Node.js + Express + MongoDB

# Module 1: Introduction to Node.js

* What is Node.js, where it is used
* Node.js architecture (event loop, async I/O)
* Installing Node.js & npm
* Running first Node.js program
* REPL basics
* Hands-on: Hello World, CLI script

# Module 2: Node.js Fundamentals

* Core modules: fs, path, os, http, events
* Asynchronous programming (callbacks, promises, async/await)
* Module system: CommonJS & ES modules
* Error handling in Node.js
* Hands-on: File server, EventEmitter example

# Module 3: Express.js Basics

* Introduction to Express
* Middleware (built-in, third-party, custom)
* Routing (GET, POST, PUT, DELETE)
* Serving static files
* Handling forms & JSON
* Hands-on: Build REST endpoints

# Module 4: REST API Development

* REST principles
* Express Router
* Route params & query strings
* Error handling middleware
* Logging with morgan
* CORS setup
* Hands-on: Build CRUD APIs for a resource

# Module 5: MongoDB Basics

* NoSQL vs SQL
* Collections, documents, BSON
* CRUD operations in Mongo shell
* Query operators, indexing basics
* Hands-on: Insert/update/find/delete docs

# Module 6: MongoDB with Node.js

* Native MongoDB driver usage
* Connecting Node.js to MongoDB
* Performing CRUD operations
* Hands-on: CRUD app with driver

# Module 7: Mongoose ODM

* Schema & model definition
* Schema validation
* Pre/post hooks
* Virtuals
* Relationships & population
* Hands-on: User/Product schema + relationships

# Module 8: Authentication & Authorization

* JWT (JSON Web Token) auth
* Password hashing (bcrypt)
* Refresh tokens
* Role-based access control (RBAC)
* Hands-on: Login/register APIs with JWT

# Module 9: Email Notifications

* Nodemailer setup
* SMTP & transactional emails
* Templating emails (Handlebars, EJS)
* Sending account verification & password reset emails
* Hands-on: Send email on user signup

# Module 10: Unit & Integration Testing

* Intro to testing in Node.js
* Mocha / Jest basics
* Supertest for API testing
* Test-driven development (TDD) basics
* Writing integration tests with mock DB
* Hands-on: Write tests for User API

# Module 11: Code Quality & Linting

* ESLint setup
* Prettier for formatting
* Code coverage with nyc or Jest
* Hands-on: Add lint + formatter to project

# Module 12: Payment Gateway Integration

* Payment basics (cards, wallets, UPI)
* Stripe API or Razorpay integration
* Secure payment flow
* Handling webhooks for transactions
* Hands-on: Checkout flow with Stripe/Razorpay

# Module 13: Real-time Communication

* Introduction to WebSockets
* Socket.IO with Express
* Broadcasting events
* Building chat/notification features
* Hands-on: Real-time chat with Socket.IO

# Module 14: Redis & Caching

* Introduction to Redis
* Connecting Node.js with Redis
* Session management with Redis
* Caching API responses
* Pub/Sub with Redis
* Hands-on: Cache API response in Redis

# Module 15: API Documentation & Swagger

* OpenAPI specification
* Swagger UI setup with Express
* Auto-generating docs from code
* Versioning APIs
* Hands-on: Document APIs with Swagger

# Module 16: Advanced Topics

* File uploads with Multer
* Async error handling (express-async-handler)
* Pagination & filtering
* Environment variables with dotenv
* Deployment (Heroku, Render, Vercel, AWS)
* Hands-on: Deploy app with MongoDB Atlas

# Module 17: Capstone Project

* Full-stack production-grade backend with:
* User authentication (JWT)
* Role-based APIs
* Email verification & password reset
* Real-time notifications (Socket.IO)
* Payment gateway integration (Stripe/Razorpay)
* Redis caching
* Swagger API docs
* Testing (unit + integration)
* Linting