Full-Stack MERN Curriculum (4-Months)

Course Objectives:

By the end of this program, learners will:

- Master full-stack development using MERN (MongoDB, Express, React, Node)
- Build scalable, real-world web applications
- Learn modern frontend using Next.js
- Understand DevOps practices and CI/CD pipelines using GitHub Actions
- Become job-ready with strong portfolio and industry exposure

Tech Stack & Tools :

- HTML, CSS, JavaScript (ES6+)
- React.js + Next.js
- Node.js + Express.js
- MongoDB (Atlas)
- Git & GitHub
- Postman
- Deployment (Vercel / Netlify)
- CI/CD (GitHub Actions)

Weekly Modules

Week 1: Programming Fundamentals – Basics

Objectives: Build strong foundation in programming and logic.

- Day 1: IT Industry overview, Full Stack architecture (real-world apps)
- Day 2: Programming basics, environment setup
- Day 3: Variables, data types
- Day 4: Operators, conditions (if/else)
- Day 5: Loops (for, while), pattern problems.

Assignment: Build a basic calculator and solve 15 logic problems on platfrorm like hacker rank or leet code.
Assessment: Quiz on fundamentals and code review of assignment.

Week 2: JavaScript Fundamentals (ES6+)

Objectives: Learn modern JavaScript syntax and logic.

- Day 1: Functions & scope
- Day 2: Arrays & operations

- Day 3: Objects & JSON
- Day 4: Problem-solving session
- Day 5: Mini Project (Calculator App)

Assignment: Array & object problems and Build CLI-based app

Assessment: Short coding challenge on ES6 features and debugging exercises in the browser console.

Week 3: Advanced JavaScript

Objectives: Master advanced JS and debugging

- Day 1: Scope & hoisting
- Day 2: String & array methods
- Day 3: Debugging techniques
- Day 4: Logic building
- Day 5: Mini Project (Quiz App)

Assignment: Build a quiz game and solve 20 problems .

Assessment: Logic Test and project review.

Week 4: HTML & Web Structure

Objectives: Understand web structure and semantics.

- Day 1: HTML basics
- Day 2: Forms & inputs
- Day 3: Tables & semantic tags
- Day 4: SEO & accessibility
- Day 5: Portfolio website

Assignment : Build portfolio page and create forms.

Assessment: HTML quiz and UI review.

Week 5: CSS & Responsive Design

Objectives: Create responsive UI.

- Day 1: CSS basics
- Day 2: Box model
- Day 3: Flexbox
- Day 4: Grid
- Day 5: Landing page

Assignment: Responsive layout and Navbar design.
Assessment: UI evaluation and css quiz.

Week 6: JavaScript DOM & APIs

Objectives: Make interactive web apps.

- Day 1: DOM manipulation
- Day 2: Events
- Day 3: Form validation
- Day 4: API calls (fetch)
- Day 5: To-Do App

Assignment: Dynamic UI and API integration.

Assessment: App review and JS quiz.

Week 7: Async JavaScript

Objectives: Handle asynchronous operations.

- Day 1: Promises
- Day 2: Async/Await
- Day 3: Error handling
- Day 4: Weather App
- Day 5: Debugging

Assignment: API-based app and error handling tasks
Assessment: Code review and Async Quiz.

Week 8: React Basics

Objectives: Build component-based UI.

- Day 1: React setup
- Day 2: Components & props
- Day 3: Hooks Basics
- Day 4: Hooks Advance
- Day 5: Blog UI

- *Assignment:* Build React components and State-based UI
- *Assessment:* React quiz and Project review

Week 9 -10: Backend Development (Node + Express)

Objectives: Build backend APIs.

Topics :

- Node.js fundamentals.
- Express routing & middleware
- REST APIs

- Authentication (JWT, bcrypt)
  Project: Auth system

Assignment: Create APIs and Implement login system
Assessment: API testing and Backend quiz

Week 11: Database (MongoDB)

Objectives: Manage data effectively.
Topics:

- MongoDB basics
- Schema design
- CRUD operations
- Project: User/Product system

Assignment: DB Integration and CRUD APIs.
Assessment: DB quiz and project review.

Week 12-13 : Full Stack Integration

Objectives: Connect frontend & backend.
Topics:

- API integration
- Authentication flow
- State handling
- Mini full stack project

Assignment: Build full stack app.
Assessment: Project overview and evaluation.

Week 14-15 : Advanced React + Major Project

Objectives: Build scalable applications.
Topics:

- State management
- Reusable components
- Performance optimization
- Deployment

Assignment: Major project.
Assessment: Code review and Performance check

Weeks 16–17: Capstone Project Sprints

Objectives: Apply all learned skills in a real-world MERN project.
- **Sprint Execution :** Teams work on building features in 2-week sprints. Hold brief daily stand-ups, update a Kanban board (e.g. GitHub Projects). Integrate continuous feedback.
- **Midpoint Review :** Each team demos functionality to class/instructor. Conduct a short retrospective: what went well, what to improve next sprint.
- **Final Development :** Complete remaining features, polish UI/UX, fix bugs. Merge final code and deploy updated versions.
- **Final Presentation :** Each team presents the project (demo site link, code repo). Cover architecture, feature list, challenges, and future work.

Weeks 18: Job Preparation.

Objectives: Get job-ready.

Topics:

- Resume building
- GitHub portfolio
- Mock interviews

Weeks 18: Next.js + DevOps + CI/CD.

Objectives: Modern full-stack + deployment skills

Topics:

- Next.js fundamentals (SSR, routing)
- API routes & data fetching
- DevOps lifecycle
- CI/CD pipelines using GitHub Actions
- Automated deployment

Assignment:

- Deploy full stack app with CI/CD.

Assessment:

- Deployment demo
- Pipeline evaluation

Learning Outcomes & Career Readiness

By completion, learners will be able to design, build, and deploy full-stack applications. They will:

- **Implement Security:** Use JWT authentication, password hashing, and role-based access control to secure applications.
- **Use Modern Tools:** Debug and test applications, manage code with Git/GitHub, and set up CI/CD pipelines using GitHub Actions.
- **Collaborate Effectively:** Work in teams using Agile practices, GitHub workflows, and code reviews.
- **Deployment & DevOps:** Deploy applications on platforms like Vercel/Netlify and manage production-ready environments.