

Full-Stack Web Development

MERN Stack

Module 1: Introduction to Programming and Web Technologies

HTML/CSS

- Basics: Elements, Attributes, Headings, Paragraphs, Lists
- CSS Fundamentals: Selectors, Properties, Values
- Layouts: Flexbox, Grid
- Responsive Design: Media Queries

JavaScript Basics

- Variables, Data Types
- Control Structures: Loops, Conditionals
- Functions, Scope
- Arrays, Objects

Module 2: Front-End Development

Advanced JavaScript

- ES6+ Features: Arrow Functions, Destructuring, Spread/Rest Operator
- Asynchronous Programming: Callbacks, Promises, Async/Await
- DOM Manipulation: Selectors, Events, Dynamic Content

Introduction to React

- JSX, Components, Props
- State Management: useState, useEffect
- Component Lifecycle
- Routing with React Router

Advanced React

- Context API for State Management
- Hooks: Custom Hooks, useReducer, useMemo, useRef
- Higher-Order Components
- Testing with Jest and React Testing Library

Module 3: Back-End Development

Node.js Basics

- Node.js Setup
- Modules, NPM
- File System, Streams
- Event Loop, Async Programming in Node

Express.js

- Routing, Middleware
- RESTful APIs
- Error Handling
- Authentication & Authorization

MongoDB and Mongoose

- MongoDB Basics: Collections, Documents
- CRUD Operations
- Mongoose for Object Data Modeling
- Data Validation, Aggregation

Module 4: Full-Stack Development

Building a MERN Application

- API Design and Integration
- Front-end and Back-end Communication
- User Authentication: JWT, OAuth
- State Management with Redux or MobX (Optional)

TypeScript

- Basic Types, Interfaces
- Generics, Enums
- Modules, Namespaces
- Migrating a JavaScript Project to TypeScript

Module 5: Advanced Topics and Best Practices

Performance Optimization

- Code Splitting, Lazy Loading
- Database Indexing
- Caching Strategies
- SEO Best Practices

DevOps and Deployment

- Version Control with Git
- Docker Basics
- CI/CD Pipelines
- Deployment to Cloud Providers: AWS, Heroku
- Additional: Deployment to Netlify

Module 6: Practical Sections and Real-Time Projects

Practical Exercises

- Building a To-Do List

- Creating a Blog Platform
- Developing a Chat Application

Real-Time Projects

- E-commerce Platform
- Social Media Dashboard
- Real-Time Notification System

Module 7: Project Management and Workflow

Version Control with Git

- Branching Strategies
- Code Reviews
- Merge and Rebase

Agile and Scrum Basics

- User Stories
- Sprints
- Stand-ups, Retrospectives

Documentation

- Code Comments
- README files
- API Documentation

Module 8: Debugging and Monitoring

Debugging Techniques

- Browser DevTools
- Debugging in IDE
- Logging and Error Tracking

Monitoring and Analytics

- Google Analytics for User Behaviour
- Server Monitoring Tools like New Relic or Datadog
- Error Reporting Services like Sentry

Module 9: Maintenance and Scaling

Database Scaling

- Sharding
- Replication
- Caching

Application Scaling

- Load Balancers
- Microservices Architecture

Maintenance

- Regular Updates
- Database Backups
- Security Audits

Module 10: Assessments and Certifications

Assessments

- Quizzes after each module
- Mid-term project evaluation
- Final project evaluation

Certifications

- Complete online exams for JavaScript, React, Node.js, and MongoDB
- Obtain course completion certificates