

Creating Modern Web and Mobile Applications

CSCI1320, Spring 2021, Prof. Reiss

Course Overview

CSCI1320, 'Creating Modern Web and Mobile Applications', is a spring semester course within the Brown CS department. The course takes a holistic look at the process of developing web and mobile applications and aims to bring students to a point of mastery of several of the most used web and recent technologies and development practices. Due to COVID-19, this year the course will be taught on-line synchronously Monday, Wednesday and Friday at 10:00am Eastern Time on Zoom. The course is more condensed this year due to the shortened semester.

The course has three intertwined parts. The first involves learning the fundamentals of web and mobile applications. In this part, we will look at the organization and mechanisms used by these applications. There are a number of different technologies used today for developing such applications. We do not expect students to be an expert in all of these, but we do expect that students should be aware of them, what they are good for, and how they work so they can reasonably determine what should be used for a new application and can talk intelligently about web applications. There are also a number of factors to consider in building web and mobile applications including human factors, universal access, privacy, reliability, and security that are covered in this part of the course. This part of the course consists mainly of lectures, labs, and the final exam.

The second part of the course involves learning a specific set of technologies for building web and mobile applications. Here we will concentrate on HTML, CSS, JavaScript, and VUE for web front ends; NativeScript for mobile front ends; and Node.JS for back ends. We will also cover databases, both SQL and No-SQL, and various forms of client-server interaction. These will be covered in five programming or design assignments where the students get to apply the technologies.

The third part of the course involves a semester long group final project in which the students will be working in teams with external companies, non-profits, faculty, and other organizations to create or augment a real modern web or mobile interface. It is also possible for students to propose and direct their own project if it is well defined at the start of the semester.

The course has two official **tracks**, one intended for CS concentrators, and one intended for non-Concentrators with previous design experience. The **concentrator track** is for students with prior programming experience (CSCI0150/0160 or CSCI0170/0180 or CSCI0190 at a minimum, CSCI0300, CSCI0320 or CSCI0330 recommended). Concentrators will learn how to build and maintain all parts of a modern web or mobile application. The specific technology assignments and labs for concentrators will involve programming, generally in JavaScript. The **design track** does not assume any programming

background, but does assume a strong design background. Designers will learn how to apply their skills to web and mobile applications and learn how to interact with programmers to create good-looking and effective applications. The technology assignments and labs for designers will involve a minimum amount of programming and a significant amount of design. The tracks in the course are flexible. For example, concentrators who want to gain design experience are free to do one or more design assignments rather than the corresponding concentrator assignments.

The course can serve as a Computer Science **capstone**. If a student is taking it as a capstone, they must be in their last two semesters, and must either propose and supervise a team project or act as the team leader on their group project.

Students interested in **entrepreneurship** in Computer Science will find that the course provides several opportunities. Students can propose a project that could eventually be the basis of a start-up, and have a team of work on it. Project development will include ample opportunities to get experience in selling the underlying ideas including elevator talks, a (virtual) poster presentation, and in-class presentations. The prototype system that you produce as the project can be used as a basis for a potential start-up.

Course Mechanics

The class will meet Monday, Wednesday and Friday from 10:00 to 10:50 synchronously on Zoom. Students are encouraged to attend each class. Information about the class, assignments, help sessions, labs, etc. is posted on the course web site (<http://www.cs.brown.edu/courses/csci1320>). Students are expected to keep up to date with the announcements both in class and on the web site.

There is no textbook per se for the course. The course web site provides a set of reference links that can be used to get information about specific technologies. Homeworks, generally prerequisites for the various labs, will include web-based tutorials providing additional information.

Labs will be done online in class. Students are expected to have either a laptop or desktop computer available either that they are using for Zoom or while they are using Zoom. Students should ensure that they have the latest version of Zoom installed on their machine and should be familiar with its use. We will be asking you to install (or sign up for or access) various software as the semester progresses. Most of the labs will have a pre-lab assignment that serves as an introduction to the material and prepares one for the lab. This should be turned in before the lab class. Labs are designed to be done in class and finished in one class period if one has completed the pre-lab.

There are five programming/design assignments that are not collaborative and that are designed to hone your skills in particular technologies. These will be assigned after the corresponding material has been covered in class and/or in lab. These are not particularly simple, but should not be overly complex either. Most are designed to be done in 1 to 2 weeks provided you start on them early.

The course will involve a team project with various milestones during the semester. It will involve five programming/design assignments. The in-class labs are designed to familiarize students with the technologies used in the assignments. These labs will be preceded by a pre-lab homework assignment

that should introduce students to the material in a tutorial manner. There will be optional Zoom sessions run by the TA staff to go over these pre-labs. (If you cannot attend, you should be able to ask the TAs for equivalent help during TA hours.) The labs themselves will let students demonstrate the associated technology in a creative way. There will also be short homeworks that will serve to frame the subsequent lectures. Students are expected to do these homeworks in advance of the lecture and to be able to discuss them in class.

