

CSC-352: Web Engineering

General Information

Course Number	CSC-352
Credit Hours	3+1 (Theory Credit Hour = 3, Lab Credit Hours = 1)
Prerequisite	CSC-102 (Programming Fundamentals)
Semester	VI

Course Objectives / Description

As an emerging discipline, web engineering actively promotes systematic, disciplined and quantifiable approaches towards successful development of high-quality, ubiquitously usable web-based systems and applications. In particular, web engineering focuses on the methodologies, techniques and tools that are the foundation of web application development and which support their design, development, evolution, and evaluation. Web application development has certain characteristics that make it different from traditional software, information system, or computer application development.

Course Learning Outcomes (CLOs)

No.	Course Learning Outcome	Domain	Level	Assessment Tool
C1	To demonstrate web engineering fundamental concepts of web technologies specially Bootstrap, JavaScript, ES6, Node.js & Express.js	C	2	LMS
C2	To develop a Front-End of the web application	C	3	LMS
C3	To develop APIs by using JavaScript (Node.js) language integrating with MongoDB/MySQL database.	C	3	LMS
C4	To analyze and debug the code.	C	4	LMS

Domains: C=Cognitive, A=Affective, P=Psychomotor

Levels:

Cognitive = {1: Remembering, 2: Understanding, 3: Applying, 4: Analyzing, 5: Evaluating, 5: Creating}

Affective = {1: Receiving, 2: Responding, 3: Valuing, 4: Organizing, 5: Characterizing}

Psychomotor= {1: Imitation, 2: Manipulation, 3: Precision, 4: Articulation, 5: Naturalization}

Course Contents

Week No.	Topic	Suggested Readings (Chapters)	CLO
1	<ul style="list-style-type: none">Introduction<ul style="list-style-type: none">Introduction of Web EngineeringA Brief Introduction to the InternetThe World Wide WebWeb vs InternetWeb BrowsersWeb ServersUniform Resource LocatorsHypertext	1-2 & Teacher Notes	C1 & C2

	<ul style="list-style-type: none"> ○ The Hyper Text Transfer protocol ○ IP Address ○ IPv4 vs Ipv6 ○ Website vs Web Application ● Domain Name Structure ● Domain Name Working ● Web Request – Response Cycle ● Categories of Web Application <ul style="list-style-type: none"> ○ Document centric web application ○ Interactive web application ○ Transactional web application ○ Workflow based web application ○ Collaborative web application ○ Portal-oriented web application ○ Ubiquitous web application ○ Knowledge-based web application ● Web Application Architecture <ul style="list-style-type: none"> ○ Single Tier ○ Client Server (Two Tier) ○ Three Tier ● Introduction to HTML <ul style="list-style-type: none"> ○ Creating an HTML Document ○ Nesting HTML Elements ○ Heads Elements & Scripts in HTML ○ HTML Layout Elements ○ Embedding Audios & Videos in HTML ○ Navbar & List Items in HTML ○ Headings in HTML ○ HTML Paragraphs & Text Formatting ○ Text Formatting in HTML ○ HTML Table ○ Page Linking in HTML ○ Forms & Inputs ○ Inline & Block Elements 		
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2 & 3	<ul style="list-style-type: none"> • Introduction to CSS <ul style="list-style-type: none"> ○ CSS Documents & The Cascade ○ Selectors, Properties & Values ○ Classes & IDs ○ Specificity in CSS ○ Setting Widths & Heights ○ Length Units ○ Colors & Color Types ○ Padding ○ Margin ○ Borders ○ The Box Model ○ Visibility ○ Working with Fonts ○ Element Flow in HTML and CSS (Block & Inline elements) ○ Float Layout ○ Position Property ○ CSS Pseudo Classes • Introduction to Bootstrap • Key Elements • Source Code Elements • Screen Sizes • Key Components <ul style="list-style-type: none"> ○ Alerts ○ Badge ○ Breadcrumbs ○ Buttons & Button Groups ○ Cards ○ Carousel ○ Collapse & Accordion ○ Dropdowns, Forms, Custom Forms ○ Input Group & List Group ○ Media Object ○ Nav & Navbar ○ Bootstrap Modal ○ Paginators ○ Progress & Spinner ○ Table ○ Toasts, Popovers & Tooltips • Styling Essentials <ul style="list-style-type: none"> ○ Breakpoints ○ Typography ○ Floats ○ Flex ○ Alignment ○ Borders ○ Position of Elements ○ Shadows ○ Visibility 	3 & Teacher Notes	C1 & C2
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4 & 5	<ul style="list-style-type: none"> • Introduction to JavaScript <ul style="list-style-type: none"> ○ Variables & Const Variables ○ Numbers & Strings ○ Booleans ○ Type Conversion ○ Arrays ○ Objects ○ Arithmetic, Relational, Increment & Decrement Operators ○ If, Else-if, And & Or ○ Switch Statement ○ Loops <ul style="list-style-type: none"> ▪ For ▪ While ▪ Do While Loops ▪ For...of ▪ For...in ○ Scope ○ Functions <ul style="list-style-type: none"> ▪ Arrow ▪ Anonymous ○ Error & its types ○ Exception Handling ○ High Order Function ○ Closures ○ Iterators <ul style="list-style-type: none"> ▪ .forEach() Method ▪ .map() Method ▪ .filter() Method ▪ .find() Method ▪ .findIndex() Method ▪ .reduce() Method ▪ .some() Method ▪ .every() Method ▪ .sort() Method ▪ Choose Right Iterator 	Teacher Notes	C1, C2 & C3
First Mid Term			
7 - 10	<ul style="list-style-type: none"> • Introduction to DOM <ul style="list-style-type: none"> ○ Console Object Functions (clear, error, warn, etc) • Access Elements in the DOM <ul style="list-style-type: none"> ○ querySelector ○ querySelectorAll ○ getElementById ○ getElementsByTagName ○ getElementsByClassName • DOM Manipulation <ul style="list-style-type: none"> ○ Node vs Element ○ Changing Attributes & Values of DOM Elements ○ Traversing the DOM ○ Add, create & Remove DOM Elements ○ Changing Multiple Elements • Working with Events <ul style="list-style-type: none"> ○ Browser Events ○ Adding/Removing Event Listener ○ Event to Wait for DOM to load ○ Event Object ○ Properties & Methods of Event Object 	Teacher Notes	C1, C2 & C3

