

CS 4962-001 Fall 2021 Web Browser Internals

Professor: Pavel Panchekha, <pavpan@cs.utah.edu>

Assistant: Ian Briggs, <ibriggs@cs.utah.edu>

Location: Tue/Thu 12:25–13:45 in WBB 617

Textbook: [Web Browser Engineering](#), note that this is the in-progress draft

Reference: [MDN](#) and [web.dev](#)

Office Hours: The hour before class (Tue: Ian, Thu: Pavel), outside Two Creek while weather permits

While there is a Zoom link in the sidebar, it is only for presenting in class. The class takes place solely in person.

Communication:

Assignments, announcements, and course policy will be communicated via Canvas. Make sure you regularly check your school email for Canvas notifications. You can [set up email forwarding](#) from your university email to another address you check more frequently.

Homework submission will happen over Github. In the first week of class we will solicit your username and set up a repository for you to use for this class.

Informal discussion will be over [Discord](#). Here you can ask questions, get help from other students, or ask for additional materials to go deeper into a concept.

Covid, vaccinations, and masks:

The instructors *strongly encourage you to be vaccinated* for Covid. Both instructors have been fully vaccinated and did not feel any side effects. The mRNA vaccines (Pfizer and Moderna) are unusually safe and effective, even compared to other vaccines. They are also great example of how good science, determined researchers, and the power of the private sector can come together to have a huge positive impact on the world—themes of this class, too.

If you haven't been vaccinated, you can walk in to most pharmacies (like Walmart, Costco, Smith's, Harmon's, Walgreens, or CVS), or schedule a shot at U Health (the Pharmacy near 1300 E, the Madsen clinic, or the Hospital). *The vaccine is totally free* to you, whether or not you have insurance. If you are

getting vaccinated (first time or booster) and worry that side effects will leave you unable to attend or work for a few days, please let the instructors know and we'll hold deadlines and excuse class absences.

If you're sick, don't come to class. Let the instructors know and we'll excuse the absence.

Wearing a mask is up to you, but if you're partially- or un-vaccinated it's definitely a good idea.

Schedule

Aug 23	Intro + Basics of HTML, CSS, and JavaScript
Aug 30	Chapter 1 (Networking)
Sep 6	Chapter 2 (Graphics)
Sep 13	Chapter 3 (Text)
Sep 20	Chapter 4 (HTML)
Sep 27	Chapter 5 (Layout)
Oct 4	Chapter 6 (Styling)
Oct 11	Fall break (no class)
Oct 18	Chapter 7 (Chrome)
Oct 25	Chapter 8 (Forms)
Nov 1	Chapter 9 (Script)
Nov 8	Chapter 10 (Security)
Nov 15	Advanced topics
Nov 22	Advanced topics
Nov 29	Advanced topics
Dec 6	Advanced topics

Flipped classroom:

This course flips the classroom: you will watch lectures for homework and complete assignments as classwork. Your homework responsibilities are:

- Watch lecture videos, as assigned each class
- Read the textbook and build your own web browser
- Finish exercises, as discussed in class

The classwork will then involve:

- Presenting your browser implementations
- Completing the textbook exercises, as a class
- Discussing real-world browser implementations

Expect to have eight hours of homework and four hours of classwork a week (three hours of class plus one hour of office hours). See below for tips on succeeding in a flipped classroom.

Leading the class: When you lead the class on an exercise, you control the keyboard, but the whole class contributes to thinking about the exercise and coming up with a solution. Your job is to break problems into pieces, direct the discussion, and cut off unproductive approaches. You should also make sure to explain what you're doing and why: that way, other students can follow along and help you.

Participating: When you're not leading the class, pay attention and take notes. The exercises you're solving in class are your homework. If you pay attention to the discussion and understand the solution—at least the high-level steps, where changes need to be made, and how the solution is tested—finishing your homework should be quick and painless.

Grading:

Your grade will be based on homework (50%), discussion (15%), a project (15%), and quizzes (15%). The remaining 5% will be awarded to all students who come to at least one office hours from September onward. If you believe a grade to be in error, or want more detailed feedback, please notify the instructor within 7 days of receiving the grade.

