San José State University
Department of Computer Engineering

CMPE 280
Web UI Design and Development

Section 2
Spring 2020

Course and Contact Information

Instructor:	Ron Mak
Office Location:	ENG 250
Email:	ron.mak@sjsu.edu
Website:	http://www.cs.sjsu.edu/~mak/
Office Hours:	TuTh 4:30 – 5:30 PM
Class Days/Time:	TuTh 10:30 - 11:45 AM
Classroom:	Clark 222
Prerequisites:	Classified graduate standing or instructor consent. Computer Engineering and Software Engineering majors only.

Course Format

This course will be taught primarily via classroom presentations.

Faculty Web Page and Canvas

Course materials, syllabus, assignments, grading criteria, exams, and other information will be posted at my faculty website at http://www.cs.sjsu.edu/~mak and on the Canvas Learning Management System course login website at http://sjsu.instructure.com. You are responsible for regularly checking these websites to learn of any updates. You can find Canvas video tutorials and documentations at http://ges.sjsu.edu/canvas-students

Course Catalog Description

"Web User-interface (UI) design and development with contemporary web standards. Understand interaction and interface design principles and processes for rich web applications, mobile web, web graphics, web design fundamentals, tools, interaction using client-side scripting and server-side frameworks."

Academic Integrity

"Major exams in this class may be video recorded to ensure academic integrity. The recordings will only be viewed if there is an issue to be addressed. Under no circumstances will the recordings be publicly released."

Course Goals

This section of the course will concentrate on current industry practices of UI design for web applications and on the tools and techniques to develop these applications. The first half of the semester will introduce the practices, tools, and technologies. After a brief introduction to *data visualization*, the second half of the semester will focus on the creation of web-based *information dashboards* and websites that *tell stories with data*, all of which are important for data science. GUI design patterns and usability testing will help ensure that each application offers a compelling user experience (UX).

Topics for the course will include:

- Web programming overview
    - Model-View-Controller (MVC) architecture
    - Client side
    - Server side
    - Data management backend
    - Single-page applications (SPAs)
- Analysis and design
    - Functional and nonfunctional requirements
    - Use cases
    - Functional specification
    - Design specification
- Client-side programming
    - HTML 5 + CSS 3
    - JavaScript
    - JavaScript libraries: jQuery, React
    - Responsive websites
    - AJAX
    - Framework: AngularJS
- Server-side programming
    - Framework: Node.js + Express
    - MEAN stack: MongoDB + Express + Angular + Node.js
    - MERN stack: MongoDB + Express + React + Node.js
    - Search engine optimization (SEO)
- Data management
    - NoSQL database: MongoDB
    - Content management: WordPress
    - RESTful web services
- Data visualization
    - Information dashboards
    - Websites that tell stories with data
- Compelling user experience (UX)
    - GUI design patterns
    - Functionality testing
    - Usability testing

Course Learning Outcomes (CLO)

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

CLO 1: **Requirements analysis:** Analyze a problem's requirements and design an application to meet them.

CLO 2: **Client side:** Use HTML 5, CSS 3, JavaScript, libraries such as jQuery, and frameworks such as AngularJS. Employ GUI design patterns to develop superior web user interfaces.

CLO 3: **Server side:** Use technologies such as node.js and MongoDB and frameworks such as Express to create RESTful web services.

CLO 4: **Web applications development:** Execute the complete process of designing, developing, deploying, and maintaining applications using web standards. Implement techniques such as search engine optimization (SEO).

CLO 5: **Data science:** Use data visualization to design and implement web-based information dashboards and web applications that tell stories with data.

CLO 6: **User experience (UX):** Perform usability testing to create web applications that offer a compelling UX.

You will follow industry-standard best practices and use software development tools that are common in today's software industry.

You will develop the *critical job skill* of working in a small project team.

Recommended texts

Web standards, tools, and techniques evolve too rapidly for published books to keep up. Rely on the web for the most current information.

Title:	*JavaScript & jQuery: The Missing Manual,* 3rd edition
Author:	David Sawyer McFarland
Publisher:	O'Reilly Media, 2014
ISBN:	978-1491947074
Title:	*Getting MEAN with Mongo, Express, Angular, and Node*
Author:	Simon Holmes
Publisher:	Manning Publications, 2015
ISBN:	978-1617292033
Title:	*Express in Action:* *Writing, Building, and Testing Node.js Applications*
Author:	Evan Hahn
Publisher:	Manning Publications, 2016
ISBN:	978-1617292422
Title:	*Learning React*
Author:	Kirupa Chinnathambi
Publisher:	Addison-Wesley Professional, 2016
ISBN:	978-0134546315
Title:	*RESTful Web API Design with Node.js,* 2nd edition
Author:	Valentin Bojinov
Publisher:	Packt Publishing, 2015
ISBN:	978-1783985869
Title:	*Storytelling with Data:* *A Data Visualization Guide for Business Professionals*
Author:	Cole Nussbaumer Knaflic
Publisher:	Wiley, 2015
ISBN:	978-1119002253
Title:	*Designed for Use:* *Create Usable Interfaces for Applications and the Web,* 2nd edition
Author:	Lukas Mathis
Publisher:	Pragmatic Bookshelf, 2017
ISBN:	978-1680501605
Title:	*Designing Interfaces:* *Patterns for Effective Interaction Design,* 2nd edition
Author:	Jenifer Tidwell
Publisher:	O'Reilly Media, 2011
ISBN:	978-1449379704
	Books on data visualization and information dashboard design by Edward Tufte and Stephen Few

Course Requirements and Assignments

You will form project teams of four students each. *Team membership is mandatory for this class.* The teams will last throughout the semester. Once the teams are formed, you will not be allowed to move from one team to another, so form your teams wisely!

