

## CS380: Full Stack Development

### Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours	2	2	-	4	3
Marks	100	5	-	150	

### Pre-requisite courses:

- HTML
- CSS
- JAVASCRIPT

### Outline of the Course:

Sr. No.	Title of the unit	Minimum number of hours
1.	Basics of Web Development with HTML, CSS and JavaScript	04
2.	Introduction to UI and UX in Web Development	02
3.	Front-end Web Development with React.js	06
4.	React Forms, Flow Architecture and Introduction to Redux	04
5.	Client-Server Communication and React Rendering	04
6.	Server-side Development with Node.js, Express and MongoDB	06
7.	Deployment of MERN Stack Web Applications	04
	Total hours (Theory)	30
	Total hours (Lab)	64
	Total hours	94

### Detailed Syllabus:

1.	<b>Basics of Web Development with HTML, CSS and JavaScript.</b>	<b>04 Hours</b>	<b>12%</b>
	Fundamentals of HTML, CSS and JavaScript, Pseudo classes, Pseudo-elements, Transitions, Animations, Positioning, Box Model, Bootstrap 4, Material-UI, Basics of Responsive website using media queries, DOM Manipulation, Handling Events using JavaScript, Regular Expressions		
2.	<b>Introduction to UI and UX in Web Development</b>	<b>02 Hours</b>	<b>8%</b>
	Visual elements of User Interface Design, Ideation, Articulation and development in UX Design, Look and Feel/Visual Research,		

	Developing and Refining UI, Sitemap, Wireframes and Prototypes		
<b>3.</b>	<b>Front-end Web Development with React.js</b>	<b>06 Hours</b>	<b>20%</b>
	Introduction to Frontend web development, Single page web applications, ECMAScript 6, Fundamentals of React.js, Components: Class Components and Functional Components, Refs, Refs with class components and Forwarding Refs, React Hooks - useEffect, useReducer, useContext, useCallback, fetching data with React Hooks, JSX, Props, Methods as props, State and setState, Destructuring props and state, Event Handling, Rendering, Error Boundary.		
<b>4.</b>	<b>React Forms, Flow Architecture and Redux</b>	<b>04 Hours</b>	<b>14%</b>
	Basics of Form Handling, Controlled Forms and form Validation, Uncontrolled Components and forms, The Model-View-Controller Framework, The Flux Architecture, Introduction to Redux, React Redux Forms, React Redux Form Validation		
<b>5.</b>	<b>Client-Server Communication and React Rendering</b>	<b>04 Hours</b>	<b>14%</b>
	Client-Server communication, HTTP Get Request, HTTP Post Request, React Render: Rendering, useState, state immutability, parent and child components, State Management		
<b>6.</b>	<b>Server-side Development with Node.js, Express and MongoDB</b>	<b>06 Hours</b>	<b>20%</b>
	Introduction to Server-side Development: Node, Node modules, Node HTTP server, Application Programming Interface, Express Framework and Rest API using Express, HTTPS and Secure Communication, Cross-Origin Resource Sharing, Basic Authentication, Session Based Authentication and Token Based Authentication, JSON Web Tokens, Passport module, OAuth and User Authentication, Backend as a Service, Integrating the React Client and Server, MongoDB and Mongoose		
<b>7.</b>	<b>Deployment of MERN Stack Web Applications</b>	<b>04 Hours</b>	<b>12%</b>
	Fundamentals of Secure Deployment, Search Engine Optimization, DNS Record Management, Deploying MERN Stack Application on Web, Free Hosting Platforms, GitHub, Firebase, Heroku		

**Course Outcome (COs):**

At the end of the course, the students will be able to

CO1	Understand various technologies and trends impacting single page web applications.
CO2	Apply a deep knowledge of MVC (Model View Controller) architecture, making the development process easier and faster using open-source technologies.
CO3	Implement UI-UX using React.js framework and Responsive web designing for Web Applications.
CO4	Demonstrate the use of JavaScript to fulfil the essentials of front-end development to back-end development.
CO5	Understand the use of MongoDB as an open-source NoSQL database to store and retrieve information.
CO6	Create a Real-time responsive web application using MERN STACK technologies.

**Course Articulation Matrix:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	2	-	1	-	-	-	-	-	-	2	1	-
CO2	3	1	3	2	2	3	-	-	-	-	-	2	2	1
CO3	2	3	3	1	2	2	-	-	1	1	-	2	1	-
CO4	3	2	2	3	2	-	-	-	2	2	-	3	2	1
CO5	2	1	2	1	3	-	-	-	1	-	-	2	2	-
CO6	3	1	3	2	2	2	-	-	-	-	-	2	2	1

Enter correlation levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

If there is no correlation, put “-”

**Recommended Study Material:****❖ Textbooks:**

1. Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node - O'Reilly Media Publications
2. The Full Stack Developer by Chris Northwood- Apress Publications

❖ **Reference Books:**

1. Beginning MERN Stack: Build and Deploy a Full Stack MongoDB, Express, React, Node.js App by Greg Lim
2. Full-Stack React Projects: Learn MERN stack development by building modern web apps using MongoDB, Express, React, and Node.js, 2nd Edition by Shama Hoque.

❖ **Web Materials:**

1. <https://www.youtube.com/watch?v=QFaFicGhPoM&list=PLC3y8-rFHvwgg3vaYJgHGnModB54rxOk3>
2. <https://www.youtube.com/watch?v=7CqJlxBYj-M>