Node.js Backend Development Course Curriculum

Duration: 12–14 Weeks
Level: Beginner to Advanced
Delivery: Self-paced / Instructor-led
Primary Stack: Node.js, Express.js, MongoDB, PostgreSQL (optional), JWT, Docker

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MODULE 1: Fundamentals of Backend Development

Week 1: Introduction to Backend & Web Architecture

- Client-server model overview
- HTTP & HTTPS basics
- RESTful architecture introduction
- Backend responsibilities in web applications
- Install Node.js, npm, VS Code, and Postman
- Create a basic HTTP server with Node.js

MODULE 2: JavaScript for Backend Development

Week 2: JavaScript Essentials (ES6+)

- Variables, functions, arrays, objects
- Control structures and loops
- Modern JavaScript features: destructuring, spread, rest
- Asynchronous JS: callbacks, promises, async/await
- Build a CLI To-Do App using Node.js

MODULE 3: Core Node.js Concepts

Week 3: Node.js In-Depth

- Node.js runtime and architecture
- Event loop, buffers, and streams
- Core modules: fs, path, http, events
- Event-driven programming in Node.js

Week 4: NPM & Module System

- Using npm: init, install, uninstall
- Semantic versioning

- Working with CommonJS and ES modules
- Using packages: dotenv, chalk, axios, uuid

MODULE 4: Express.js & Building RESTful APIs

Week 5: Express.js Basics

- Creating an Express server
- Handling HTTP methods (GET, POST, etc.)
- Middleware functions
- Serving static files and basic error handling

Week 6: CRUD with REST API

- RESTful design principles
- Route parameters and query strings
- Error handling and status codes
- Modularizing routes and controllers
- Create a To-Do or Notes API

MODULE 5: Working with Databases

Week 7: MongoDB and Mongoose

- NoSQL vs SQL overview
- MongoDB Atlas setup
- CRUD operations using Mongoose
- Schema definitions, validation, and relationships
- Build a blog post API

Week 8: (Optional) PostgreSQL with Node.js

- SQL basics: tables, queries, joins
- Setup PostgreSQL and connect using pg/sequelize
- Model creation and migrations
- Simple CRUD API with PostgreSQL

MODULE 6: Authentication and Security

Week 9: User Authentication

- Authentication vs Authorization
- Password hashing using bcrypt
- Token-based authentication with JWT
- Protected routes and middleware

Week 10: Web Security Fundamentals

- Securing HTTP headers with helmet
- Enabling CORS
- Preventing XSS, CSRF, injection attacks
- Implementing rate limiting

MODULE 7: Advanced Features & DevOps

Week 11: Production-Ready Features

- File uploads using multer
- Search, filters, and pagination
- Scheduled tasks with node-cron
- Sending emails using nodemailer

Week 12: Testing & Documentation

- Testing with Jest, Mocha, Chai, Supertest
- Writing unit and integration tests
- Documenting APIs with Swagger/Postman

MODULE 8: Deployment & Final Project

Week 13: Deployment and DevOps

- Managing environment variables
- Using Git & GitHub
- Deploying to Render, Railway, Vercel, or Netlify
- Introduction to Docker and containerization

Week 14: Capstone Project

- Final full-featured backend application
- Example ideas:
    - E-commerce backend
    - Chat application backend with Socket.IO
    - Learning management system API
- Include GitHub repo, API docs, and deployment

Optional Bonus Topics

- Real-time APIs using WebSockets
- GraphQL API development
- Microservices and event-driven systems
- Docker for Node.js applications

- Message Queues (RabbitMQ, BullMQ)

Course Outcome

By completing this course, learners will: - Build and document robust RESTful APIs - Work with MongoDB and PostgreSQL - Implement user authentication a nd security best practices - Test and deploy Node.js applications - Manage pro duction-level backend systems

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Additional Resources

- GitHub starter projects
- Postman collections
- Slides and reading materials
- Weekly coding assignments
- Peer code reviews (optional for cohort-based)