Team-based assignments will provide practice with web tools and techniques, and opportunities for research. Each student team will also have a semester design project to develop a significant web application that tells a story with data. The assignments will incrementally help each team develop its project, and each assignment will take one or two weeks. *Each student on a team will receive the same score for each team assignment and the team project.*

Each team will submit its assignments and project into Canvas, which will display the scoring rubric. At the end of the semester, each team will give a presentation and demo of its design project, and students will help to score each presentation.

Each assignment and project will be worth up to 100 points. Late assignments will lose 20 points and an additional 20 points for each 24 hours after the due date.

The university's syllabus policies:

- University Syllabus Policy S16-9 at http://www.sjsu.edu/senate/docs/S16-9.pdf.
- Office of Graduate and Undergraduate Programs' Syllabus Information web page at http://www.sjsu.edu/gup/syllabusinfo/

"Success in this course is based on the expectation that students will spend, for each unit of credit, a minimum of 45 hours over the length of the course (normally 3 hours per unit per week with 1 of the hours used for lecture) for instruction or preparation/studying or course related activities including but not limited to internships, labs, clinical practica. Other course structures will have equivalent workload expectations as described in the syllabus."

Exams

The midterm and final examinations will be closed book. There can be no make-up midterm examination unless there is a documented medical emergency. Make-up final examinations are available only under conditions dictated by University regulations.

The exams will test understanding (not memorization) of the material taught during the semester and now well each of you participated in your team assignments and project.

Grading Information

Your individual final class grade will be weighted as follows:

30%	Assignments*
35%	Project*
15%	Midterm exam**
20%	Final exam**

* *team scores*
** *individual scores*

Course grades will be based on a curve. Per CMPE Department policy, the median total score will earn a B+. Approximately one third of the class will earn higher grades, and another one third will earn lower grades.

Postmortem Report

At the end of the semester, each student must also turn in a short (under 1 page) individual postmortem report that includes:

- A brief description of what you learned in the course.
- An assessment of your accomplishments for your team assignments and design project.
- An assessment of each of your other project team members.

Only the instructor will see these reports. How your teammates evaluate you may affect your course grade.

Classroom Protocol

It is very important for each student to attend classes and to participate. Mobile devices in silent mode, please.

University Policies

Per University Policy S16-9, university-wide policy information relevant to all courses, such as academic integrity, accommodations, etc. will be available on Office of Graduate and Undergraduate Program's Syllabus Information web page at http://www.sjsu.edu/gup/syllabusinfo/.

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Course Schedule (subject to change with fair notice)

Week	Date	Topics
1	Jan 23	Web programming overview HTTP protocol "Naked" HTML: lists, tables, links, and images HTML user input components: push buttons, checkboxes, radio buttons, menus *Form programming teams*
2	Jan 28 Jan 30	Model-view-controller (MVC) architecture Node.js server-side programming The Express framework Functional and nonfunctional requirements Use cases The Functional Specification
3	Feb 4 Feb 6	CSS 3 stylesheets Text formatting Page layout
4	Feb 11 Feb 13	Session management and cookies JavaScript client-side programming Document object model (DOM) JavaScript regular expressions User authentication
5	Feb 18 Feb 20	HTML 5 canvas drawing JavaScript animation Mouse and keyboard events DOM manipulation Object-oriented JavaScript AJAX
6	Feb 25 Feb 27	The jQuery library AJAX support jQuery User Interface Toolkit (jQueryUI)
7	Mar 3 Mar 5	Search engine optimization (SEO) Content management and WordPress
8	Mar 10 Mar 12	***Midterm exam Tuesday, March 10*** NoSQL databases MongoDB Documents and collections

Week	Date	Topics
9	Mar 17 Mar 19	Express + MongoDB Database queries Database CRUD actions and HTTP verbs The REST API and RESTful web services Web-based information dashboards
10	Mar 24 Mar 26	Pre-attentive attributes Visual perception Types of data Uses of color Gestalt principles
	Mar 30 Apr 3	***Spring break***
11	Apr 7 Apr 9	Data visualization tools Choose the right charts Websites that tell stories with data GUI design patterns Organization design patterns Navigation design patterns Page layout design patterns List design patterns
12	Apr 14 Apr 16	Action design patterns User input design patterns AngularJS 2-way data binding MongoDB + Express + AngularJS + node.js (MEAN stack)
13	Apr 21 Apr 23	AngularJS filters and services AngularJS tables, events, forms, animation, and routing Single-page application (SPA) The React library MongoDB + Express + React + node.js (MERN stack)
14	Apr 28 Apr 30	Usability testing Project presentations
15	May 5 May 7	Project presentations Project presentations
Final exam	***Monday, May 18***	Time: 9:45-12 noon Room: ENG 337