12-Month MERN Stack and DSA Course

Month 1: Introduction to Web Development & Basics and Git

- **Week 1:** Overview of Web Development
  - Basics of HTML, CSS, and JavaScript
  - Introduction to responsive design
- **Week 2:** Advanced HTML and CSS
  - Flexbox, Grid, and modern CSS features
  - CSS preprocessors (optional: SASS/LESS)
- **Week 3:** Introduction to Git and Version Control
  - Git installation, basic commands (init, add, commit)
  - Working with remote repositories (GitHub)
- **Week 4:** Advanced Git Concepts
  - Branching, merging, and resolving conflicts
  - Git workflows and best practices

Month 2: TypeScript Basics

- **Week 1:** Introduction to TypeScript
  - Setting up TypeScript in a project
  - Basic types, interfaces, and functions
- **Week 2:** Advanced TypeScript Features
  - Classes, inheritance, and generics
  - Utility types and advanced types
- **Week 3:** TypeScript with JavaScript Libraries
  - Using TypeScript with popular JavaScript libraries
  - Type definitions and managing dependencies
- **Week 4:** TypeScript Best Practices
  - Type safety and code quality
  - Refactoring JavaScript code to TypeScript

Month 3: Introduction to Node.js & Express

- **Week 1:** Node.js Fundamentals
  - Node.js runtime and core modules
  - Setting up a Node.js project

- **Week 2:** Building APIs with Express.js
    - Setting up an Express server
    - Routing, middleware, and error handling
- **Week 3:** Advanced Express.js
    - Authentication and authorization (JWT, sessions)
    - Error handling and validation
- **Week 4:** Integrating with Databases
    - Basics of connecting Node.js to databases
    - Introduction to MongoDB

Month 4: MongoDB & Mongoose

- **Week 1:** Introduction to MongoDB
    - Basics of NoSQL databases
    - MongoDB installation and CRUD operations
- **Week 2:** Mongoose Basics
    - Setting up Mongoose with Node.js
    - Defining schemas and models
- **Week 3:** Advanced Mongoose
    - Data validation and relationships
    - Query optimization and indexing
- **Week 4:** MongoDB Aggregation and Performance
    - Aggregation framework
    - Performance tuning and best practices

Month 5: React Basics and Redux

- **Week 1:** React Fundamentals
    - Components, props, and state
    - Functional vs. class components
- **Week 2:** React Hooks
    - useState, useEffect, and custom hooks
    - Managing side effects and context
- **Week 3:** React Router and Navigation
    - Setting up React Router
    - Handling navigation and routing
- **Week 4:** Redux introduction

    - State management and props
    - Knowlegde of reducers, slices, actions

Month 6: TypeScript with React

- **Week 1:** Setting Up TypeScript with React
    - Configuring TypeScript in a React project
    - Type annotations for props and state
- **Week 2:** Advanced TypeScript in React
    - TypeScript with React Hooks and context
    - Using TypeScript with Redux (optional)
- **Week 3:** Error Boundaries and Testing
    - Implementing error boundaries in React
    - Basic testing with Jest and React Testing Library
- **Week 4:** Performance Optimization
    - Code splitting and lazy loading
    - Memoization and optimization techniques

Month 7: Tailwind CSS

- **Week 1:** Introduction to Tailwind CSS
    - Setting up Tailwind CSS in a project
    - Understanding utility-first CSS principles
- **Week 2:** Advanced Tailwind CSS
    - Customizing Tailwind configuration
    - Creating responsive designs with Tailwind
- **Week 3:** Tailwind CSS with React
    - Using Tailwind CSS in React components
    - Building layouts and styling complex components
- **Week 4:** Best Practices and Optimization
    - Optimizing Tailwind CSS for production
    - Best practices for maintaining scalable styles

Month 8: Data Structures & Algorithms (DSA) Basics

- **Week 1:** Introduction to DSA
    - Basics of algorithms and data structures
    - Big-O notation and complexity analysis

- **Week 2:** Arrays and Strings
    - Operations and problems with arrays and strings
    - Common algorithms and use cases
- **Week 3:** Linked Lists and Stacks
    - Singly and doubly linked lists
    - Stack operations and applications
- **Week 4:** Queues and Hash Tables
    - Queue operations and applications
    - Introduction to hash tables and hashing

Month 9: Advanced DSA Concepts

- **Week 1:** Trees and Graphs
    - Binary trees, binary search trees, and AVL trees
    - Graph representations and traversal algorithms
- **Week 2:** Advanced Tree Structures
    - Red-Black trees, B-trees, and tries
    - Tree algorithms and applications
- **Week 3:** Graph Algorithms
    - Shortest path algorithms (Dijkstra's, Bellman-Ford)
    - Minimum spanning trees (Kruskal's, Prim's)
- **Week 4:** Dynamic Programming
    - Fundamentals of dynamic programming
    - Common DP problems and solutions

Month 10: Next.js Basics

- **Week 1:** Introduction to Next.js
    - Setting up a Next.js project
    - Pages, routing, and static generation
- **Week 2:** Dynamic Routing and API Routes
    - Dynamic routes and parameters
    - Creating API routes in Next.js
- **Week 3:** Styling in Next.js
    - Using CSS modules and global styles
    - Integrating Tailwind CSS with Next.js
- **Week 4:** Data Fetching and Optimization

    - Data fetching methods
    - Performance optimization techniques

Month 11: System Design and Architecture

- **Week 1:** Introduction to System Design
    - Overview of system design principles
    - Scalability, performance, and reliability
- **Week 2:** Designing Scalable Systems
    - Load balancing, caching, and database design
- **Week 3:** Real-World System Design Patterns
    - Microservices, event-driven architecture
- **Week 4:** Case Study: Designing a Scalable Application
    - Applying system design principles to a real-world scenario

Month 12: Advanced Topics and Live Project

- **Week 1:** Review and Advanced Topics
    - Reviewing key concepts from MERN stack and DSA
    - Advanced topics and emerging technologies
- **Week 2:** Live Project Planning
    - Defining project scope and requirements
    - Planning and setting milestones
- **Week 3:** Live Project Development
    - Working on the live project
    - Applying all learned skills in a comprehensive project
- **Week 4:** Finalization and Presentation
    - Completing and polishing the live project
    - Preparing and presenting the project
    - Resume building, interview preparation, and career advice