

As Per NEP 2020

University of Mumbai



Syllabus for Minor Vertical 2

Faculty of Engineering

Board of Studies in Information Technology

Second Year Programme in Minor – Information Technology

Semester	IV	
Title of Paper (Theory)	Sem.	Total Credits 4
I) Introduction to Web Technologies	IV	3
Title of Paper (Lab)		Credits
I) Web Technologies Lab	IV	1
From the Academic Year		2025-26

Sem. - IV

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Pract.	Tut.	Theory	Pract.	Tut.	Total
2344211	Introduction to Web Technologies	3	--	-	3	-	-	3

Course Code	Course Name	Theory					Term work	Pract / Oral	Total
		Internal Assessment (IAT)			End Sem Exam	Exam Duration (in Hrs)			
		IAT-I	IAT-II	IAT-I + IAT-II (Total)					
2344211	Introduction to Web Technologies	20	20	40	60	2	--	--	100

Course Objectives:

The course aims to

1. To understand the fundamentals of the internet, web protocols, and the World Wide Web, along with the basics of Git and GitHub for version control.
2. To learn the principles of web design using HTML5 and CSS3 for creating structured and visually appealing web pages.
3. To develop interactive and dynamic web applications using JavaScript, DOM manipulation, AJAX, and jQuery.
4. To introduce server-side programming using PHP for handling web requests, session management, and database connectivity with MySQL.
5. To explore XML technologies for structured data representation and processing using XML parsers and XSL.
6. To understand modern front-end development using ReactJS, including component-based architecture, state management, and API integration.

Course Outcomes:

Students will able to

1. **Understand** the fundamentals of internet protocols, HTTP communication, and utilize Git and GitHub for version control and collaboration.
2. **Design** structured and visually appealing web pages using HTML5, CSS3, and Bootstrap for responsive web development.
3. **Develop** interactive and dynamic web applications using JavaScript, DOM manipulation, AJAX, and jQuery for enhanced user experience.
4. **Implement** Server-side scripting with PHP and MySQL for web request handling, session management, and database-driven applications.
5. **Utilize** XML technologies for structured data representation, parsing using DOM/SAX, and transformation using XSL.
6. **Build** Modern, scalable web applications using ReactJS with component-based architecture, state management, and API integration.

DETAILED SYLLABUS:

Sr. No.	Name of Module	Detailed Content	Hours	CO Mapping
	Prerequisites	Basic of C and Python.	01	--
I	Introduction to the Internet & Web Technologies	Internet fundamentals, web architecture, and protocols - HTTP request and response messages, web clients, and web servers - HTML: Introduction, history, versions, and basic elements - HTML5 elements: headings, paragraphs, colors, fonts, links, lists, tables, images, forms - Difference between HTML and HTML5 - Git & GitHub : Introduction, pushing source code, pull requests, collaboration	06	CO1
II	Styling with CSS3 & Bootstrap	CSS3: Inline, embedded, and external stylesheets - Rule cascading, inheritance, backgrounds, borders, colors, shadows - Text transformations, transitions, and animations - Advanced CSS: Grouping, dimensions, positioning, floating, alignment, pseudo-classes, navigation bar, image sprites - Bootstrap : Grid system, foundations, navigation systems, JavaScript effects	06	CO2
III	JavaScript & AJAX	JavaScript - JavaScript: Introduction, syntax, variables, data types, operators, functions, objects, arrays, Built-in objects, debugging, event handling Document Object Model (DOM) : history, levels, modifying element styles, document tree manipulation jQuery : Selectors, event handling, DOM manipulation AJAX : Introduction, components, AJAX with JavaScript, jQuery, JSON, API integration, AJAX with forms	08	CO3
IV	Server-Side Programming with PHP & MySQL	PHP introduction: syntax, primitives, operations, expressions - Control statements, arrays, functions, pattern matching - Form handling, file handling, cookies, session tracking - Connecting PHP with MySQL for database operations	07	CO4
V	XML & Data Exchange Technologies	XML: Introduction, Document Type Definition (DTD), XML Schema - Document Object Model (DOM) and SAX parsers - Presenting XML using XSL (Extensible Stylesheet Language)	06	CO5
VI	Modern Frontend	Introduction to ReactJS, JSX, components, props, state management	06	

