Lecture Plan

1. **Course Code: CSE-3532**
2. **Course Title: Tools and Technologies for Internet Programming**
3. **Credit Hours: 2**
4. **Contact Hours: 4 lab hours per week**
5. **Type: Core, Engineering**
6. **Prerequisite: Software Development -1 (CSE-2340**)
7. **Co-requisite: Computer Programming-II (CSE 1221)**
8. **Instructor's name and contact address:**

Instructor: Mr. Mahir Shadid
Email: mahir.shadid@iiuc.ac.bd

9. Course Rationale / Summary:

This course gives students experience of designing, developing, implementing, testing, and debugging full stack Web Application. Students will also get advanced Web or Internet programming experience; covering topics such as HTML, CSS, CSS framework, React, Node JS, Express JS, database programming, and web development.

10. Course Objective:

Upon successful completion of the program, student should be able to:

- To understand the concept of Web Application Development and its Architecture.
- To understand the Essentials of Web Application Development.
- To understand and practice web page designing techniques.
- To understand and practice embedded dynamic scripting on client side Internet Programming.
- To understand the differences between client side & server side technologies to develop Web Application.

11. Teaching and Learning Activities:

i. **Lecture and class discussion.**
ii. **Active Learning Approach –** Instant feedback by performing assigned works in the class both individually and in group.
iii. **Project-based learning-** The students are given individual project on separate topic to convert their learning in the class to practical applications.

12. Assessment Method:

i. **Individual Performances:** Quizzes, Lab Performances, Lab Report, Viva, Assignment
ii. **Group Performances:** Projects & Presentation, teamwork, communication skill
iii. **Formal Assessment:** Continuous Evaluation and Final Exam

13. Course Outcomes (COs):

Upon successful completion of this course, students will be able to:

#	CLO Description	Weightage (%)
1	Demonstrate practical proficiency in applying front-end and back-end web development tools and technologies through structured assignments and short projects.	**40%**
2.	Apply foundational web technologies and protocols in lab/project environments.	15%
3.	Design secure, efficient web systems addressing conflicting requirements.	10%
4.	Use modern tools, frameworks, and libraries for full-stack web development.	15%
5.	Collaborate effectively in teams to plan, develop, and test applications.	10%
6.	Apply project management principles, including cost estimation and economic decision-making.	10%

14. Mapping of CO-PO-WK-WP-WA:

CO#	Course Outcome	POs	WK	WP	Bloom's Domain / Level	Teaching-Learning Strategy (TLS)	Assessment Strategy (AS)
CO1	Demonstrate practical proficiency in applying front-end and back-end web development tools and technologies through structured assignments and short projects.		K3		Cognitive/ Apply	Tool Demonstrations, Hands-on Labs, Assignments, Mini Projects	Tool-Based Assignments, Short Individual Projects, Code Review, Practical Evaluation Mid/Final Exam
CO2	Apply foundational web technologies and protocols in lab/project environments.	PO1	K3	WP1	Cognitive / Apply	Lecture, Guided Lab, Hands-on Tutorials, Project walk-through	Quiz, Exam, Lab Test, Assignment, Project
CO3	Design secure, efficient web systems addressing conflicting requirements.	PO3	K5	WP1, WP2, WP7	Cognitive / Create	Design Studio, Lab Projects, Group Work	Exam, Project, Report, Viva
CO4	Use modern tools, frameworks, and libraries for full-stack web development.	PO5	K6	WP1	Cognitive / Apply	Tool Demos, Pair Programming, Labs	Tool-based Assignment, Practical Exam
CO5	Collaborate effectively in teams to plan, develop, and test applications.	PO9			Affective / Organize	Group Work, Agile Sprints, Peer Feedback	Peer Review, Presentation, Team Project
CO6	Apply project management principles, including cost estimation and economic decision-making.	PO11			Cognitive / Evaluate	Project Planning Workshops	Project, Reflection Report

15. **Course Content**

#	Content	**Duration**	**COs**
Mid-Term (30 Marks)			
1	**Course Introduction:** Overview of Web Development, Introduction to Web technologies **Introduction to Web, HTML and Web Page:** Introduction to Web technologies, Basic, Elements, Attributes, Headings, Paragraphs, Formatting, Links, Head, Images, Tables, Lists, Blocks, Layout, Forms, Colors, Colornames, CSS, JavaScript,	2 weeks	CO1

