

TRN-301 Full Stack Web Application Development with MERN Stack

Course Duration: 8 Weeks

Instructor: Memby Poudel (MERN Stack Developer, Clove IT)

Location: Clove IT, Mahendra Chowk, Biratnagar

Class Days: All Weekdays (Sunday - Friday)

Course Objective: To equip students with practical skills in full-stack web application development using the MERN stack through hands-on projects.

Week 1: Introduction to Full Stack Development and Project Setup

Objectives:

- Understand full stack development concepts
- Set up the development environment
- Create the initial project structure for both frontend and backend

Topics:

- Introduction to Full Stack Development
 - Overview of Node.js, Express.js, MongoDB, React
- Setting up the development environment
 - Installing Node.js, npm
 - Setting up Express.js backend
 - Connecting MongoDB with Node.js
 - Initializing React app (Create React App or Vite)
- Project structure & initial setup
 - Basic Express.js server setup
 - File and folder structure

Activities:

- Set up Node.js, npm, MongoDB

- Develop a simple "Hello World" backend with Express

Assignment:

- Read about MERN stack basics
- Draft basic API endpoints for a Library Management System (LMS)

Week 2: Express.js Fundamentals and API Development

Objectives:

- Understand Express.js fundamentals
- Develop basic CRUD APIs

Topics:

- Express.js Fundamentals
 - Routing
 - Middleware
 - Basic CRUD APIs

Activities:

- Create API routes in Express
- Implement CRUD operations for books and users

Assignment:

- Expand backend with additional CRUD endpoints for LMS

Week 3: MongoDB Integration and Advanced Express.js

Objectives:

- Integrate MongoDB with Express.js
- Enhance Express backend with advanced features

Topics:

- MongoDB Integration
 - MongoDB Atlas setup
 - Mongoose ODM
 - Schema definition and data manipulation for books, users, and loans
- Advanced Express.js Features
 - Middleware for authentication
 - Error handling middleware

Activities:

- Configure MongoDB connection using Mongoose
- Add authentication and error-handling middleware in Express

Assignment:

- Practice database operations with Mongoose
- Implement authentication middleware in backend APIs

Week 4: React Basics and Component Development**Objectives:**

- Learn React basics and component development

Topics:

- React Basics
 - JSX
 - Components, Props, and State
 - Functional components and Hooks

Activities:

- Develop fundamental React components
- Implement interactive components using hooks

Assignment:

- Build interactive React components for LMS user interfaces

Week 5: State Management and Frontend-Backend Integration

Objectives:

- Manage React state with Context API
- Integrate React frontend with Express backend

Topics:

- State Management in React
 - Context API
 - useState, useEffect
- Frontend-Backend Integration
 - Fetching data using Axios
 - Handling async operations

Activities:

- Implement Context API for global state management
- Fetch data from backend and display dynamically

Assignment:

- Create reusable API service layer
- Add error handling and validation

Week 6: Forms and User Input Handling

Objectives:

- Handle forms and user input in React
- Validate and process form data in Express

Topics:

- React Form Handling
 - Controlled components
 - Form validation
- Data Validation in Express
 - Using Joi or express-validator

Activities:

- Build forms for adding/editing books, users, and loans
- Implement frontend and backend validation

Assignment:

- Enhance forms with detailed validation rules
- Practice backend validation with Joi/express-validator

Weeks 7 & 8: Student Project**Objectives:**

- Independently develop a comprehensive project* using learned concepts

Topics:

- Project* planning and setup
- Independent development

Activities:

- Define features and UI components for project*

- Develop project using MERN stack
- Implement comprehensive API functionality for project*

Assignment:

- Finalize the project*
- Review feedback and make adjustments