	Development with ReactJS	- Hooks: useState, useEffect - React Router, Axios for API integration - Virtual DOM and form handling		CO6
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Text Books:

1. Kogent Learning Solutions Inc., *Web Technologies: HTML, JavaScript, PHP, Java, JSP, XML and AJAX, Black Book*. Dreamtech Press, 2012.
2. L. Lemay, R. Colburn, and J. Kyrnin, *HTML, CSS & JavaScript Web Publishing*. Pearson Education, 2015.
3. B. McLaughlin, *PHP & MySQL: The Missing Manual*. O'Reilly Media, 2018.
4. D. Flanagan, *JavaScript: The Definitive Guide*, 7th ed. O'Reilly Media, 2020.
5. Stefanov, *React Up and Running: Building Web Applications*. O'Reilly Media, 2016.

References:

1. R. York, *Beginning JavaScript and CSS Development with jQuery*. Wrox Publications, 2009.
2. R. Nixon, *Learning PHP, MySQL & JavaScript*, 5th ed. O'Reilly Media, 2021.
3. T. A. Powell, *AJAX: The Complete Reference*. McGraw-Hill Education, 2008.
4. B. Evjen, *Professional XML*. Wrox Publications, 2007.
5. Boduch, *React and React Native*. Packt Publishing, 2020.

Online References:

Sr. No.	Website Name
1	Mozilla Developer Network (MDN), "MDN Web Docs," https://developer.mozilla.org/
2	ReactJS, "React Documentation," https://react.dev/ .
3	PHP.net, "PHP Manual," https://www.php.net/manual/en/
4	Bootstrap, "Bootstrap Documentation," https://getbootstrap.com/
5	GitHub Learning Lab, "Learn Git and GitHub," https://lab.github.com/

Assessment:

Internal Assessment (IA) for 20 marks each:

- IA will consist of Two Compulsory Internal Assessment Tests. Approximately 40% to 50% of the syllabus content must be covered in the IAT-I and the remaining 40% to 50% of the syllabus content must be covered in the IAT-II.

End Semester Theory Examination:

➤ Question paper format

- Question Paper will comprise a total of **six questions each carrying 15 marks Q.1** will be **compulsory** and should **cover the maximum contents of the syllabus**
- **Remaining questions** will be **mixed in nature** (part (a) and part (b) of each question must be from different modules. For example, if Q.2 has part (a) from Module 3 then part (b) must be from any other Module randomly selected from all the modules)
- A total of **four questions** need to be answered

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Pract.	Tut.	Theory	Pract.	Tut.	Total
2344212	Web Lab	-	2	-	-	1	-	1

Course Code	Course Name	Examination Scheme						
		Theory Marks				Term Work	Practical/ Oral	Total
		Internal assessment (IAT)			End Sem. Exam			
		IAT-I	IAT-II	IAT-I +IAT-II (Total)				
2344212	Web Lab	--	--	--	--	25	25	50

Lab Objectives: Students will be able to learn.

1. To understand the fundamentals of web technologies and implement version control using Git and GitHub.
2. To design and style interactive web pages using HTML5, CSS3, and Bootstrap.
3. To develop dynamic web applications using JavaScript, DOM, AJAX, and jQuery.
4. To implement server-side programming using PHP and MySQL for handling web requests and databases.
5. To explore XML and XSL for structured data representation and transformation.
6. To build modern front-end applications using ReactJS with API integration and state management.

Lab Outcomes: Students will be able to achieve the outcome.

1. Demonstrate proficiency in HTML, CSS, and Git for structuring and managing web applications.
2. Apply CSS3 and Bootstrap to create responsive and visually appealing web pages.
3. Develop interactive web applications using JavaScript, DOM manipulation, AJAX, and jQuery.
4. Implement server-side applications using PHP and MySQL for dynamic content management.
5. Utilize XML and XSL for structured data processing and transformation.
6. Build modern, scalable web applications using ReactJS with API integration.

