useCallback
- Context API
- Component Communication
- Controlled Components
- Form Handling & Validation
- Custom Hooks
- Conditional Rendering
- Lists and Keys

Mini Projects

- Advanced Todo Application
- Registration Form with Validation
- Expense Tracker

Learning Outcome

Build interactive applications with efficient state management and form handling.

Week 4 – Connecting Applications to Real-World Data

Objective: Learn how to consume APIs, manage application routes, and handle data-driven applications.

Topics Covered

- REST API Fundamentals
- Fetch API & Axios
- GET, POST, PUT, DELETE Operations
- Loading and Error Handling
- React Router DOM
- Nested Routes
- Dynamic Route Parameters
- Protected Routes
- JWT Authentication Basics

Mini Projects

- Product Listing Application
- Movie Search Application
- User Management Dashboard

Learning Outcome

Develop applications that interact with external services and support seamless navigation.

Week 5 – Building Scalable Server-Side Applications

Objective: Develop secure and scalable backend services using Node.js and Express.js.

Topics Covered

- Introduction to Node.js
- Node.js Runtime & Event Loop
- Express.js Framework
- Routing and Middleware
- Request & Response Handling
- RESTful API Development
- Error Handling
- Environment Variables
- API Testing with Postman

Mini Projects

- Student Management API
- Employee Management API

Learning Outcome

Create robust backend APIs capable of supporting enterprise applications.

Week 6 – Database Engineering and Secure Applications

Objective: Learn database management, authentication, and application security best practices.

Topics Covered

- MongoDB Fundamentals
- Collections and Documents
- CRUD Operations
- Mongoose ODM
- Schema Design
- Authentication using JWT
- Password Hashing with bcrypt
- Role-Based Access Control (RBAC)
- Security Best Practices

Mini Projects

- Secure Authentication System
- User Role Management Application

Learning Outcome

Design secure and scalable applications with professional database architecture.

Week 7 – Leveraging Artificial Intelligence in Software Development

Objective: Learn how modern developers use AI tools to increase productivity and build intelligent applications.

Topics Covered

- Introduction to Generative AI
- Prompt Engineering Fundamentals
- ChatGPT for Development
- Cursor AI
- GitHub Copilot
- Claude AI & Gemini AI
- AI-Assisted Debugging
- AI-Powered Documentation
- AI Code Review & Optimization
- OpenAI API Fundamentals
- Building AI-Powered Features

Mini Projects

- AI Content Generator
- AI Chat Assistant

Learning Outcome

Utilize AI tools effectively to accelerate development and create intelligent applications.

Week 8 – Building Production-Ready Frontend Applications

Objective: Learn advanced React concepts used in modern enterprise applications.

Topics Covered

- Redux Toolkit
- Store, Slice & Reducers
- Async Thunks
- RTK Query
- React.memo
- Code Splitting
- Lazy Loading
- Performance Optimization
- Material UI
- Responsive Design Principles

Mini Projects

- Admin Dashboard
- Enterprise Analytics Dashboard

Learning Outcome

Build scalable, high-performance React applications using industry best practices.

Week 9 – End-to-End Full Stack Application Development

Objective: Apply all acquired skills to develop real-world production-ready applications.

Projects Covered

Project 1: AI-Powered Expense Tracker

- Authentication
- Expense Analytics
- AI Insights

Project 2: E-Commerce Platform

- Product Management
- Shopping Cart
- API Integration

Project 3: Learning Management System (LMS)

- Student Dashboard
- Course Management
- Progress Tracking

Learning Outcome

Gain practical experience in building and managing complete full-stack applications.

Week 10 – Launching Applications and Building Your Career

Objective: Learn deployment strategies and prepare for technical interviews and job opportunities.

Topics Covered

- Git & GitHub Workflow
- Version Control Best Practices
- Deployment with Vercel
- Deployment with Netlify
- Backend Deployment with Render
- Environment Configuration
- Debugging with React DevTools
- Resume Building
- LinkedIn Profile Optimization
- GitHub Portfolio Development
- Mock Interviews
- Technical Interview Preparation

Project

Build and deploy a complete **AI-Powered MERN Stack Application** incorporating:

- Authentication
- React Frontend
- Node.js Backend
- MongoDB Database
- OpenAI Integration
- Responsive Design

Learning Outcome

Graduate as an **Industry-Ready Full Stack AI Developer** with a professional portfolio, live projects, deployment experience, and interview readiness.

Start Your React Journey with Codevensiva Academy

- **Industry-Oriented Curriculum** : Designed based on current industry requirements, covering Full Stack Development, Cloud Deployment, and AI Integration.
- **Hands-On Practical Learning** : Learn by building real-world applications through assignments, mini-projects, and industry-level capstone projects.
- **AI-Assisted Development Training** : Master modern AI tools such as ChatGPT, Cursor AI, GitHub Copilot, Claude AI, and OpenAI APIs to accelerate software development.
- **Real-World Industry Projects** : Gain practical experience by developing production-ready applications including E-Commerce, LMS, AI Chatbots, and Enterprise Dashboards.
- **Job-Focused Training Approach** : Curriculum designed to make learners industry-ready with practical skills that employers actively seek.
- **End-to-End Development Experience** : Learn Frontend, Backend, Database Management, Authentication, API Development, AI Integration, and Cloud Deployment in a single program.
- **Portfolio & GitHub Development** : Build an impressive portfolio with live projects and a professional GitHub profile to showcase your skills.
- **Expert Mentor-Led Sessions** : Learn directly from experienced industry professionals through interactive live sessions and personalized guidance.
- **Interview & Career Preparation** : Comprehensive support for technical interviews, resume building, LinkedIn optimization, and career development.
- **Project Certification** : Complete a production-level AI-powered MERN application and earn an industry-recognized certification.
- **Future-Ready Skill Set** : Stay ahead in the evolving technology landscape by combining Full Stack Development with Artificial Intelligence and modern engineering practices.