MERN ACADEMY

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MERN Stack Development + AI Vibe Coding: A Placement-Oriented Course

This 6-month, placement-oriented course is designed for beginner and junior developers who want to master MERN stack development with an emphasis on integrating AI tools for efficient project creation. The curriculum focuses on developing projects with less effort by leveraging AI for core logic development.

Course Overview

- **Duration:** 6 Months
- **Target Audience:** Beginner and Junior Developers
- **Focus:** Full Stack MERN Development + AI Tools for Rapid Development
- **Outcome:** Placement-Oriented

Weekly Course Structure

Month 1: Frontend Fundamentals (HTML, CSS, JavaScript)

Week 1: Introduction to Web Development & HTML
- **Topics:**
    - What is Web Development? Frontend vs. Backend
    - Introduction to HTML5: Structure, Elements, Attributes
    - Basic HTML Tags: Headings, Paragraphs, Links, Images
    - Semantic HTML and Best SEO practices
- **Project Points:**
    - Create a static personal portfolio page with basic HTML.

Week 2: Styling with CSS3

- **Topics:**
  - Introduction to CSS3: Selectors, Properties, Values, Animations
  - Box Model, Display Properties, Positioning
  - Flexbox for Layout
  - Responsive Design Basics
- **Project Points:**
  - Style the personal portfolio and zomato landing page using CSS3, making it responsive for different screen sizes.

Week 3: JavaScript Core Concepts

- **Topics:**
  - Introduction to JavaScript: Variables, Data Types, Operators
  - Control Flow: Conditional Statements, Loops
  - Functions: Declaration, Expression, Arrow Functions
  - DOM Manipulation
- **Project Points:**
  - Add interactive elements to the portfolio and zomato landing page using JavaScript (e.g., a simple contact form validation).

Week 4: Advanced JavaScript & ES6+ Features

- **Topics:**
  - Arrays and Objects
  - Higher-Order Functions: map, filter, reduce
  - Asynchronous JavaScript: Callbacks, Promises, Async/Await
  - ES6+ Features: Let, Const, Template Literals, Destructuring
- **Project Points:**
  - Develop a small interactive game or a To-Do list application using advanced JavaScript.

Month 2: React.js Fundamentals

Week 5: Introduction to React.js

- **Topics:**
  - What is React? Component-Based Architecture
  - Setting up a React Project (Create React App)
  - JSX Syntax
  - Components: Functional vs. Class Components
- **Project Points:**
  - Rebuild the To-Do list and Zomato, Ola application using React components.

Week 6: State and Props

- **Topics:**
  - Managing Component State with `useState` Hook
  - Passing Data with Props
  - Event Handling in React
  - Conditional Rendering
- **Project Points:**
  - Enhance the React To-Do list with state management for adding, deleting, and marking tasks as complete.

Week 7: Lifecycle Methods & Hooks

- **Topics:**
  - Component Lifecycle (for class components)
  - `useEffect` Hook for Side Effects
  - Custom Hooks
  - Context API for Global State Management
- **Project Points:**
  - Implement a simple theme switcher in Zomato, Ola app using the Context API in a React application.

Week 8: React Router & Styling & Animation in React

- **Topics:**
  - React Router for Navigation
  - Styling React Components: CSS Modules, Styled Components, Tailwind CSS (introduction)
  - Form Handling in React, Framer motion, LENIS and GSAP
- **Project Points:**
  - Create a multi-page e-commerce Myntra with product display page using React Router and a chosen styling method.

Month 3: Node.js & Express.js - Backend Development

Week 9: Introduction to Node.js

- **Topics:**
  - What is Node.js? Event-Driven Architecture
  - NPM (Node Package Manager)
  - Core Modules: File System, HTTP, Path
  - Asynchronous Programming in Node.js
- **Project Points:**
  - Build a simple command-line utility using Node.js to manage files.

Week 10: Building APIs with Express.js

- **Topics:**
    - Introduction to Express.js: Routing, Middleware
    - Handling HTTP Requests (GET, POST, PUT, DELETE)
    - Request and Response Objects, CSP Headers (Security)
    - Error Handling in Express
- **Project Points:**
    - Develop a basic REST API for a blog application (users, posts) using Express.js.

Week 11: Database Integration with MongoDB (NoSQL) and PG (SQL)

- **Topics:**
    - Introduction to NoSQL and SQL Databases: MongoDB , Postgres
    - MongoDB CRUD Operations | ACID properties of DB
    - Connecting Node.js with MongoDB (Mongoose ODM)
    - Data Modeling in MongoDB and Postgres
- **Project Points:**
    - Integrate MongoDB with the blog API to store and retrieve posts and user data.