	Entities, URL Encode, Quick List **Introduction to CSS** CSS Introduction, Syntax, Id & Class, Styling Backgrounds, Text, Fonts, Links, Lists, Tables, Box Model, Border, Outline, Margin, Padding, Grouping/Nesting, Dimension, Display, Positioning, Floating, Align, Navigation Bar, Image Gallery		
2	**Introduction to Tailwind CSS:** 1. Overview of utility-first CSS, Setting up TailwindCSS, Basic styling with Tailwind CSS, Introduction to tailwind CSS component library like flowbite and daisy UI, Building complex components with Tailwind CSS	1 Week	CO1
3	**Introduction to JavaScript:** Introduction to Javascript,Input, Output, Statements, Comments, Variables, Data Types, Objects, Functions, Loop, Errors Operators, Comparisons, Conditions, DOM Introduction, Number, String, Date, Array, Window, Screen, Location, History, Navigator, Popup Alert	2 Weeks	CO1
4	**JavaScript DOM Manipulation:** Understanding the Document Object Model (DOM), Selecting and manipulating DOM elements, Introduction to Event handling and listeners, Updating the DOM in response to user actions, Creating a project by using DOM event listeners.	1 Week	CO1
Final Exam: 50 Marks			
5	**Introduction to ReactJS:** Setting up the development environment, Introduction to React App, Introduction to react Components, JSX and rendering elements, Discussion about props	2 Weeks	CO3

	and state, Hooks in React, useState, useEffect, useRef, useEffect and useContext, Discuss about elements of react router , Setting up React Router, Navigating between pages using react router.		
6	**Authentication with Firebase:** Introduction to firebase, Registration with email and password, Login with email and password, Logout, Login with google account, Login with github account, Logout.	1 Week	CO2
7	**Introduction to NodeJS and Express:** 1. Understanding NodeJS and Express Server, Setting up a NodeJS environment, Building a basic server with Express, Middleware and routing, Introducing cors, nodemon,dot env etc.Introduction to MongoDB atlas, Creating mongodb account, Introduce cloud and local version of mongodb.	2 Weeks	CO3
8	**Introduction to MongoDB or MYSQL:** Introduction to MongoDB atlas, Creating mongodb account, Introduce cloud and local version of mongodb, Creating new Database user in mongoDB	1 Week	CO3
8	**Comprehensive Full-Stack Application Development:** Building a full-stack application, Real-world project implementation with React + Node.js + PostgreSQL Or the instructor's preferred tech stack.	3 Weeks	CO4, CO5

16. **Weekly Activity Plan:**

Lecture Period		Topic	TLS	AS
Week -1	**Day-1**	**Introduction to Web, HTML and Web Page** 1. Overview of Web Development 2. Introduction to Web technologies 3. Environment setup A. Visual Studio code (VS Code) B. Setting Plugins of VS Code 1. Live server 2. Live Preview 3. Prettier Code Formatter 4. Auto Rename Tag 5. HTML End Tag Tables (Nested HTML structure) 6. Image preview 7. Material Icon Theme 8. live share 9. HTML to CSS autocompletion 10. React Code Snippet **Introduction to Version Control with Git and Github** 1. Creating procedure of github and git 2. Practice github operation 3. Install node	Lecture, Lab work	Assignment, Lab work, Mini Project
	Day-2	**Introduction to HTML and basic elements** 1. Introduction to HTML 2. Basics of HTML 3. HTML Tags 4. HTML Tables 5. HTML Lists 6. HTML Formatting 7. Forms and Input Elements 8. Semantic HTML and HTML5 Features 9. Creating a form and validating input 10. Creating a simple web page using above features	Lecture, Lab work	Assignment And Lab Test
Week-2	**Day-1**	**Introduction to CSS** 1. Different ways of using CSS 2. CSS Fundamentals	Lecture, Lab work	Lab test, Assignment

		3. CSS Styling Techniques 4. CSS Box model		
	Day-2	**Advance CSS** 5. Flexbox and Grid layouts 6. CSS transform, transition, animation etc. 7. CSS Responsive Design and Media Queries 4. Creating a responsive webpage with Flexbox and grid layout		
Week-3	**Day-1**	**Introduction to Tailwind CSS** 1. Overview of utility-first CSS 2. Setting up TailwindCSS 3. Basic styling with TailwindCSS	Lecture, Lab work	Lab test, Assignment
	Day-2	**Advanced Tailwind CSS** 4. Introduction to tailwind CSS component library like daisy UI **5.** Building complex components with TailwindCSS **6.** Rebuilding a CSS project with TailwindCSS and tailwind CSS component library	Lecture, Lab work	Lab test, Assignment
Week-4	**Day-1**	**Introduction to JavaScript** 1. JavaScript Basics 2. JavaScript Control Flow Statements 3. JavaScript Loops 4. JavaScript Objects 5. JavaScript Functions	Lecture, Lab work	Lab test, Assignment
	Day-2	**Advanced JavaScript and ES6** 1. ES6 features: let, const, var, arrow functions, etc.	Lecture, Lab work, Group Work	Lab test, Assignment
Week-5	**Day-1**	**JavaScript DOM Manipulation** 1. Understanding the Document Object Model (DOM) 2. Selecting and manipulating DOM elements 3. Introduction to Event handling and listeners	Lecture, Lab work	Lab test, Assignment, Mini Project

