

# 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

## 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