

MERN STACK DEVELOPMENT

Module 1: Foundation in Web Development

- **HTML5:**
 - Structure of an HTML document
 - Elements, attributes, and tags
 - Semantic HTML
 - Forms and input types
 - Responsive design basics
- **CSS3:**
 - Introduction to CSS
 - Selectors, properties, and values
 - Box model
 - Flexbox and Grid layout
 - Responsive design with CSS media queries
 - CSS preprocessors (Sass/Less - optional)
- **JavaScript:**
 - Core concepts (variables, data types, operators, control flow)
 - Functions, arrays, objects
 - DOM manipulation
 - Event handling
 - Asynchronous programming (callbacks, promises, async/await)
 - Introduction to ES6 features

Module 2: Node.js and Express.js

- **Node.js:**
 - Introduction to Node.js and its event-driven architecture
 - Core modules (fs, path, http, etc.)
 - NPM and package management
 - Node.js modules and require
 - Debugging Node.js applications
- **Express.js:**
 - Introduction to Express.js
 - Routing and middleware
 - Request and response objects
 - Templating engines (EJS, Pug)
 - Error handling
 - Building RESTful APIs
 - Middleware for authentication and authorization (optional)

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Module 3: MongoDB

- **Introduction to MongoDB:**
 - NoSQL databases vs. relational databases
 - MongoDB architecture and features
 - MongoDB installation and connection
 - CRUD operations (Create, Read, Update, Delete)
 - Data modeling with MongoDB
 - Indexing and query optimization
 - Aggregation pipeline
 - MongoDB Atlas (cloud-based MongoDB)

Module 4: React.js

- **Introduction to React:**
 - Components and JSX
 - State and props
 - Lifecycle methods
 - Conditional rendering and lists
 - Forms and user input
 - Event handling
 - Routing with React Router
 - State management with Redux (optional)
 - Advanced React topics (hooks, context API, performance optimization)

Module 5: Building Full-Stack Applications

- **Integrating MERN stack:**
 - Connecting React frontend with Node.js backend
 - Building RESTful APIs with Express.js
 - MongoDB database integration
 - User authentication and authorization
 - Deployment (Heroku, AWS, Netlify)
- **Project-based learning:**
 - Building real-world applications
 - Collaboration and version control (Git)
 - Testing and debugging
 - Deployment and hosting
 - Continuous integration and continuous delivery (CI/CD)

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Additional Topics (Optional)

- **TypeScript:**
 - Introduction to TypeScript
 - Type safety and benefits
 - Migrating JavaScript code to TypeScript
- **WebSockets:**
 - Real-time communication
 - Building chat applications
- **GraphQL:**
 - Introduction to GraphQL
 - Building GraphQL APIs with Node.js and Apollo Server
- **Mongoose:**
 - Object modeling with Mongoose
 - Schema design and validation
- **Security:**
 - Protecting web applications
 - Authentication and authorization
 - Input validation and sanitization
 - SQL injection and cross-site scripting (XSS) prevention

Course Delivery Methods

- **Lectures:** Theoretical concepts and explanations
- **Hands-on exercises:** Practical coding assignments
- **Projects:** Building real-world applications
- **Code reviews:** Feedback on student code
- **Q&A sessions:** Addressing student questions

Assessment Methods

- Assignments and quizzes
- Projects
- Practical exams
- Code reviews