	Day-2	**Advanced JavaScript DOM Manipulation** Updating the DOM in response to user actions Creating a project by using DOM event listeners	Lecture, Lab work	Lab test, Assignment, Mini Project
Week-6	**Day-1 and 2**	**Introduction to Local Storage API** 1.Introduction to API 2. Fetching and integrating APIs 3. Creating an e-commerce project by using API and DOM	Lecture, Lab work	Lab test, Assignment, Mini Project
Mid Term Examination				
Week-7	**Day-1**	**Introduction to ReactJS (vite)** 1. Setting up the development environment 2. Introduction to Vite React App 3. Introduction to react Components 4. JSX and rendering elements 5. Discussion about props and state 6. Building your first React component	Lecture, Lab work,	Lab test, Assignment, Mini Project
	Day-2	**ReactJS Advanced Concepts** 1. Hooks in React 2. useState, useEffect, useRef 3. useEffect and useContext Building React component using hook	Lecture, Lab work, Group work,	Lab test, Assignment, Mini Project
Week-8	**Day-1**	**Introduction to React Router** 1. Discuss about elements of react router 2. Setting up React Router 3. Navigating between pages using react router 4. Creating a multi-page React application	Lecture, Lab work	Lab test, Assignment, Mini Project
	Day-2	**Styling in React** 1. react-reveal 2. react-fast-marquee 3. Animation with framer motion	Lecture, Lab work	Lab test, Assignment, Mini Project
Week-9	Day-1	**Authentication with Firebase** 1. Introduction to firebase 1. Registration with email and	Lecture, Lab work	Lab test, Assignment, Mini Project

		password 2. Login with email and password 3. Logout		
	Day-2	**Advanced Authentication with Firebase** 1. Login with google account 2. Login with github account 3. Logout	Lecture, Lab work	Lab test, Assignment, Mini Project
Week-10	**Day-1**	**Introduction to NodeJS and Express** 1. Understanding NodeJS and Express Server 2. Setting up a NodeJS environment 3. Building a basic server with Express 4. Middleware and routing 5. Introducing cors, nodemon,dot env etc.	Lecture, Lab work	Lab test, Assignment, Mini Project
	Day-2	**Introduction to MongoDB or MYSQL** 2. Introduction to MongoDB atlas 3. Creating mongodb account 4. Introduce cloud and local version of mongodb 5. Creating new Database user in mongoDB	Lecture, Lab work	Lab test, Assignment, Mini Project
Week-11	Day-1	**Connecting React Frontend with NodeJS Backend and perform CRUD operations** 1. Create a server with Express 2. Connecting front-end with back-end 3. Creating a backend API for inserting data into database with Express and check with postman 4. Creating a backend API for deleting data from database with Express and check with postman	Lecture, Lab work	Lab test, Assignment, Mini Project
	Day-2	1. Creating a backend API for reading data from database with Express and check with postman 2. Creating a backend API for	Lecture, Lab work	Lab test, Assignment, Mini Project

		updating data into database with Express and check with postman 3. Authentication and authorization in Express 4. Error handling and validation		
Week-12	Day-1	**Implement full Stack final project (Backend)** 1. Creating a server using Express 2. Implement Error handling and validation mechanism 3. Connecting with server and database 4. Creating DOT.ENV file for responsive data	Lecture, Lab work	Lab test, Assignment, Mini Project
	Day-2	**Implement full Stack final project (Backend)** 1. Creating Rest API for insert and read Data 2. Creating Rest API for Update and Delete Data from database	Lecture, Lab work	Lab test, Assignment, Mini Project
Week-13	Day-1	**Implement full Stack final project (Front-end)** 1. Creating a React Project with vite 2. Initiate React router DOM 3. Create Multiple Page like Navigation, Home, Registration and Login Page, Products, Services, Reviews, Upcoming Product Contact, and Footer	Lecture, Lab work	Lab test, Assignment, Mini Project
	Day-2	**Implement full Stack final project (Front-end)** 1. Design Navigation page using Tailwind and react router dom 2. Design Home, Reviews, Contact, and footer page	Lecture, Lab work	Lab test, Assignment, Mini Project
Week-14	Day-1	**Implement full Stack final project (Front-end)** 1. Design Registration and login Page with Firebase 2. Design a form for inserting Data and sent data to server	Lecture, Lab work	Lab test, Assignment, Mini Project
	Day-2	**Implement full Stack final project (Front-end)**	Lecture, Lab work	Lab test, Assignment,