DETAILED SYLLABUS:

Sr. No.	Module	Detailed Content	Hrs	LO Mapping
0	Prerequisite	Basic of C and Python.	01	--
1	HTML, CSS & Git for Web Pages	- HTML5 elements: Basic of HTML, headings, paragraphs, colors, fonts, links, lists, tables, images, forms. - CSS3: Inline, embedded, and external stylesheets - Rule cascading, inheritance, backgrounds, borders, colors, shadows - Git & GitHub: Introduction, pushing source code, pull requests, collaboration	03	LO1
2	Styling with CSS3 & Bootstrap	- CSS3: - Text transformations, transitions, and animations - Advanced CSS: Grouping, dimensions, positioning, floating, alignment, pseudo-classes, navigation bar, image sprites - Bootstrap: Grid system, foundations, navigation systems, JavaScript effects	04	LO2
3	JavaScript & AJAX	JavaScript - JavaScript: Basic syntax, variables, data types, operators, functions, objects, arrays, Built-in objects, debugging, event handling Document Object Model (DOM): levels, modifying element styles, document tree manipulation jQuery: Selectors, event handling, DOM manipulation AJAX: Introduction, components, AJAX with JavaScript, jQuery, JSON, API integration, AJAX with forms	06	LO3
4	PHP & MySQL	PHP: Basic syntax, primitives, operations, expressions - Control statements, arrays, functions, pattern matching - Form handling, file handling, cookies, session tracking - Connecting PHP with MySQL for database operations	04	LO4
5	XML & XSL	XML: Introduction, Document Type Definition (DTD), XML Schema - Document Object Model (DOM) and SAX parsers - Presenting XML using XSL (Extensible Stylesheet Language)	04	LO5
6	Frontend Development with ReactJS	Basic of ReactJS, JSX, components, props, state management - Hooks: useState, useEffect - React Router, Axios for API integration - Virtual DOM and form handling	05	LO6

Text Books:

1. Learning PHP, MySQL, JavaScript, CSS & HTML5, Robin Nixon, O'Reilly, 3rd Edition, 2014.

2. Professional Rich Internet Applications: AJAX and Beyond, Dana Moore, Raymond Budd, Edward Benson, Wiley, 1st Edition.
3. JavaScript: The Complete Reference, Thomas A. Powell, Fritz Schneider, Tata McGraw Hill, 3rd Edition, 2013.
4. REST API Design Rulebook, Mark Masse, O'Reilly, 1st Edition, 2011.
5. Learning React: Functional Web Development with React and Redux, Alex Banks and Eve Porcello, O'Reilly, 1st Edition.

References:

1. Thomas A Powell, Fritz Schneider, “JavaScript: The Complete Reference”, Third Edition, TataMcGraw Hill, 2013.
2. Mike Mcgrath, “PHP & MySQL in easy Steps”, Tata McGraw Hill, 2012, Second Edition.
3. Masse, M. (2011). REST API Design Rulebook. Germany: O'Reilly Media,First Edition.
4. Steven Holzner —The Complete Reference - PHP, Tata McGraw Hill, 2008,First Edition.

Online Resources:

Sr. No.	Website Name
1.	https://www.w3.org/html/
2.	http://www.htmlref.com/
3.	https://www.w3schools.com/
4.	http://www.nptelvideos.in/2012/11/internet-technologies.html

List of Experiments.