Dr. Reiss will have virtual office hours Monday and Thursday from 1 -3 pm. He will also be generally available from 8am to 4pm most weekdays via Zoom. (The virtual sign available at <https://www.cs.brown.edu/people/spr/status.html> should indicate his availability and how to reach him at the time. TA hours will announce during the first week of classes.

Project

Much of the course will involve a team project proposed by either outside sponsors or students. Project teams should ideally be four people. Information on posting projects is available on the course web site. The project schedule is tentatively:

DATE	PROJECT EVENT
1/23	Student Project Proposals due
1/25	Project proposals available
1/29	Project preferences due
2/2	Project teams announced
2/3	Initial team meeting in class
2/12	Initial client report (requirements)
3/1	Project specifications due, Project elevator talks
3/8	User feedback report
3/15	Project front end design due
3/15-3/21	Virtual Poster fair
3/26	Project implementation design due
4/2	Project prototype target date
4/9	Testing report and client feedback report due
4/12-4/16	Project presentations
4/19	Final project demos if desired
4/21	Final project hand-in

Grading

Your grade will be determined from programming assignments, labs, class participation, homeworks, final project, and final exam:

Programming Assignments	35% (7% each)
Homeworks, labs, participation	23%
Group Project	32%
Final Exam	10%

Note that Zoom and Panopto both record the identities of who attends or watches videos, and this will be used in part to determine the participation grade (which will be about 5%). Some of the lectures and labs will involve interactive components (e.g., commenting on other's designs) and will be difficult to do outside of class. Unless there are extenuating circumstances, all students in a project group will receive the same grade. The final exam will be take-home, open book.

A rough estimate of the required time would be 120 hours over the semester for the final project, 10 hours each for the five programming assignments, 20 hours for the labs and pre-labs, and 2 hours doing the pre-lecture homeworks.

Each student can use five late days throughout the whole semester. Late days can be used only for assignments, not for the final project, the labs, or the pre-labs, with at most three being used for any one assignment. Without late days, late assignments are penalized 15% per day. Late days will be applied optimally at the end of the semester on your behalf. **All assignments must be turned in**, even if they get zero points. Failure to do so will result in an NC for the course. The final project will not be accepted late. Absences or delays due to planned travel (e.g. job interviews) are not excusable (plan your late days accordingly). Students who need more time due to illness or other emergencies should get a dean's note or a note from health services when possible and should inform Dr. Reiss (no specifics needed) in a timely fashion.

Students are also required to work on and hand-in in-class labs. Labs must be completed (what this means depends on the lab) before two classes beyond the lab. After that, they receive no credit.

Collaboration

In general, this course encourages collaborative efforts. The final projects are collaborative. The in-class labs are generally collaborative. Homeworks can be collaborative (but require individual hand-ins). Especially for their final projects, students are encouraged to use publically available libraries and materials *as long as they are appropriately cited and the intellectual property rights are appropriate for the project*. If you have any questions as to what is allowed and what is not, please ask a TA or Dr. Reiss.

However, **the programming/design assignments and final exam are not collaborative exercises**. They should be the student's own work. A TA must approve any potential use of outside packages for the programming or design assignments. MOSS or similar technology will be used to detect plagiarism. Details of the policy can be found on the web site and the collaboration policy that must be signed by all students.

Diversity

Brown University is committed to full inclusion of all students. Please inform Dr. Reiss early in the term if you have a disability or other conditions that might require accommodations or modification of any of these course procedures. Lecture videos will be accompanied by transcripts. You may speak with Dr.

Reiss after class or during office hours. For more information, please contact [Student and Employee Accessibility Services](#) at 401-863-9588 or SEAS@brown.edu. Students in need of short-term academic advice or support can contact one of the deans in the Dean of the College office.

Tentative Class Schedule

Lecture: Course Introduction
Lecture: The Browser, HTML, CSS
Lecture: Accessibility
Lab: HTML/CSS
Lecture: JavaScript
Lecture: Dynamic Web Pages
Lecture: Dynamic Web Pages
Lecture: Requirements and Specifications
Lab: JavaScript/DOM
Lecture: JavaScript Frameworks/VUE
Lab: VUE
--- HOLIDAY
Lecture: The Web Server
Lecture: Node.JS
Lecture: Web App Architectures
Lecture: Web App Architectures
Lab: Node.JS
Project: Elevator Talks
Lecture: SQL Databases
Lecture: NoSQL Databases
Lab: Databases
Lecture: Mobile Applications
Lecture: NativeScript
Lab: Mobile
Lecture: HCI
Lab: Cloud-based deployment (AWS)
Lecture: HCI Design
Lecture: HCI Design
Lecture: Security I
Lecture: Security II
Lecture: Security III
Lecture: Privacy
Lecture: Testing I
Lecture: Testing II
--- HOLIDAY
Project: Final Presentations
Final Exam