		1. Design products Page and fetching Data from server 2. Design a Page for single product and fetching single products 3. Implement delete operation for deleting data from database		Mini Project
Week-15	Day-1	**Implement full Stack final project (Front-end)** 1. Design a Page for updating products 2. Design a Order Page	Lecture, Lab work	Lab test, Assignment, Mini Project
	Day-2	**Implement full Stack final project (Front-end)** 1. Deploy project in vercel and firebase	Lecture, Lab work	Lab test, Assignment, Mini Project

17. Assessment Rubrics of final project

Assessment Criteria	**CO**	**PO**	**WP**	**Excellent (5/10)**	**Satisfactory (3/7)**	**Needs Improvement (2/3)**	**Weight**
1. Requirement Analysis & Problem Interpretation	CO 1	PO1	WP1	Clearly articulates the stakeholder needs, fully interprets the problem context, identifies all key functional and non-functional requirements, and justifies them with real-world relevance	- Identifies most of the requirements correctly with some explanation, though with minor omissions or lack of depth in justification	- Basic or unclear understanding of the problem - key requirements are missing, vague, or misinterpreted	5
2. System Design & Architecture	CO 2	PO3	WP1, WP2	- Presents a modular, scalable, and maintainable design with layered architecture - includes clearly labeled diagrams, identifies components and their interactions with rationale	- Design is mostly functional with some modularity and correct components, though rationale or diagrams may be partial or not well explained	- Design lacks clarity or completeness - no diagrams or unclear module responsibilities	5
3. Frontend	CO	PO1	WP1				10

Development Implementation	1			- Implements fully responsive, accessible, and aesthetic frontend using semantic HTML, Tailwind CSS and React - includes proper state management and code organization	- Frontend is mostly functional but may lack full responsiveness or have inconsistent styling or structure	- Frontend is incomplete or poorly structured with styling and usability issues	
4. Backend & API Development	CO 2	PO3	WP2	- Implements RESTful APIs using Express - includes robust error handling, proper use of HTTP methods, and well-integrated database access with validation	- APIs cover basic CRUD operations - error handling or validations are minimal or inconsistent	- Backend is partially functional - missing key routes or not integrated with frontend	10
5. Use of Modern Tools & Technologies	CO 3	PO5	WP1	- Effectively utilizes React, Tailwind, Firebase, MongoDB and other tools as required - demonstrates confidence and independence in integrating technologies	- Uses most tools effectively but with some integration issues or needing instructor help	- Limited or incorrect use of required tools and technologies	5
6. Collaboration and Team Contribution	CO 4	PO9	WP7	- Actively participates in team activities, contributes regularly via commits, helps resolve merge issues, and documents tasks using GitHub projects or equivalent	- Participates in group work, commits some code, but collaboration or documentation is inconsistent	- Minimal or no collaboration evident - lacks participation in version control	5
7. Project Planning and Time Management	CO 5	PO11	WP7	- Provides a well-structured plan including	- Plan submitted with some scope and	- No clear plan or deadlines - missing task	5

				scope, timeline, task breakdown and responsible team members - plan is realistic and regularly updated	timeline, but lacks updates or proper delegation	breakdown or unrealistic timeline	
8. Final Demonstration & Presentation	CO 5	PO11	WP7	- Professional and well-structured presentation, covers all features, shows live deployment, explains challenges and reflections clearly	- Covers most features, includes demo and some explanation, but lacks depth or clarity	- Unstructured or incomplete presentation - missing demo or unclear articulation	5

18. Text Books:

1. "Paul Deitel" Internet & World Wide Web How to Program, Fifth Edition "Pearson Education Limited England" 2011 ISBN-10: Harvey Deitel and Abbey Deitel, ISBN-10: 0132151006, ISBN-13: 9780132151009

19. Reference Books:

1. Marty Hall and Core Web programming, Second Edition "Prentice Hall USA" 2001 ISBN: 987130897930 ISBN-13: 978-0130897930
2. Jeffrey C. Jackson Web Technologies: A Computer Science Perspective First Edition "Pearson Education Limited England" 2006 ISBN: 987131856030 ISBN-13: 978-0131856035
3. Patel Bankim and Bihari Barik Lal Introduction to Web Technology and Internet First Edition "Acme Learning Private Limited New Delhi" 2009 ISBN: 9878190710435 ISBN-13:978-8190710435
4. Alexis Leon and Mathews Leon Internet for Everyone Second Edition "Vikas Publishing House" 2012 ISBN-10: New Delhi, ISBN-13: 978-8182093188

20. Weight Distribution among Assessment Tools:

Assessment Tools	**Weight (%)**
Class Attendance	10
Assignment	10
Continuous Assessment / Mid Project	30
Final Examinations / Final Project	50

20. Grading Policy:

As per IIUC grading policy