Syllabus for CS152aj: Web Application Development

Learning Objectives:
At the end of this course you will be able to

- understand and explain the syntax and semantics of javascript including
  o the implementation of first order functions as closures
  o the prototype model of Objects and how it compares to the Java OOP model
  o the interaction of javascript and DOM for client-side applications
  o event handling for javascript in webpages and deployed on servers
- create a webapp using javascript on the server (e.g. on Heroku) which interacts with the file system, with databases, and with other servers using sockets
- describe Restful APIs and how they contribute to Scalability
- implement secure authentication in a webapp
- create mobile webapps (using Cordova or PhoneGap or similar web-based approaches) using modern technology which interact with your server

Topics to cover

- Javascript the language
  o The basics - syntax, values, expressions, arrays, regex, control flow
  o Functions - scope, semantics (first-class functions)
  o Objects - prototype-semantics, scoping, members
  o Run-time environments
    ■ browsers, DOM, window
    ■ consoles (Rhino, command-line interface)
    ■ servers (node.js context)
- Basic Webservice Topics
  o FileSystem operations (threads, asynchronous file I/O)
  o Sockets (listening, read/write)
  o Modules and a messaging architecture
  o Database creation and access
  o Restful APIs and Scalability
  o JSON
  o Authentication
  o Load Balancing and Multi-threading on Heroku
- Web/Mobile Applications
  o HTML5
  o CSS2.3
  o DOM
○ Event handling in Client-side Javascript
○ jQuery
○ jQueryMobile
○ AJAX
○ Phonegap and Native Apps
○ Persistence (cookies, localstorage, cloud storage, client DB)
○ Geolocation

● Software Engineering Topics (introduce in 1st 5 weeks, apply in 2nd 5 weeks)
  ○ Distributed Version Control (git, github)
  ○ Integrated Development Environments (eclipse)
  ○ Lean Startup Methodology (fast fail, pivot, customer development,...)
  ○ Agile Software Development (stories, sprints, principles)

Schedule
Here is a 1st pass at a rough schedule of lessons. We may vary the schedule based on how much time is needed to fully master the material.

Week 1 -
● Wed AM Javascript: values, expressions, control-flow, arrays, functions.
● Wed PM Servers: Examples of simple node.js webservers
● Thu AM Clients: Intro to HTML5 and CSS and DOM
● Thu PM Software Engineering: Eclipse

Week 2 -
● Wed AM Servers: filesystem access, sockets, JSON
● Wed PM Javascript: prototypes, objects, and modules
● Thu AM Clients: AJAX, audio I/O, accessing speech services
● Thu PM Software Engineering: Git

Week 3 -
● Wed AM Servers: databases, modules, threads, and messaging
● Wed PM Clients: PhoneGap, persistence
● Thu AM Javascript: regular expressions, webworkers
● Thu PM Software Engineering: Lean Startup Methodology

Week 4
● Wed AM Software Engineering: Customer Development
● Wed PM Servers: Load Balancing and Multi-threading on Heroku
● Thu Clients: jQuery Mobile and other client-side javascript libraries
Week 5
- Wed AM Software Engineering: Agile Development and Scrum
- Wed PM Servers: Authentication and Accessing Webservices
- Thu AM Clients: app distribution (Android and iOS markets ...)
- Thu PM Reflection: Group Project presentations (form groups and agree on product ideas)

Homework
There will be
- daily homework (mostly consisting of reading and/or simple interactions with the technology as well as reflective blogging) and
- weekly programming assignment that involve writing increasing complex webapps

Grading
The course will be graded as follows
20% participation in class (contributing to discussions, asking and answering questions)
40% daily homework assignments
40% weekly programming assignments