

UKA TARSADIA UNIVERSITY  
M.C.A. (1<sup>st</sup> Semester) Syllabus, 2024-2025

Course Code: CS7034

Course Title: Full Stack Web Development using MERN

Course Credits: [Lecture: 04, Tutorial: 00, Practical: 02]

**Prerequisites:** JavaScript, HTML, CSS, and AJAX

**Objectives:** Provide foundational knowledge of modern full stack web application development using MERN stack.

**Course Outcomes:** Upon completion of the course, students shall be able to

- C01: Acquire knowledge in modern web development technologies using MERN stack, and advanced JavaScript concepts.
- C02: Implement advanced ES6 features to write efficient and scalable code.
- C03: Build interactive user interfaces using React and state management effectively.
- C04: Implement backend services using Express.js to facilitate client-server communication via HTTP.
- C05: Utilize JavaScript's asynchronous capabilities for data handling and server-side operations.
- C06: Manage data manipulation and storage on MongoDB server using the Node application.

**Course Objective and Course Outcomes Mapping:**

- Provide foundational knowledge of modern full stack web application development using MERN stack. : C01 to C06

**Programme Outcomes:** The student will have

PO1: Proficiency in and ability to identify problems related to computer science as well as design and apply computational knowledge to solve them.

PO2: Ability to design, develop, test and maintain system, component, product or process as per needs and specification.

PO3: Understanding of professional and ethical role and responsibility.

PO4: Recognition of the need for and an ability towards life-long learning.

PO5: Knowledge of programming languages, database systems, operating systems, software engineering, Web & Mobile technology and relevant modern issues.

PO6: Ability to demonstrate the use of modern tools, models and languages to solve problems related to software development.

PO7: An ability to communicate and present knowledge effectively.

**Programme Outcomes and Course Outcomes mapping:**

Course Outcomes	Programme Outcomes						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
C01	✓						
C02		✓	✓				
C03		✓	✓			✓	
C04		✓	✓		✓		
C05		✓	✓				
C06	✓			✓			✓

## Curriculum Unit Titles

Units	Unit Description	Weightage
1	<b>Introduction to Full Stack Development</b> <ul style="list-style-type: none"><li>1.1. Overview: Frontend, Backend, and Databases, Benefits of MERN</li><li>1.2. Introduction to Component-Based Programming and SPA</li><li>1.3. Virtual DOM and JSX Compilation using Babel</li><li>1.4. Introduction to ES6: const, let and Arrow Functions</li><li>1.5. ES6 Classes, Promises, and Modules</li></ul>	[20%]
2	<b>React Components and Elements</b> <ul style="list-style-type: none"><li>2.1. Creating and Rendering Elements</li><li>2.2. Components and Props Types: Built-in and Custom Property Validation</li><li>2.3. Class Components and Functional Components</li><li>2.4. CSS in JS and Styled Components</li><li>2.5. React Routing</li></ul>	[15%]
3	<b>React State Management</b> <ul style="list-style-type: none"><li>3.1. Async State Initialization</li><li>3.2. Hooks: useState and useEffect</li><li>3.3. Event Handling</li><li>3.4. Forms in React</li><li>3.5. Context API</li></ul>	[15%]
4	<b>REST API with Express.js</b> <ul style="list-style-type: none"><li>4.1. Overview of RESTful API</li><li>4.2. HTTP Methods as Actions</li><li>4.3. Routing and Middleware</li><li>4.4. Handling HTTP Request and Response: Fetch API</li></ul>	[15%]
5	<b>Backend Server with Node.js</b> <ul style="list-style-type: none"><li>5.1. Overview of Node.js and Event Loop</li><li>5.2. Asynchronous Programming with Callbacks, Promises, and Async/Await</li><li>5.3. Modules and npm packages</li><li>5.4. Creating Simple Web Server: Error Handling</li></ul>	[20%]
6	<b>Data Management with MongoDB</b> <ul style="list-style-type: none"><li>6.1. Introduction to NoSQL: Needs</li><li>6.2. Overview of MongoDB: Document, Collection, and Query Language</li><li>6.3. Callback hell and promises</li><li>6.4. Mongoose ODM</li><li>6.5. CRUD operation using MongoDB</li></ul>	[15%]

### Course Units and Course Outcomes Mapping:

Unit No.	Unit	Course Outcomes					
		C01	C02	C03	C04	C05	C06
1	Introduction to Full Stack Development	✓					
2	React Components and Elements		✓				
3	React State Management			✓			
4	REST API with Express.js				✓		
5	Backend Server with Node.js					✓	
6	Data Management with MongoDB						✓

### Computing Environment:

A student must have the following computing environment in the laboratory and/or on his/her laptop.

- CE#1: Visual Studio Code
- CE#2: Node.js and npm
- CE#3: MongoDB or MongoDB Atlas
- CE#4: React, Babel, and Express.js

### Text Books

1. Vasan Subramanian – “Pro MERN Stack Full Stack Web App Development with Mongo, Express, React, and Node”, Apress.

### References:

1. Eddy Wilson Iriarte Koroliov - "MERN Quick Start Guide", Packt Publishing.
2. Greg Lim – “Beginning Node.js, Express & MongoDB Development”,
3. Basarat Syed - “Beginning Node.js”, 1st Edition, Apress.