	<ul style="list-style-type: none"> ○ Event Target property • Working with Local Storage & Cookies • preventDefault & stopPropagation • Web Working <ul style="list-style-type: none"> ○ Request/Response Cycle ○ REST ○ • XHR, AJAX & JSON <ul style="list-style-type: none"> ○ AJAX with JS ○ Fetch function 		
Second Mid Term			
12 - 15	<ul style="list-style-type: none"> • ES6 Features <ul style="list-style-type: none"> ○ Template Literal ○ Arrow Function ○ Classes ○ Modules ○ Enhanced Object Literals ○ Destructuring <ul style="list-style-type: none"> ▪ Object ▪ Array ○ Default + Rest + Spread ○ Iterators & For...Of ○ Generators ○ Promises ○ Proxies • Introduction to React.js <ul style="list-style-type: none"> ○ Core Features ○ Thinking in React.js ○ Building and App Using Components ○ ReactDOM, JSX & Babel ○ Creating Custom Components ○ Introduction to Props ○ Adding CSS Classes to JSX ○ Conditional JSX • Props <ul style="list-style-type: none"> ○ Usage of Props ○ PropTypes and DefaultProps • State <ul style="list-style-type: none"> ○ Important State Concepts ○ Pure Functions & setState ○ Passing State to Child Components ○ Passing State to Parent Components • Component Architecture <ul style="list-style-type: none"> ○ Component Hierarchy ○ Different Styles of React Components ○ Declarative vs Imperative ○ Virtual DOM • Events in React • Fetching Data From an API • Component Life Cycle • Node Package Manager <ul style="list-style-type: none"> ○ Introduction of NPM ○ Installing Packages Locally ○ Adding Dependency in package.json ○ Updating Packages 		C1 & C3

15	Project Presentations and Revision		
Final Exam			

CLO-PLO Map

Graduate Attribute (PLOs)												
CLOs	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12
CLO 1	1	0	0	0	0	0	0	0	0	0	0	0
CLO 2	0	0	1	0	0	0	0	0	0	0	0	0
CLO 3	0	0	1	0	0	0	0	0	0	0	0	0
CLO 4	0	1	0	0	1	0	0	0	0	0	0	0

Textbook

1. Web Engineering: A Practitioner's Approach by Roger S. Pressman, David Lowe
2. You Don't Know JS by Kyle Simpson
3. The Road to learn React: Your journey to master plain yet pragmatic React.js by Robin Wieruch
4. Beginning Node.js, Express & MongoDB Development by Greg Lim - (2019)

Reference Material

Available on LMS

Instructor

Name	Khalid Hussain
Designation	Lecturer
Department	Computer Science

Computer Science/Software Engineering Program Learning Outcomes

GA: Graduate Attributes

GA1 Computing Knowledge: An ability to apply knowledge of mathematics, science, computing fundamentals and computing specialization to the solution of complex computing problems.

GA2 Problem Analysis: An ability to identify, formulate, research literature, and analyze complex computing problems reaching substantiated conclusions using first principles of mathematics, natural sciences and computing sciences.

GA3 Design/Development of Solutions: An ability to design solutions for complex computing problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

GA4 Investigation: An ability to investigate complex computing problems in a methodical way including literature survey, design and conduct of experiments, analysis and interpretation of experimental data, and synthesis of information to derive valid conclusions.

GA5 Modern Tool Usage: An ability to create, select and apply appropriate techniques, resources, and modern IT tools, including prediction and modeling, to complex computing activities, with an understanding of the limitations.

GA6 The Computer Scientist and Society: An ability to apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional computing practice and solution to complex computing problems.

GA7 Environment and Sustainability: An ability to understand the impact of professional computing solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development.

GA8 Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of computing

practice.

GA9 Individual and Teamwork: An ability to work effectively, as an individual or in a team, on multifaceted and /or multidisciplinary settings.

GA10 Communication: An ability to communicate effectively, orally as well as in writing, on complex computing activities with the computing community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

GA11 Project Management: An ability to demonstrate management skills and apply computing principles to one's own work, as a member and/or leader in a team, to manage projects in a multidisciplinary environment.

GA12 Lifelong Learning: An ability to recognize importance of, and pursue lifelong learning in the broader context of innovation and technological developments