

MERN STACK FULL STACK DEVELOPMENT

with TypeScript & Tailwind CSS

Industry-Ready Full-Stack Training for BTech Students | 45 Days | 60 Hours | Capstone Project

45 Days	60 Hours	6 Phases	1 Capstone
Duration	Live Training	Structured	Deployed Project

Program Overview

A 45-day, 60-hour industry-grade MERN Stack program covering TypeScript, Tailwind CSS, React, Node.js, Express, and MongoDB for BTech students.

Students progress from JavaScript/TypeScript fundamentals through full-stack development with REST APIs, JWT authentication, and Supabase integration.

The program concludes with a capstone project — a production-ready web application deployed on Vercel/Render — and includes interview preparation, Git/GitHub workflows, and modern DevOps basics.

45-Day Curriculum at a Glance

Phase 1: JavaScript & TypeScript Foundations		Days 1–7 10 hrs
ES6+ syntax: let/const, arrow functions, template literals • Destructuring, spread/rest, optional chaining • Promises, async/await, error handling • ES Modules: import/export		TypeScript: primitive types, arrays, tuples • Interfaces, type aliases, enums • Generics and utility types (Partial, Pick, Omit) • TypeScript strict mode and tsconfig.json
Phase 2: Tailwind CSS & UI Design		Days 8–14 10 hrs
Utility-first CSS philosophy • Tailwind v3 installation and configuration • Responsive design: breakpoints and mobile-first approach • Flexbox and Grid utilities		Dark mode with class strategy • Custom theme extension (colors, fonts, spacing) • Component patterns with @apply • Accessibility basics: ARIA roles, semantic HTML5
Phase 3: React 18 with TypeScript		Days 15–24 14 hrs
React 18 features: concurrent rendering, transitions • Functional components and JSX with TypeScript types • useState, useEffect, useRef, useCallback, useMemo • useContext and Context API for global state • useReducer for complex state		React Router v6: nested routes, loaders, actions • React Query (TanStack Query) for data fetching • React Hook Form + Zod for type-safe form validation • Component composition patterns and custom hooks
Phase 4: Node.js & Express REST API		Days 25–31 10 hrs
Node.js runtime: event loop, non-blocking I/O • npm/npmx ecosystem and package.json • Express.js application architecture • RESTful API design: routes, controllers, services • Middleware pipeline: logging, CORS, body-parser		JWT authentication: access tokens and refresh tokens • bcrypt password hashing • Role-based access control (RBAC) • Error handling middleware and HTTP status codes
Phase 5: MongoDB, Mongoose & Supabase		Days 32–37 8 hrs
MongoDB Atlas setup and collections • Mongoose schemas, models, and virtual fields • CRUD operations with Mongoose • Aggregation pipelines and indexing		Supabase: PostgreSQL as Backend-as-a-Service • Supabase Auth, Row Level Security (RLS) • Supabase Storage for file uploads • Environment variables and secrets management

Phase 6: Capstone Project & Deployment

Days 38–45 | 8 hrs

• Project: Full-stack Task Management App • Features: auth, dashboards, file uploads, real-time chat • Socket.io for real-time notifications • Frontend deployment on Vercel

• Backend deployment on Render • GitHub Actions CI/CD pipeline basics • Performance optimization and Lighthouse audit • Final presentation and code review

Tools & Technologies

VS Code + ESLint + Prettier	Git & GitHub (branching, PRs, code review)	Postman for API testing	MongoDB Atlas	Supabase	Vercel & Render (deployment)	Docker basics	Figma (UI mockup reading)
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Assessment & Outcomes

Assessment Strategy

- ✓ Weekly quizzes (5 quizzes)
- ✓ Mid-term mini-project on Day 22
- ✓ Peer code reviews
- ✓ Final capstone project on Day 45
- ✓ GitHub portfolio submission

Learning Outcomes

- ✓ Build and deploy production-ready MERN applications
- ✓ Write type-safe code with TypeScript
- ✓ Design responsive UIs with Tailwind CSS
- ✓ Implement secure REST APIs with JWT auth
- ✓ Use MongoDB and Supabase as databases
- ✓ Ready for full-stack internships and placements