

MERN Stack (Backend → Frontend) Roadmap Syllabus

Phase 1: JavaScript Fundamentals (2–3 Classes)

 **Goal:** Build strong JS logic before exploring frameworks

Topics Covered

1. Core Concepts

- Variables (let, const, var)
- Data Types and Type Conversion
- Operators and Expressions
- Conditional Statements (if, else, switch)
- Loops (for, while, for...of, for...in)

2. Functions and Scope

- Function Declarations and Expressions
- Arrow Functions
- Parameters, Arguments, and Return Values
- Scope and Hoisting
- Closures and Lexical Environment

3. Arrays and Objects

- Array Methods (map, filter, reduce, forEach, find)
- Object Manipulation and Destructuring
- Spread and Rest Operators
- JSON and Data Structures

4. DOM Manipulation (Intro)

- Selecting and Modifying Elements
- Event Listeners
- Basic Form Handling

5. ES6+ Features

- Template Literals
- Modules (import/export)
- Promises and Async/Await
- Default Parameters

6. Error Handling and Debugging

- try...catch
- Console Tools and Debugging Techniques

Mini Projects

- Calculator App
 - To-Do List (Local Storage)
 - Simple Quiz App
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Phase 2: Node.js & Express.js (4–5 Classes)

 **Goal:** Learn backend fundamentals and REST API development

Topics Covered

1. **Introduction to Node.js**
 - What is Node.js and NPM
 - Modules and Package Management
 - File System and Path Modules
2. **Express.js Basics**
 - Setting up a Server
 - Routing and Middleware
 - Handling Requests and Responses
3. **RESTful APIs**
 - CRUD Operations
 - Route Parameters and Query Strings
 - Postman Testing
4. **Data Handling**
 - Working with JSON
 - Environment Variables (dotenv)
5. **Error Handling & Validation**
 - Custom Error Middleware
 - Input Validation with express-validator

Mini Projects

- REST API for Notes App
 - Basic Authentication API
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Phase 3: MongoDB & Mongoose (3–4 Classes)

 **Goal:** Learn database design and integration with Node.js

Topics Covered

1. **MongoDB Basics**
 - Collections, Documents, and CRUD Operations
 - MongoDB Compass Overview
2. **Mongoose ODM**
 - Schema and Models
 - CRUD with Mongoose
 - Relationships and Population
3. **Advanced Topics**
 - Indexing and Query Optimization
 - Aggregation Framework

🧩 Mini Projects

- User Management API
 - Blog API with MongoDB
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📅 Phase 4: React.js (5–6 Classes)

🧠 **Goal: Build dynamic frontend applications**

Topics Covered

1. **React Fundamentals**
 - Components and Props
 - JSX and Rendering
 - State and Lifecycle
2. **Hooks and State Management**
 - useState, useEffect, useContext
 - Custom Hooks
3. **Routing and Navigation**
 - React Router
 - Dynamic Routes
4. **API Integration**
 - Fetching Data from Backend
 - Handling Loading and Errors
5. **Advanced Concepts**
 - Context API
 - Performance Optimization
 - Component Reusability

🧩 Mini Projects

- Weather App
 - Blog Frontend
 - E-commerce Product Listing
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📅 Phase 5: Full MERN Integration (4–5 Classes)

🧠 **Goal: Connect frontend and backend into a full-stack application**

Topics Covered

1. **Connecting React with Node.js API**
 - Axios and Fetch Integration
 - CORS Setup
2. **Authentication & Authorization**
 - JWT Tokens

- Protected Routes

3. Deployment

- Environment Setup for Production
- Hosting on Render/Vercel
- MongoDB Atlas Integration

Final Project

- Full MERN Stack Application (e.g., Task Manager, Blog, or E-commerce App)
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Bonus Phase: Advanced Topics (Optional)

- Redux Toolkit
 - TypeScript with React
 - Socket.io (Real-time Communication)
 - Testing with Jest and Supertest
 - CI/CD Basics
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Outcome

By the end of this roadmap, learners will be able to:

- Build RESTful APIs using Node.js, Express, and MongoDB
- Develop dynamic frontend applications with React
- Integrate backend and frontend into a complete MERN stack project
- Deploy full-stack applications to production environments