Week No	List of Experiments	Hrs
01	Basic GitHub Setup • Install Git and set up a new repository. Learn fundamental Git commands: add, commit, modify, view. Create and manage branches for version control. Use Git & GitHub for version control: Initialize a repository, commit changes, push to GitHub, and create a pull request.	02
02	Web Page Styling using CSS3 & Bootstrap • Implement various CSS3 styles: colors, fonts, borders, backgrounds, and text effects. • Create a responsive web page using Bootstrap Grid System and Navigation Bar. ➤ Ex. Develop a personal resume webpage using HTML and CSS. Include sections for personal details, education, skills, experience, and	02

	contact information. Apply CSS styles and layout techniques for better readability. ➤ Ex.Design a landing page for a fictional product or service using HTML, CSS, and Bootstrap. Include a hero section, product descriptions, pricing plans, and a contact form. Make it mobile-friendly with Bootstrap grid system. Design a dropdown menu with Indian cities (e.g., Delhi, Agra, Mumbai, Jaipur, Hyderabad). When a city is selected, display a famous monument from that city (e.g., Taj Mahal for Agra). Style the output with CSS (font color, bold text, size adjustments).	
03	JavaScript Fundamentals ● Implement JavaScript programs for arithmetic operations, conditional statements, and loops. ➤ Create an interactive form validation script using JavaScript. Create a dynamic To-Do List where users can add, mark as complete, and remove tasks using JavaScript & DOM.	02
04	DOM Manipulation & jQuery ● Develop a dynamic webpage where content updates on button click using JavaScript DOM. Implement jQuery effects: hide/show elements, toggle visibility, and animate elements.	02
05	AJAX for Asynchronous Web Requests ● Develop an AJAX-based search suggestion feature using JavaScript and jQuery. ● Fetch and display JSON data dynamically from an external API. ➤ Ex. Validate a registration form using regular expressions in JavaScript. Implement asynchronous login validation using AJAX & JSON without page refresh Ex. Develop a web application to fetch real-time weather data for a city. Use AJAX & a public weather API to retrieve information. Display temperature, humidity, and weather conditions dynamically.	02
06	PHP & MySQL - User Registration System ● Design a user registration form using HTML and process the form using PHP. ● Store user details in MySQL database and display them on another page. ● Ex.Implement a real-time search functionality where users can search for products, movies, or books, and results appear dynamically without refreshing the page ● Ex.Create a webpage that retrieves, displays, and updates user data from a MySQL database. Implement CRUD operations (Create, Read, Update, Delete) using PHP & MySQL. Ensure user input is validated and securely stored in the database.	02
07	PHP Sessions & Cookies ● Implement user authentication using PHP sessions and cookies.	02

	Allow users to login and maintain session state across multiple pages.	
08	XML & XSL for Data Representation - Create an XML file representing a product catalog (e.g., books, electronics). - Use XSLT to transform XML into an HTML webpage for better presentation. - Ex. Create an XML file (students.xml) that stores student details such as Name, Roll No, Branch, and Email. Write a DTD file (students.dtd) to define rules for the XML structure. Link the XML with the DTD and validate it using an XML parse. Ex. Use XSLT (eXtensible Stylesheet Language Transformations) to convert XML data into an HTML table for better presentation. Create an XML file (books.xml) containing book details (Title, Author, Price). Write an XSL file (books.xsl) that transforms the XML data into an HTML table. Link the XSL with XML and open it in a browser to see the formatted output.	02
09	ReactJS Component-Based Web Application - Develop a ReactJS application with functional components and props. - Implement React Hooks (useState, useEffect) for state management. Ex. Building a Simple Counter App using React Hooks. Use React Hooks (useState, useEffect) to manage state and side effects.	02
10	API Integration in ReactJS Fetch and display real-time data from a third-party API using Axios in ReactJS. Implement a search functionality to filter API results dynamically.	02

Assessment:

Term Work: Term Work shall consist of 10 practicals based on the above list. Since the initial Python programs are small and straightforward, this allows for more practicals to be conducted, providing essential practice needed for mastering any programming language.

Internal Practical Exam: Conduct an internal practical exam after completing the first three modules of the Python course to assess and ensure the learner's understanding.

Term Work Marks: 25 Marks (Total marks) = 10 Marks (Experiment) + 10 Marks (Internal Practical Exam) + 5 Marks (Attendance)

Practical& Oral Exam: An Oral & Practical exam will be held based on the above syllabus.

Sd/-

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