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**SESSION
2024-2025**



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MERN STACK COURSE

CERTIFICATE COURSE

DURATION

ONLINE : 03 MONTHS

OFFLINE : 06 MONTHS

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MERN STACK

Introduction to Web Development and JavaScript Basics

- Overview of Web Development and Frontend vs Backend
- Introduction to JavaScript, ES6+ features
- Understanding Variables, Data Types, Operators, and Expressions
- Control Structures (Loops, If-Else, Switch Case)
- Functions, Arrow Functions, and Callbacks
- Understanding Scope, Hoisting, Closures, and the "this" keyword
- Arrays, Objects, and their Methods
- Error Handling and Debugging

Frontend Development with React.js

- Introduction to React.js and JSX Syntax
- Components (Functional vs Class-based Components)
- Props, State, and Lifecycle Methods
- Event Handling in React
- React Router for Navigation
- Forms and Controlled Components
- Conditional Rendering and Lists in React
- Hooks: useState, useEffect, useContext
- Context API for State Management
- Advanced React Concepts: Error Boundaries, Suspense, and Lazy Loading
- Working with External APIs using Fetch and Axios
- Styling in React: CSS, Styled Components, Material-UI

Backend Development with Node.js and Express.js

- Introduction to Node.js and Asynchronous Programming
- File System, Buffers, Streams, and Event Loop in Node.js
- Introduction to Express.js and Setting up a Basic Server
- Routing, Middleware, and Error Handling in Express
- RESTful APIs and HTTP Methods
- Authentication and Authorization (JWT, OAuth)
- Connecting with MongoDB using Mongoose
- Validation and Data Sanitization
- Error Handling in Backend
- Testing Backend with Mocha, Chai, and Supertest
- Creating and Managing APIs (CRUD operations)

Database Management with MongoDB

- Introduction to NoSQL and MongoDB
- MongoDB Architecture and Data Models
- CRUD Operations in MongoDB (Create, Read, Update, Delete)
- Indexing, Aggregation, and Query Optimization
- Relationships in MongoDB (Embedded vs Referenced Documents)
- MongoDB Aggregation Framework and Pipelines
- Mongoose for Object Data Modeling
- Data Validation and Schema Design
- Data Security in MongoDB

Full Stack Integration (Frontend + Backend)

- Connecting React.js Frontend with Node.js Backend
- Axios for API Calls from Frontend to Backend
- Authentication with JWT: Login, Signup, and User Sessions
- Deploying Full Stack Applications on Heroku, Netlify, and Vercel
- Handling Forms and File Uploads
- Real-time Applications using WebSockets (Socket.io)
- State Management with Redux (for large-scale apps)
- Unit Testing for React with Jest and Enzyme
- Environment Variables and Configuration Management

Advanced Topics in MERN Stack

- Server-Side Rendering (SSR) with Next.js
- Progressive Web Apps (PWA) with React
- Microservices Architecture with Node.js
- GraphQL vs REST APIs: Setting up GraphQL with Apollo Server
- Optimizing MERN Stack Performance
- Caching Mechanisms (Redis)
- Payment Gateway Integration (Stripe/PayPal)
- Deployment using Docker, Kubernetes
- Continuous Integration/Continuous Deployment (CI/CD)
- Using Git and GitHub for Version Control

INTERVIEW PREPARATION

- Common MERN Stack Interview Questions (Frontend + Backend)
- Problem-Solving with Data Structures and Algorithms
- System Design Principles and Architecture
- Mock Interviews and Real-World Problem Simulations
- Understanding of Core Web Technologies (HTML, CSS, JavaScript)
- Node.js Interview Focus: Asynchronous Programming, Event Loop
- JavaScript Concepts: Closure, Event Bubbling, Prototypes, Hoisting
- Debugging and Troubleshooting Skills
- Optimization Techniques for Frontend and Backend
- Testing (Unit Testing, Integration Testing)
- Portfolio Development: Building Projects for Showcase
- Best Practices for Clean Code and Code Reviews

