Course Overview
CS132, 'Creating Modern Web 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 many of the most used web technologies and development practices.

The course has three intertwined parts. The first involves learning the fundamentals of web applications. In this part, we will look at the fundamentals of web applications. There are a number of different technologies available today. We don't 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 applications including human factors, universal access and security which will be covered in this part of the course. These will be covered mainly in lectures, homeworks, and labs.

The second part of the course involves learning a specific set of technologies for building a web application. Here we will concentrate on HTML, CSS and JavaScript for the front end and Node.js for the backend. We will also cover databases, both SQL and No-SQL, and various forms of client-server interaction. These will be covered in four 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 tracks, one intended for CS concentrators, and one intended for non-Concentrators with previous design experience. The concentrator track is designed for students prior programming experience (CSCI0150/0160 or CSCI0170/0180 at a minimum, CSCI0320 or CSCI0330 is recommended). Concentrators will learn how to build and maintain all parts of a modern web 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 course can be used 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 poster presentation, and in-class presentations. The prototype system that is produced as the project can be used as a prototype for a potential start-up.

**Course Mechanics**

The class will meet Monday, Wednesday and Friday from 10:00 to 10:50 in MacMillan 117. Students are encouraged to attend each class. Information is posted on the course web site ([http://www.cs.brown.edu/courses/csci1320](http://www.cs.brown.edu/courses/csci1320)) and students are expected to keep up to date with the announcements there.

There is no text book 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 will include web-based tutorials providing additional information.

The course will involve a team project with various milestones during the semester. It will involve four programming/design assignments. There will be in-class labs on specific technologies. The labs will be preceded by a homework assignment that should introduce students to the material in a tutorial manner. 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 office hours Monday and Thursday from 1 -3 pm. 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. The project schedule is tentatively:

<table>
<thead>
<tr>
<th>DATE</th>
<th>PROJECT EVENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/24</td>
<td>Student Project Proposals due</td>
</tr>
<tr>
<td>1/29</td>
<td>Project proposals available</td>
</tr>
<tr>
<td>2/2</td>
<td>Project preferences due</td>
</tr>
<tr>
<td>2/5</td>
<td>Project teams announced</td>
</tr>
<tr>
<td>2/16</td>
<td>Initial client report</td>
</tr>
<tr>
<td>2/26</td>
<td>Project specifications due</td>
</tr>
<tr>
<td>3/2</td>
<td>User feedback report</td>
</tr>
<tr>
<td>3/5,7</td>
<td>Project elevator talks</td>
</tr>
<tr>
<td>3/12</td>
<td>Initial project design</td>
</tr>
</tbody>
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### Grading

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

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
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</thead>
<tbody>
<tr>
<td>Programming Assignments</td>
<td>8% each (32% total)</td>
</tr>
<tr>
<td>Homeworks, labs, participation</td>
<td>23%</td>
</tr>
<tr>
<td>Group Project</td>
<td>35%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>10%</td>
</tr>
</tbody>
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A rough estimate of the required time would be 120 hours over the semester for the final project, 10 hours each for the four programming assignments, and one hour reading/doing homeworks per non-presentation class.

Each student can use three late days throughout the whole semester. Late days can be used only for assignments, not for the final project. Students can use late days as they want; they can use all three late days for one assignment or three different assignments. 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. Late days are available where needed. 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.

Students are also required to work on and hand-in in-class labs. If labs are not completed in class, they can be shown to TAs during TA hours for credit up to two classes beyond the lab.

### Collaboration

In general, this course encourages collaborative efforts. The final projects are collaborative. The in-class labs are collaborative. Homeworks can be collaborative. Especially for their final projects, students are encouraged to use publically available libraries and materials as long as they are appropriately cited.
However, the programming assignments and final exam are not collaborative exercises. They should be the student’s own work. 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. You may speak with me 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  
Lecture: Accessibility  
Lab: HTML/CSS  
Lecture: JavaScript  
Lecture: Dynamic Web Pages  
Lab: JavaScript/JQuery  
Lecture: Requirements/Specifications  
Lab: Front end frameworks (angular, react ...)  
Lecture: The Web Server  
Lecture: Web App Architectures  
-------- Holiday  
Lecture: Node.JS  
Lab: Note.JS  
Lecture: SQL Databases  
Lecture: NoSQL Databases  
Lab: Databases  
Project: Elevator Talks  
Project: Elevator Talks  
Lecture: Backend Technologies  
Lecture: Backend Technologies  
Lecture: HCI Navigation  
Lecture: HCI Design  
Project: Poster fair  
Project: Poster fair  
Lab: HCI Design  
-------- Spring Break  
Lab: Cloud-based deployment  
Lecture: Security I  
Lecture: Security II  
Lecture: Privacy and Security  
Lab: Security Challenge  
Lab: Security Challenge
Project: Presentations
Project: Presentations
Lecture: Testing I
Lecture: Testing II
Lab: Testing
Lab: Testing
Lecture: Mobile applications
Lab: Nobbles
Lecture: Future of Web Apps
Project: Final Presentations
Final Exam