Cummins College of Engineering for Women

(An autonomous institute affiliated to Savitribai Phule Pune University)

Karve Nagar, Pune - 411 052.

Vision

To be globally renowned engineering institute for imparting holistic education and developing professional women leaders in engineering and technology

B.Tech. (Hons.) Information Technology

with specialization in

Full Stack Development

2023 Pattern [R0]

Autonomous Program Structure
B.Tech in Information Technology with Honors Degree Programme in FULL STACK DEVELOPMENT
(Academic Year: 2025-26 Onwards)

Sr. No.	Course Code	Course Title	Teaching Scheme Hours /Week			Credits	Examination Scheme			Total Marks
			L	T	P		ISE	ESE	Pr/Or	
1	23HFS501	User Experience	3	0	0	3	50	50	0	100
2	23HFS502	Front End Technology	3	0	0	3	50	50	0	100
3	23HFS502L	Front End Technology Laboratory	0	0	2	1	25	0	25	50
4	23HFS601	Server Side Technology	3	1	0	4	50	50	0	100
5	23HFS601L	Server Side Technology Laboratory	0	0	4	2	25	0	25	50
6	23HFS801	Full Stack Integration	3	0	0	3	50	50	0	100
7	23HFS801L	Full Stack Integration Laboratory	0	0	4	2	25	0	25	50
		Total =	**12**	**1**	**10**	**18**	**275**	**200**	**75**	**550**

L=Lecture, T=Tutorial, P= Practical, Cr= Credits, ISE =In Semester Evaluation, ESE =End Semester Examination, Pr/Or = Practical/Oral

APPROVED BY
Secretary Academic Council
MKSSS's Cummins College of Engineering
For Women, Pune-411052

APPROVED BY
Chairman Academic Council
MKSSS's Cummins College of Engineering
For Women, Pune-411052

MKSSS's CUMMINS COLLEGE OF ENGG. FOR WOMEN KARVENAGAR PUNE-52.

23HFS501 User Experience

Teaching Scheme:
Lectures: 3 hours/week

Examination Scheme:
In-Semester: 50 Marks
End-Semester: 50 marks
Credits: 3

Prerequisites: Design Thinking

Course Objectives:

Familiarize students with

1. Foundations of User Experience
2. Understanding of the guidelines and principles related to user-centered design
3. The importance of User Experience research
4. Trending applications where User Experience plays a key role

Course Outcomes:

Students will be able to:

1. Identify user's perspective to provide a design solution
2. Apply user-centered research methods to empathize with target users
3. Apply UX design strategies to address emerging trends and diverse user needs
4. Recommend a suitable design for a real-life application

Unit I Introduction to User Experience

The elements of engaging user experience, disciplines of user experience, UX from the business perspective, focusing on the user, perception bias, aspects of product experience, UX psychology, contextual enquiry, interviews, journey mapping

Unit II Building Empathy

User research, building upon the foundations of user research, empathy mapping, modeling personas, demographics, user stories, scenarios and case studies

Unit III UX Research

Research methods: qualitative, quantitative, competitive research, triangulation approach, exploratory approach, explanatory approach, affinity mapping, ethnography, usability testing: usability labs, cognitive walkthroughs, longitudinal diary studies

Unit IV UX Design

Importance of UX Design, layout designs: ratios and perspectives, wireframing: versioning of wireframes, pencil sketches, digital low fidelity, digital high-fidelity prototyping, mood boards, Iconography, typography

Unit V Trends in UX

Accessibility design, age focused UX design, UX for AI bots and chatbots, UX for social media, UX information architecture, UX for Virtual reality, UX for transportation and sustainable energy domain, UX for augmented reality, UX for calling and virtual work platforms, ethics in UX

Text Books:

1. Rex Hartson & Pardha S. Pyla , "The UX Book: Agile Design for a Quality User Experience" 3rd Edition, 2025
2. Pamala Deacon, "UX and UI strategy: a step by step guide on UX and UI design", Wiley Publication, 2023

Reference Books:

1. Uijun Park, "Introduction to Design Thinking for UX Beginners: 5 Steps to Creating a Digital Experience That Engages Users with UX Design, UI Design, and User Research. Start Building Your UX Career", Pearson, 2023
2. Alan Cooper, Robert Reimann, and Dave Cronin, "About Face 3: The Essentials of Interaction Design", Wiley Publishing, Inc, 2007

23HFS502 Front End Technology

Teaching Scheme:
Lectures:3 hours/week

Examination Scheme:
In-Semester: 50 marks
End-Semester: 50 marks
Credits: 3

Prerequisites: Understating of programming languages

Course Objectives:

Familiarize students with

1. Structuring and designing web pages.
2. Scripting the web page for better communication.
3. Front end technologies like HTML, JavaScript.
4. Framework technologies like React

Course Outcomes:

Students should be able to

1. Apply markup language and stylesheets for a given problem.
2. Apply scripting language to provide solutions for web applications.
3. Identify solutions for frontend development.
4. Analyse the component-based architecture of React and its impact on web page design.

