



**Note:** *This course outline and schedule are tentative and may be adjusted by the instructor depending on class progress and circumstances.*

# Back-end Web Development Course Outline

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## Course Details

Course Type: [Diploma](#)

Course Duration: [6 months](#)

Class Frequency: [3 classes/week, 2 hours each](#)

Mode of Delivery: [On-Campus](#)

## Course Objectives

- Build foundational knowledge in server-side development using Node.js.
- Understand Express framework to develop scalable APIs.
- Learn database concepts using MongoDB.
- Build and customize CMS platforms using WordPress.
- Develop a complete e-commerce store and deploy it.
- Capstone project covering full MERN stack.

## Week-wise Course Plan

Week	Topics Covered	Learning Objectives	Activities / Assignments
1	<b>Introduction to Server-Side Programming</b>  What is Backend?  Frontend vs Backend, HTTP  Client-Server Architecture	Understand backend purpose, web structure, HTTP basics	Diagram activity, browser-inspector intro

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2	<b>Setting up Node.js Environment</b>  Installing Node.js, VS Code  REPL & Writing JS in Node  Creating Local Server (HTTP Module)	Local setup and backend runtime familiarity	Hello World server, CLI test
3	<b>Core Modules in Node.js</b>  fs module  path & os modules  Creating CLI with core modules	Learn internal Node functionality	Mini CLI file manager project
4	<b>Asynchronous Programming</b>  Callback functions  Promises in Node  Async/Await usage	Handle async tasks in backend	Async API simulation
5	<b>NPM &amp; Package Management</b>  package.json & scripts  Installing dependencies  CLI app using external packages	Manage and use Node packages	Build chalk/moment-based CLI app
6	<b>Intro to Express.js</b>  Installing Express  Basic Routing & Server  Middleware concepts	Setup Express server	Multiple route Express app

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7	<b>RESTful API Design</b>  REST principles CRUD structure Student Record API	Understand RESTful backend	CRUD API project
8	<b>Code Structuring with MVC</b>  Folder structure Separating Routes/Controllers Connecting to server.js	Clean modular backend design	Refactor previous CRUD project
9	<b>Error Handling &amp; Custom Middleware</b>  Central error handler Route-based validation Try/catch + error messages	Handling failure safely	Build global error handler
10	<b>Database Concepts + MongoDB</b>  SQL vs NoSQL Intro to MongoDB Atlas Compass/Mongo Shell setup	Learn NoSQL schema and usage	Connect Mongo locally and remotely
11	<b>MongoDB CRUD Operations</b>  Create/Read operations Update/Delete operations Mongo shell/Compass hands-on	Perform basic database functions	Build product list manually

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12	<b>Mongoose ODM Integration</b>  Schema design Models & validations Relationship with populate	Understand structure and DB logic	Blog (user/posts) model implementation
13	<b>CRUD using Express &amp; Mongoose</b>  API POST/GET API PUT/DELETE Validate + Save to DB	Complete API logic cycle	Build Task Manager backend
14	<b>Authentication with JWT</b>  Signup/Login logic Token generation Auth Middleware	Secure access to routes	Login-protected API routes
15	<b>Authorization &amp; Roles</b>  Role setup (admin/user) Role validation middleware Admin-only CRUD example	Role-based system understanding	Protect specific routes
16	<b>File Uploads with Multer</b>  Single image upload Multiple files Store path in DB	Handle media and input files	Profile image upload feature
17	<b>Advanced Query</b>	Make large datasets	Product list API

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	<b>Features</b> Pagination logic Filtering via query Sorting & Search	manageable	with filters
18	<b>Postman API Testing</b> Create collection Auth + route testing Upload & filter test	Use Postman as test suite	Finalize CRUD API with tests
19	<b>MERN Stack Introduction</b> Stack breakdown Setup backend + React Project folder structure	Understand full-stack flow	MERN starter scaffold
20	<b>React Essentials</b> Components & JSX Props/State basics Hooks intro	React UI building	Build dashboard layout
21	<b>React + Backend Integration</b> Axios fetch Handling forms Show fetched data	React state with API	Form submission to DB
22	<b>WordPress CMS Basics</b> Install LocalWP Dashboard/Pages/Posts	CMS content understanding	Personal Blog in WP

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	Plugins/Themes setup		
23	<b>Site Customization in WP</b>  Menus/Widgets Plugins (SEO/contact) Site structure planning	Customize site for usability	Create 5-page portfolio layout
24	<b>WooCommerce for WP</b>  Install & configure Add products Orders & categories	Setup basic e-store	Demo 5-product eCommerce site
25	<b>Payment Gateway &amp; Checkout</b>  PayPal/Stripe config Shipping + taxes Cart/Checkout flow	Real purchase system	Simulate transaction flow
26	<b>Deploy WP to cPanel</b>  Export/import DB FTP upload Connect domain	Go live with website	Deploy portfolio/store
27	<b>Capstone Planning</b>  Feature list Database design Wireframes	Plan complete app	Trello setup, Figma UI
28	<b>Advanced Authentication</b>  Reset Password via Email	Implement complete auth lifecycle	Build secure auth API with nodemailer

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	Account Activation Links  Refresh Tokens & Expiry		
29	<b>Security &amp; Optimization</b>  Rate Limiting & Helmet  Data Sanitization  Preventing NoSQL Injection & XSS	Secure APIs against real-world attacks	Add middleware to secure app
30	<b>Testing &amp; Deployment</b>  Unit testing (Jest)  API testing with Supertest  Deploy MERN app (Render + Vercel)	Understand and test full-stack app	Test + deploy capstone project
31	<b>Database Indexing &amp; Performance</b>  Indexing in MongoDB  Aggregation Pipeline  Performance Best Practices	Optimize DB performance	Add indexes, run aggregations
32	<b>Project Debugging &amp; QA</b>  Final Code QA  Class 2: Project Review  Code Cleanup & GitHub Push	Final polish before handover	Bug-fixing and project submission

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## **Assessment Structure**

<i>Component</i>	<i>Weightage</i>
Class Participation	20%
Assignments	30%
Final Project / Exam	50%

## **Final Project**

Full CRUD-based MERN Stack Management Web App

- Role-based login (JWT)
- Product/Order/User management
- File uploads (images/docs)
- Admin dashboard
- Deployed frontend and backend (Render, Vercel, MongoDB Atlas)

## **Recommended Resources**

- Node.js Documentation (<https://nodejs.org/en/learn/getting-started/introduction-to-nodejs>)
- Express Official Guide(<https://expressjs.com/en/starter/installing.html>)
- MongoDB University(<https://www.mongodb.com/docs/manual/introduction/>)
- WordPress.org Tutorials(<https://learn.wordpress.org/>)
- Tools: Postman, VS Code, LocalWP, GitHub, cPanel, XAMPP for Wordpress

## **Attendance Policy**

- 80 % Attendance is mandatory for certification.
- Late submissions may result in grade deductions.

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