CS 106AX — General Information

This handout is based on a course information template used by Eric Roberts in early April, 2018.

Instructor: Jerry Cain
E-mail: jerry@cs.stanford.edu
Office: Gates 192
Phone: 415-205-2242
Hours: Mondays and Wednesdays, 3:15pm until 4:45pm

TA: Ryan Eberhardt
E-mail: rebs@stanford.edu
Office: Gates B02
Hours: TBD

Course description

CS 106AX: Programming Methodologies in JavaScript and Python (Accelerated) (ENGR 70AX)
Introduction to the engineering of computer and web applications emphasizing modern software engineering principles: object-oriented design, decomposition, encapsulation, abstraction, and testing. This course targets an audience with prior programming experience, and that prior experience is leveraged so material can be covered more quickly and in greater depth.

Terms: Aut | Units: 3-5 | UG Reqs: WAY-FR | Grading: Letter or Credit/No Credit

Why Two Programming Languages?

Until very recently, CS 106A was taught using the Java programming language. CS 106A is often the largest class taught on campus in any single quarter, and the class has been well liked by the vast majority of its students. We have a dedicated group of professors and lecturers whose full-time job is to lead the course, we have excellent undergraduate section leaders who more or less operate as graduate student CAs, and we have a collection of polished, well-crafted assignments to help our students learn how to program well. Why, then would we tinker with the course at all if everything was so stable?

Computer science is one of the most dynamic disciplines in today’s world. Technology changes rapidly, and it is important for our courses to remain current if they’re to remain relevant. The Java language—which has been the programming language used in CS 106A for the last decade—is beginning to show its age. When we adopted Java in the early-to-mid 2000’s, it seemed likely that Java would become one of the primary languages used in the age of the World Wide Web. As things turned out, Java’s model for interacting with the web through the use of programs called applets did not succeed. When Java failed to provide a platform for implementing web content, JavaScript came along and assumed that responsibility. As it turns out, JavaScript is one of the most popular programming languages today, and the language—at least the parts we’ll expose in this course—is elegant and relatively easy to learn.
While there are an unbounded number of applications that require JavaScript for them to work and work well—after all, any interactive web page relies on JavaScript to implement that interactivity—there are a large class of problems for which JavaScript isn’t the best fit. Computationally intense problems—the ones that big data and machine learning platforms are designed to solve—are better suited for more general-purpose programming languages.

One such language is Python, which is currently being used as the sole language of instruction for CS 106A. And if it isn’t already the case, it will soon be true that most introductory programming courses at our peer institutions use Python as well.

I argue that we can learn both, and, in the process, learn about programming, software development, and the World Wide Web to a degree that wouldn’t be very easy if we tapped just one language instead of two. In particular, virtually all modern web clients rely on JavaScript, and many web servers rely on Python to synthesize HTML pages—or at least portions of them—before delivering them to the browser that requested them. By learning both languages, we’ll be in a position to not only learn how to program, but to understand how modern web applications are architected and implemented and how multiple components (HTML for content, CSS for formatting, JavaScript for interactivity, and Python for content generation) are merged together so that web properties like Facebook, Instagram, Google, Microsoft, and Amazon all work the way they do.

**Lectures**

Lectures are scheduled for Monday, Wednesday, and Friday at 10:30 A.M. in Gates B12. Lectures aren’t being recorded this quarters, since the course is experimental and very small. The schedule for individual lectures is given on the accompanying calendar handout.

In addition to lecture, you must also sign up for a weekly 50-minute section, which will be scheduled to begin in the second week of the quarter. A section signup link will go active this coming Thursday at 5:00 P.M. and stay active until Sunday at 5:00 P.M. During that 72-hour window, you can see what section times are available and state your preferences. Note that there is no advantage to submitting preferences before others, so you’re welcome to wait until Sunday afternoon if need be. Please do sign up for a section before the Sunday, 5:00 P.M. deadline, else you’ll be excluded from the initial round of section assignments.

**Units**

If you are an undergraduate, you are required to take CS 106AX for 5 units of credit. If you are a graduate student, you may enroll in CS 106AX for 3 units if it is necessary to reduce the unit count for administrative reasons. Taking the course for reduced units does not imply any change in the course requirements. CS106AX can be used to satisfy any requirement that CS106A does.
Drop/add deadlines
You may not add or drop courses from your study list after 5:00 P.M. on Friday, October 11, without having that course appear on your transcript with a notation indicating that you have withdrawn from the course. The last day to change your status to CR/NC or to withdraw from the course is Friday, November 15 at 5:00 P.M.

Web page
The web page for CS 106AX is, not surprisingly, http://cs106ax.stanford.edu. All the materials and course announcements will be posted on this website, so be sure to visit it often.

Course materials
The required text for this class is a new book called Introduction to JavaScript Programming: The “Nothing but a Browser” Approach, which is available at the Stanford Bookstore. The book is by Eric Roberts, who only recently retired from Stanford after nearly 30 years. He spent the last several quarters of his time at Stanford working on this textbook, and it’s beautifully written. (Note that last year’s course reader—the draft form of the book used the final time CS106AX was taught—is now obsolete, so you’ll need to purchase the physical textbook.)