Unit I HTML and Modern Document Structure

HTML Introduction, Elements and Tags, Basic Text Formatting and Semantic Tags, Grouping Elements: and ,Lists, Hyperlinks, Images, Tables, Forms, HTML5 Features: Audio, Video, Input Types, Semantic Tags (<article>, <section>, etc.), DOM Basics and Element Access, Introduction to Dynamic Content with DOM and Events.

Unit II CSS and Responsive Frameworks

Introduction to CSS: syntax, selectors, colors, fonts, box model, positioning, float, z-index, flexbox and css grid, responsive design with media queries, css transitions and animations Bootstrap, CSS over Bootstrap, Bootstrap grid system, bootstrap responsive, Bootstrap classes, components, Bootstrap as a cross platform.

Unit III JavaScript

JavaScript introduction, syntax, variables, data types, operators, control structures: conditions, loops, switch functions, scope, hoisting, strict mode arrays, objects, json event handling and forms DOM manipulation, BOM overview, introduction to es6+: let/const, arrow functions, template strings asynchronous js

Unit IV Introduction to React JS

Introduction to React, SPA Concept, JSX syntax and compilation, functional and class components, props and state basics, introduction to es6+, destructuring, spread operator, modules, react project structure and tooling

Unit V Pure React

Virtual DOM and Re-rendering, lists and keys, conditional rendering, event handling and forms, react hooks, react router, state management with redux or context api, making api calls with fetch/axios, session management and working with REST APIs

Text Books:

1. Kogent Learning Solutions Inc., Web Technologies Black Book: HTML, JavaScript, PHP, Java, JSP, XML and AJAX, DreamTech Press, First Edition, 2009
2. Robin Wieruch, The Road to React: The React.js 19 with Hooks in JavaScript, Independently Published, 2025 Edition

Reference Books:

1. Dr. Hiren Joshi, Web Technology and Application Development, DreamTech Press, First Edition, 2011
2. Alex Banks, Eve Porcello, Learning React: Modern Patterns for Developing React Apps, O'Reilly Media, Second Edition, 2020
3. Steven M. Schafer, HTML, XHTML, and CSS Bible, Wiley India, Fourth Edition, 2008
4. Kogent Learning Solutions Inc., HTML5 Black Book (Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery), Wiley India, Second Edition, 2016
5. Laura Lemay, Rafe Colburn, Jennifer Kyrnin, HTML, CSS & JavaScript Web Publishing in One Hour a Day, Sams Teach Yourself, Sams Publishing, Seventh Edition, 2015

23HFS502L Front End Technology Laboratory

Teaching Scheme:
Practical: 2 hours/week

Examination Scheme:
In-Semester: 25 Marks
Practical: 25 marks
Credits: 1

Prerequisites: Basic understating of programming languages

Course Objectives:
Familiarize students with

1. Structuring and designing web pages.
2. Scripting the web page for better communication.
3. Front end technologies like HTML, JavaScript.
4. Framework technologies like react

Course Outcomes:
Students will be able to:

1. Design solution for problems given using HTML and CSS.
2. Apply scripting language to provide solutions for web applications.
3. Design frontend for real life applications.
4. Develop applications using appropriate technologies in a team.

Part A:

Assignment 1:

Create interactive web pages using HTML, CSS and Bootstrap. Choose any domain for designing web pages.

Assignment 2:

1. Write a Java script program to create a simple calculator.
2. Write a JavaScript program to check empty fields of registration form and validate the fields of registration form.

Assignment 3:

1. Create React App package to instantiate a directory to hold and run the calculator app.
2. Create a React weather app that can display a 5-day weather forecast with all the basic functions, including city name, current weather icon, temperature, humidity, wind speed, etc. It must display the recording of high and low temperatures of each day, including images for sunny/ rainy/ cloudy/ snowy weather conditions.

Part B:

Develop a web application using front end technologies in any domain

Text books

1. Kogent Learning Solutions Inc., Web Technologies Black Book: HTML, JavaScript, PHP, Java, JSP, XML and AJAX, DreamTech Press, First Edition, 2009
2. Robin Wieruch, The Road to React: The React.js 19 with Hooks in JavaScript, Independently Published, 2025 Edition

Reference Books

1. Dr. Hiren Joshi, Web Technology and Application Development, DreamTech Press, First Edition, 2011,
2. Alex Banks, Eve Porcello, Learning React: Modern Patterns for Developing React Apps, O'Reilly Media, Second Edition, 2020
3. Steven M. Schafer, HTML, XHTML, and CSS Bible, Wiley India, Fourth Edition, 2008
4. Kogent Learning Solutions Inc., HTML5 Black Book (Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery), Wiley India, Second Edition, 2016
5. Laura Lemay, Rafe Colburn, Jennifer Kyrnin, HTML, CSS & JavaScript Web Publishing in One Hour a Day, Sams Teach Yourself, Sams Publishing, Seventh Edition, 2015

