CAS CS412: Full Stack Application Design and Development

Perry Donham / perryd@bu.edu / 202-567-7362
PGP Key ID: BCC1ADDF
Mailslot: 111 Cummington / MCS138
Blog: http://sites.bu.edu/perryd
Twitter: @perrydBUCS
Office: PSY228C (64 Cummington Mall)

About the course
This course provides an introduction to the architecture, development, testing, and deployment of full-stack web-based applications, primarily in the MEAN stack but also examining Ruby/Rails and Python/Django/Flask. Included are technologies such as non-relational data stores (i.e. mongoDB), RESTful, decoupled appellations using JSON as a data transport, and web sockets. Front-end work is done in JavaScript (via Angular, React, and AJAX), and back-end work is primarily in Node and Express.

We will examine each component of the stack from a theoretical standpoint, and then put theory to practice by working on a semester-long programming project using the technologies in combination.

There are several interesting concepts that you might not have been exposed to yet in the CS curriculum, including:

- Non-relational, document-oriented data stores
- Asynchronous, non-blocking programming using Promises and thenables
- Architectures using internal application programming interfaces (APIs)
- Use of chained and lambda functions
- Working with third-party data sources via JSON APIs
- Deploying applications in a server less (cloud) environment such as AWS EC2 and Lambda
- Testing decoupled, API-based applications using frameworks such as Mocha/Chai

Stack overflow's annual developer surveys (n=62,000 this year) shows JavaScript to be the dominant language in the industry, with Python and Javascript in the #1 and #2 position in the 'technology I most want to learn' category. There is strong industry demand for full-stack developers. In this context, the course will help prepare you for this evolving workplace.

Text
We will use Kyle Simpson's excellent 5-book series *You Don't Know JavaScript (YDKJ)*, which is available at no cost from his GitHub repo: https://github.com/getify/You-Dont-Know-JS
Printed copies are also available through Amazon.

Blackboard / Piazza / GitHub / Slack
We use Blackboard (https://learn.bu.edu) as a repository for the slide sets for each class, for homework and lab assignments, and for announcements. You should be enrolled already, so that when you log on to the site you'll see the course listed. Piazza.com will be our tool for questions and discussion; a link to it will be on the Blackboard page. I'll post each week's

lecture materials as PDFs on Blackboard for your reference, you'll use Blackboard to turn in homework, which for the most part will be in the form of lab exercises, and to take quizzes.

Example code, and your project assignments, will be posted on GitHub. If there is interest we'll set up a Slack channel for the course, as well.

Homework/Lab Assignments
CS412 is a lecture/lab course, which means that part of your time will be spent completing lab exercises. Your lab section will meet each Wednesday. A Teaching Assistant will conduct lab sections and will be available for tutoring; their hours will be posted on Blackboard. We also have undergraduate assistants (UAs) who can help you with questions. Lab locations and times are available on Blackboard.

Generally speaking, labs and homework will be due one week after they are assigned. Assignments turned in after the due date will be docked 10 points (out of a total of 100 points).

Quizzes
There are 6 scheduled quizzes for the semester. Each will typically have 5 questions and will cover the material we discussed in Tuesday's lecture; occasionally there will be a question or two from the prior Thursday. The quizzes are taken online in Blackboard and you'll do them during your lab section on Wednesdays. I'll drop your lowest quiz grade at the end of the semester, so if you are ill or for some reason can't make it to lab you are covered at least once. There are no make-ups for quizzes.

Midterm and Final Exam
The midterm exam covers first-half material, and the final covers the second-half. Each is roughly 20 questions with a focus on the theoretical underpinnings and process behind full-stack application development.

Grades
The allocation for your final grade looks like this:

Homework/labs	15%
Quizzes	15%
Project	15%
Midterm exam	25%
Final exam	30%

Grades are not negotiable, but if you think that a mistake was made in grading, we'll take a look at it together. The course grading scale is numerical:

96-100	A	80-84	B	65-69	C
90-95	A-	75-79	B-	60-64	C-
85-89	B+	70-74	C+		

If your course grade happens to be close to a boundary, such as an 89.5, I'll bump you up unless your overall course work for some reason doesn't justify it.

Attendance
The format of the course is that Tuesday's lecture will be on something you will work on in lab on Wednesday, and you'll also take a quiz on Wednesday covering material from the lectures from the prior Thursday and Tuesday. Since quizzes are 15% of your grade, it pays to attend both lectures. In addition, the course moves quickly and there will be a significant amount of take-home work in the form of lab exercises and project work. Missing more than a class or two will impact your learning and your grade.

Getting Help
We want you to succeed in this class, and if you are stuck on something, email me or your teaching assistant or drop by my or their office hours. You can also post a question on our Piazza forum … that's usually the fastest way to get information. There are lots of ways that we can help, but you need to ask. Our teaching assistants and undergraduate assistants will hold tutoring hours during the week, which will be posted on Blackboard, as will be my office hours.

Contacting me and office hours
The best way to contact me is by email at perryd@bu.edu. You may also IM me at perryd@bu.edu (iMessage). My office is in the Psychology building at 64 Cummington Mall, room PSY228C. Office hours are posted on Blackboard. No appointment needed, just drop by if you have a question or want to hang out a bit. If you need to drop something off, my mail slot is in the CS office in MCS138.

If you'd like to get some practice in using encryption tool, you are invited to send encrypted and/or digitally signed email to me at perryd@bu.edu. On MacOS, the GPGSuite at gpgtools.org is a good choice (though I personally use Thunderbird with the Enigmail plugin on my own Macs); for Windows users you can try gpg4win.de. My public encryption key is available at https://pgp.mit.edu, and my key fingerprint/ID is C894 B69B 6576 C394 1452 2E9E 7C38 F315 BCC1 ADDF.

I also am a proponent of the encrypted IM app Signal; if you'd like to practice with it I'm happy to help you get it set up.

Academic Conduct Code
The University the College take cheating very seriously. Cheating and plagiarism will not be tolerated in any course. Cases will be referred to the Dean's office and may result in loss of credit for an exam or assignment or other disciplinary action. Please read the college's policy at http://www.bu.edu/academics/policies/academic-conduct-code and, if you have any question as to whether something you are doing is in violation, please ask me about it.

Programming is a collaborative effort, and I fully expect that you will use resources such as Google, fellow students, and our own discussion forum on Blackboard to learn the material and do your assignments. We'll discuss code and approaches in class, and I'll occasionally post sample code on GitHub that you are welcome to use as a starting point. However, I don't want you to simply copy entire programs that you find on the web and turn them in as your own work (that's the definition of plagiarism). If you do use more than a line or two of someone else's code (including mine), make a note in a comment in your program to point to where you got it. Again, if there's any doubt, ask me.