Week 12: Authentication & Authorization

- **Topics:**
    - User Authentication: JWT (JSON Web Tokens), cookies, sessions, O Auth, 2FA
    - Password Hashing (bcrypt.js)
    - Authorization Middleware
- **Project Points:**
    - Implement user registration, login, and protected routes in the blog API.

Month 4: MERN Stack Integration & AI Tools Introduction

Week 13: Connecting Frontend and Backend

- **Topics:**
    - Making API Calls from React (Fetch API, Axios)
    - CORS (Cross-Origin Resource Sharing)
    - Full MERN Stack Project Setup
- **Project Points:**
    - Connect the React frontend with the Express/MongoDB backend to create a full-stack blog application.

Week 14: Introduction to AI Tools for Developers

- **Topics:**
  - Overview of AI in Software Development (Code Generation, Debugging, Documentation)
  - Introduction to AI-powered Code Assistants (CLI tools, GitHub Copilot, Tabnine)
  - Leveraging AI for boilerplate code generation
- **Project Points:**
  - Use an AI code assistant to generate simple utility functions for the blog application.

AI - VIBE Developer stuffs

Week 15: AI for UI/UX Prototyping & Design

- **Topics:**
  - AI tools for generating UI mockups and prototypes like Lovable, Bolt, Replit etc.
  - Using AI to suggest design patterns and components
  - Transforming wireframes to code with AI assistance
- **Project Points:**
  - Utilize an AI design tool to create a new UI concept for a feature in the blog application.

Week 16: AI for Data Handling & Validation

- **Topics:**
  - AI tools for generating realistic test data
  - Using AI for form validation logic
  - Data cleaning and transformation with AI
- **Project Points:**
  - Implement AI-assisted data validation for user inputs in the Ai Intreview application.

Month 5: Advanced MERN & AI Integration for Core Logic

Week 17: Advanced React Concepts & State Management Libraries

- **Topics:**

- Redux/Zustand for complex state management
        - React Query for data fetching
        - Performance Optimization in React
    - **Project Points:**
        - Refactor the blog application to use Redux or Zustand for global state management.

Week 18: Advanced Express.js & Deployment

- **Topics:**
    - WebSockets for Real-time Applications
    - File Uploads with Multer
    - Introduction to Deployment (Render, Vercel, Netlify)
- **Project Points:**
    - Add a real-time Chat feature to the blog using WebSockets. Deploy the full MERN stack application to a cloud platform.

Week 19: AI for Business Logic Generation

- **Topics:**
    - Prompt Engineering for AI code generation
    - Using AI to generate complex backend business logic
    - Code review and refinement of AI-generated code
- **Project Points:**
    - Leverage an AI tool to generate a new complex feature for the blog, focusing on the backend logic (e.g., a recommendation engine for related posts).

Week 20: AI for Testing & Debugging

- **Topics:**
    - AI tools for generating unit and integration tests
    - Debugging assistance with AI
    - Identifying potential bugs and vulnerabilities using AI
- **Project Points:**
    - Use an AI tool to generate test cases for the newly implemented feature in the blog application and assist in debugging.

Month 6: Project Development & Placement Preparation

Week 21-22: Capstone Project - Idea Generation & Planning with Containerization

- **Topics:**
    - Brainstorming innovative MERN + AI project ideas

- Defining project scope, features, and user stories
- Creating a detailed project plan and timeline,Developing with AI and Deploying with Docker and AWS.
- **Project Points:**
  - Students will form teams and finalize their capstone project idea, creating a comprehensive project proposal.

Week 23-24: Capstone Project - Development with AI Vibe Coding
- **Topics:**
  - Implementing the capstone project using MERN stack
  - Actively integrating AI tools for core logic, UI generation, data handling, and testing
  - Iterative development and problem-solving
- **Project Points:**
  - Develop the capstone project, documenting the use of AI tools at each stage.

Week 25: Project Presentation & Portfolio Building
- **Topics:**
  - Refining project presentations
  - Building a professional development portfolio (GitHub, personal website)
  - Showcasing AI-assisted development
- **Project Points:**
  - Prepare and deliver a compelling presentation of the capstone project, highlighting AI integration.

Week 26: Placement Preparation & Mock Interviews
- **Topics:**
  - Resume and Cover Letter, Linkedin Workshop every weekend with live Job Hunting Strategies.
  - Technical Interview Preparation (DSA, MERN concepts)
  - Behavioral Interview Skills
  - Mock Interviews and Feedback
- **Project Points:**
  - Participate in mock interviews and receive personalized feedback to prepare for job placements.

Note: The specific AI tools introduced will be updated regularly to reflect the latest industry standards and advancements. The focus is on teaching the methodology of "AI

Vibe Coding" – using AI as an intelligent assistant to accelerate development, allowing developers to concentrate on the core logic and creative problem-solving.

For any inquiries, please contact ⛎ Person at 🗓 Calendar event .