Other Resources:

1. https://www.w3schools.com/html/default.asp
2. https://www.w3schools.com/css/default.asp
3. https://codersera.com/blog/reactjs-projects-for-beginners/
4. https://www.w3schools.com/bootstrap
5. https://www.w3schools.com/js/default.asp
6. https://www.w3schools.com/html/default.asp

23HFS601 Server-Side Technology

Teaching Scheme:
Lectures: 3 hours/week
Tutorial: 1 Hour/Week

Examination Scheme:

In-Semester: 50 Marks
End-Semester: 50 marks
Credits: 4

Prerequisites: JavaScript

Course Objectives:
Familiarize students with

1. Technical concepts behind Server-side technology
2. Structure a Server-side technology-based application in modules
3. Buffers, Streams, and Pipes
4. Building a web application and API

Course Outcomes:
Students will be able to:

1. Structure server-side technology-based applications in modules
2. Manage packages, frameworks and events for server-side technology
3. Build a web server to develop web applications
4. Establish connectivity with database

Unit – I Introduction

Traditional web server model, what is node js?, advantages, Node.JS process model, installation of node.js, working in REPL, node js console, asynchronous and non-blocking i/o

Unit – II Modules and Package Manager

Node.JS modules: functions, buffer, module, module types, core modules, local modules, module. exports, node package manager (npm): introduction to npm, package installations, handling dependency in package.json

Unit – III Web Server Development And File System

Web server development, handling http requests, sending requests file system: fs.readfile, writing a file, writing a file asynchronously, opening a file, deleting a file, other io operation

Unit – IV Events and Framework

Events: classes, returning emitters, inheriting events, express framework: route configuration, working with express, serving static files, working with middle ware

Unit – V Database Connectivity

Introduction to different data storage: JSON, MongoDB, parameters to choose correct database for full stack, setting up connection string, configuration, performing CRUD operations, commands for CRUD operations

Unit – VI Template Engines

Two-way data binding, appending dynamic data to the webpage, view engines and their syntax, why Template Engine, introduction to Jade, introduction to Vash, Examples

Textbooks

1. Alex Young et.al, "Node.js in Action", Second Edition, Dreamtech press publication, ISBN: 978-93-86052-04-9, 2017
2. Ethan Brown, "Web Development with Node and Express: Leveraging the JavaScript Stack", 2nd Edition, O'Reilly Media, ISBN: 978-1492053514, 2019

Reference Books

1. Greg Lim, "Beginning Node.js, Express & MongoDB Development Paperback", ISBN: 978-1078379557, 2019
2. Kristina Chodorow, "MongoDB: The definitive Guide", Second Edition, O'Reilly Media, ISBN:978-93-5110-269-4, 2013
3. Jonathan Wexler, "Get Programming with Node.js" ISBN: 9781617294747, February 2019 Kogent Learning Solutions Inc., "HTML 5 Black Book (Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery) "2Ed.
4. Laura Lemay, Rafe Colburn, Jennifer Kyrnin, "Mastering HTML, CSS & Javascript Web Publishing"

23HFS601L Server-Side Technology Laboratory

Teaching Scheme:
Practical: 4 hours/week

Examination Scheme:

In-Semester: 25 Marks
Practical: 25 marks
Credits: 2

Prerequisites: JavaScript

Course Objectives:
Familiarize students with

1. Implementation concepts behind Server-side technology
2. Structure an Server-side technology-based application in modules
3. Buffers, Streams, and Pipes
4. Building a web application and API

Course Outcomes:
Students will be able to:

1. Create modules
2. Manage node packages, frameworks and events
3. Build a web Server to develop web applications
4. Establish database access

Design and implement a mini project using following concepts of Server-side technology

1. Creating Modules
2. Packages, framework and events
3. Building web server for web application
4. Establishing connectivity with backend

Textbooks

1. Alex Young et.al, "Node.js in Action", Second Edition, Dreamtech press publication, ISBN: 978-93-86052-04-9, 2017
2. Ethan Brown, "Web Development with Node and Express: Leveraging the JavaScript Stack", 2nd Edition, O'Reilly Media, ISBN: 978-1492053514, 2019

Reference Books

1. Greg Lim, "Beginning Node.js, Express & MongoDB Development Paperback", ISBN: 978-1078379557, 2019
2. Kristina Chodorow, "MongoDB: The definitive Guide", Second Edition, O'Reilly Media, ISBN:978-93-5110-269-4, 2013
3. Jonathan Wexler, "Get Programming with Node.js" ISBN: 9781617294747, February 2019 Kogent Learning Solutions Inc., "HTML 5 Black Book (Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery) "2Ed.
4. Laura Lemay, Rafe Colburn, Jennifer Kyrnin, "Mastering HTML, CSS & Javascript Web Publishing"