We’ll also assign reading from a second textbook by Eric Roberts, one he’s been working on since his retirement. (True educators never really retire.) The book is currently in draft form, and much of it is a cannibalization of his JavaScript textbook. Its treatment of the Python programming language, however, is so clear and entertaining that I want to use it anyway. The course reader PDF is available free of charge to all CS106AX students, and I’ll soon include a link to it on the course website.

Programming assignments and problem sets
This quarter, CS 106AX requires either seven programming assignments, which are due on the dates given in the calendar handout. Except for the last assignment (which is due at the very end of the quarter), each assignment is graded during an interactive, one-on-one session with your section leader, who assigns two grades—one for functionality and one for style—drawn from this list:

++ An absolutely fantastic submission of the sort that will only come along a few times during the quarter. To ensure that this score is given only rarely, any grade of ++ must be approved by the instructor and TA.
+

A submission that exceeds our expectations for the assignment. The program must reflect additional work beyond the requirements or get the job done in a particularly elegant way.

√+

A submission that satisfies all the requirements for the assignment.

√

A submission that meets the requirements for the assignment, with a few small problems.

√– A submission that has problems serious enough to fall short of the requirements for the assignment.
A submission that has extremely serious problems, but nonetheless shows some effort and understanding.

A submission that shows little effort and does not represent passing work.

From past experience, we expect most grades to be $\sqrt{+}$ and $\sqrt{\cdot}$. Dividing the grades into categories means that your section leader can spend more time talking about what you need to learn from the assignment and not have to worry about justifying each point.

For each assignment, you must make an appointment with your section leader for an interactive grading session. Your section leader will explain how to schedule these sessions and go over the grading process in more detail.

**Examinations**

The midterm examination will be administered at two different times on **Tuesday, October 29th from 3:30 to 5:30 P.M.** and from **7:00 to 9:00 P.M.** The final examination is tentatively scheduled to be offered on **Monday, December 9th, from 3:30 to 6:30 P.M.**

The examinations are designed so that you should be able to complete them in less than the fully allotted time: the midterm is designed to take one hour, and the final is designed to take 100 minutes. Both exams are closed-computer, open-book, and you may use any notes or materials from the class.

**Late policy**

Assignments are submitted electronically as described in the first assignment handout, which goes out this coming Friday. **All assignments are due at 5:00 P.M. on the date indicated on the assignment handout. Assignments submitted after 5:00 P.M. will be considered late.**

Because each of you will come upon some moment during the quarter where so much work piles up that you need a little extra time, every student begins the quarter with three free "late days". To avoid any ambiguity, a "day" is defined as a class day. Thus, if your assignment was due on Friday but turned in the following Monday, that assignment would be one day late. After your late days for the quarter are exhausted, programs are assessed a late penalty of one category point per late day used (a $\sqrt{+}$ turns into a $\sqrt{\cdot}$, and so forth). Late days are valuable, and it pays to keep some around for the harder assignments toward the end of the quarter. In all cases, assignments must be turned in within a calendar week of their published due date.

In special circumstances such as extended medical problems or other emergencies, extensions may be granted beyond the late days. To request an extension, send an email to rebs@stanford.edu no later than 24 hours before the program is due. Only Ryan is authorized to approve extensions. In particular, do not ask your section leader.

**Grading**

The most important component of the final grade in CS 106AX is always the programming assignments, which count for just over half the final grade. Even so, one of the complaints we regularly hear from students is that the assignments don’t count for
enough relative to the exams. Many students feel that as long as they can implement the assignments correctly, it shouldn’t be necessary to suffer through an examination taken under arbitrary time constraints without the aid of a computer.

Although we’re sympathetic, there is a big problem. Computer science courses—here at Stanford as well as at most other colleges and universities—have been marked by an intolerably high number of academic dishonesty cases. Given that reality, we use exams to ensure our students have really learned the material. Someone who copies their assignments from someone else may do very well on those assignments (assuming we don’t catch it) but will in all probability do poorly on the midterm and the final.

Here, then, are the weights for the different components of the course:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Programming assignments</td>
<td>55%</td>
</tr>
<tr>
<td>Final examination</td>
<td>25%</td>
</tr>
<tr>
<td>Midterm examination</td>
<td>15%</td>
</tr>
<tr>
<td>Section participation</td>
<td>5%</td>
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</tbody>
</table>

**Fair Access**

Students who may need an academic accommodation based on the impact of a disability must initiate the request with the Student Disability Resource Center (SDRC) located within the Office of Accessible Education (OAE). SDRC staff will evaluate the request with required documentation, recommend reasonable accommodations, and prepare an Accommodation Letter for faculty dated in the current quarter in which the request is being made. Students should contact the SDRC as soon as possible since timely notice is needed to coordinate accommodations. The OAE is located at 563 Salvatierra Walk (phone: 650-723-1066).

**Financial Aid**

All students should retain receipts for books and other course-related expenses, as these may be qualified educational expenses for tax purposes. If you are an undergraduate receiving financial aid, you may be eligible for additional financial aid for required books and course materials if these expenses exceed the aid amount in your award letter. For more information, review your award letter or visit the Student Budget website.