We expect numeric grades to map to letter grades in the normal way (93+ is an A, 90– is a A–, 87– is a B+, and so on) but the instructors retain the right to curve grades up. (But we promise not to curve them down.)

This course is teaching cutting-edge, highly-specialized skills and the course material is difficult. This is the first semester that Web Browser Internals is taught to undergraduates, so we will try to grade permissively. That said, it is

easiest to be generous if we think you're making an effort and getting help (like coming to office hours or discussing issues on Discord).

Homework: Your homework is to implement the web browser described in the textbook and complete several exercises. This checks that you watch the lectures, read the textbook, and follow along with the code. Typically, you'll be asked to complete four exercises a week—I expect all four exercises to be completed in class, so following along in class should make your homework easy. There are 10 total homework assignments (one per chapter), each weighted at 5% of your grade.

Discussion: Presentations, exercises, and discussions will be led by students. Sign up on Canvas to lead; each student will lead for approximately 20 minutes. Lead class activities doesn't mean doing all the work yourself. You are graded on: being prepared for class; soliciting help from the class; vocalizing your thought process; and handling instructor and student questions.

You will not lose marks for having a buggy or incomplete browser implementation, or for being unable to complete an exercise (it is the job of the whole class to help you resolve problems). You will, however, lose marks for being unprepared: not having read the text or watched through the videos, and having little sense of what you are trying to accomplish or why. I expect every student to present twice; the first presentation will be 5% of your grade, and the second will be 10%.

Projects: In the last four weeks of the class, you'll be asked to complete a project of your choosing. Class size depending, these will likely be three-person projects. Projects should extend your browser in some direction, preferably something existing browsers implement. It could be an algorithm implementation, new layout modes, more advanced syntax, new protocols, or features like GUI widgets, plugin support, developer tools, and more. You'll be graded on a two-page project proposal (5%) and on the submitted project (10%).

Quizzes: You'll be asked to answer quiz questions on each day's lecture (due Friday / Wednesday night) and on each reading (Monday night). The quizzes aren't intended to be difficult. They're just about ensuring you actually read / watched the material. There will be a total of 30 quizzes, each worth 0.5% of your grade.

Quizzes are handled online through Canvas. The quiz also has a spot to leave comments on the course and rate the clarity of the material and your interest in it.

Late policy: For homework submissions, two-day extensions are automatically granted—no need to reach out to the instructors. Otherwise, late assignments are not accepted except in emergencies (for which, contact the instructors).

Succeeding in a flipped classroom:

Start preparing for class the previous week. Consider the week of 11 October, covering layout (one of the most complex topics this class covers), with classes scheduled for the 12th (Tuesday) and 14th (Thursday). The 8th, the prior Friday, is a good time to start preparing.

- On Friday, watch the "Layout A" lecture videos and answer their quiz questions. This will take about a half hour.
- On Monday, read the layout chapter, following along with your own web browser code. Debug your browser and get it running. This will take about six hours. You might do this over the weekend if you have time.
- Before class Tuesday, come to office hours if you found the videos confusing or you couldn't get your browser to work.
- On Wednesday, watch the "Layout B" lecture videos and answer their quiz questions. This will take about a half hour and will prepare you for some of the harder exercises.
- Before class Thursday, again come to office hours to clarify the videos or get help on any exercises you've started.

By Tuesday's class, you've seen the material twice, and have worked with the code. This gives you a good understanding of browser layout. You're thus prepared to present your code and lead the other students in fixing bugs, testing your browser, or implementing an exercise.

Get help: If you have questions about the material, or need help debugging your web browser, ask them on Discord or at office hours. Since office hours are right before class, they will also help you prepare for class.

Other policies:

Please familiarize yourself with [University policies](#) on the ADA, safety, sexual misconduct, Covid, undocumented students, drop/withdrawal, student mental health, student support, and [academic misconduct](#), as well as [School of Computing academic policies](#) and [College of Engineering policies](#).