

Syllabus: CS166 and CS162

Last revised: January 12, 2021

This is the official syllabus for both CS166 and CS162. Consult the course website at <https://cs.brown.edu/courses/csci1660/> for more details.

Overview and Learning Goals

CS166 This course teaches principles of computer security from an applied viewpoint and provides hands-on experience with security threats and countermeasures. The course additionally covers principles and skills useful for making informed security decisions and for understanding how security interacts with the world around it. The main topics covered are cryptography, authentication, access control, operating systems security, web security, and network security. Other topics include general security principles, human factors such as trust and social engineering, the security of complex systems, and the economics of security. The course aims to balance theory and practice.

CS162 This course is a half-credit lab intended to be taken concurrently with CS166 and provides students with a deeper understanding of the material by doing advanced versions of the CS166's projects. These advanced versions focus on real-world skills: performing attacks that are more difficult and rely on less serious vulnerabilities, performing attacks against systems with more real-world constraints, and creating attacks that achieve a higher standard of quality than a mere "proof of concept."

Diversity and Inclusion

We intend for this course to provide a welcoming learning environment for all students. We especially welcome diverse ideas and perspectives during class discussions—after all, viewing systems in different ways often results in more robust and secure systems in the end.

Each year, the course staff examines all aspects of the course (content, assignments, and overall structure) to ensure the material is accessible and inclusive to all. However, despite our best efforts, we may accidentally slip up, so please feel free to speak to any member of the course staff with any concerns you have during the semester and do not hesitate to contact the instructor directly. In case you believe you need to escalate your concerns further, you can reach out to Professor Thomas Doepfner (Vice Chair and Director of Undergraduate Studies).

To access student support services and resources, and to learn more about diversity and inclusion in CS, please visit <https://cs.brown.edu/about/diversity/resources/> and feel free to contact Laura Dobler, who coordinates diversity and inclusion initiatives in the department.

Prerequisites

CS166 Students are expected to have taken (1) CS016, CS018, or CS019; and (2) CS030, CS033, CS131, or CS133. Students who have previously taken CS1951-E (a course no longer offered by the department) should not enroll in CS166 given the significant overlap between CS166 and CS1951-E.

CS162 Students enrolling in CS162 must simultaneously enroll in CS166.

Learning Activities and Expected Workload

CS166 Lectures are held on Tuesdays and Thursdays from 1:00 PM–2:20 PM ET via Zoom. Attending lectures and active class participation is highly encouraged. While lecture will be recorded, class participation will help the instructor better assess your understanding of the topics in determining the final grade.

Coursework in CS166 consists of 4 homeworks, 4 projects, and 2 midterms.

- **Homeworks** ask you and your peers to collectively and critically think about systems security questions that extend various topics covered in lecture. Through analyzing protocols, devising attacks, developing defenses, and considering ethical issues that are heavily tied to the material, the homeworks are designed to reinforce your skills in security analysis, discussing complex security topics with your peers, and precise written communication of attacks and defenses.
- **Projects** provide you with the opportunity to engage with real-world vulnerabilities in computer systems. They ask you to get down into the mud—hacking, scripting, breaking, and fixing— via a combination of developing exploits and designing countermeasures.
- **Midterms** distill the systems security knowledge from the semester to encourage you to identify and apply the “big ideas” in systems security that we’ll see throughout the course. Midterms are take-home, open-note, zero-collaboration exams that you have several days to complete.

During the semester, students will spend about 3 hours per week in lecture (36 hours total), 8 hours per homework (48 hours total), and 10–30 hours per project (average 80 hours total). Additionally, combined preparation and active work time on each midterm is expected to take 8 hours (16 hours total), for a total expected course workload of 180 hours.

CS162 Coursework in CS162 consists of doing advanced versions of the projects in CS166 and additional questions on the written assignments (homeworks and midterms). The advanced components are designed to provide you with a greater appreciation of systems security and the “security mindset” as a whole by performing attacks against systems with more real-world constraints, and creating attacks that achieve a higher standard of quality than a mere proof of concept.

There is no scheduled meeting time for CS162.

For CS162, the advanced components add about 70 hours of project material, 16 hours of homework material, and 4 hours of midterm material, for a total expected half-credit course workload of 90 hours.

Grading

Final numerical grades are determined using the weights below:

Assignments	Weighting
· Homeworks	24%
· Midterm 1	12%
· Midterm 2	16%
· Project 1	11%
· Project 2	11%
· Project 3	11%
· Project 4	15%

All homeworks (with the exception of Homework 0, which does not count towards the final grade) are equally weighted.

If a student drops from CS162 to CS166-only, any CS162 components that were completed will no longer count towards the final grade (with the exception of some assignments where the CS162 requirements overlap with optional extra credit tasks for CS166 students—in these cases, extra credit for such work will be given).

The instructor determines overall letter grades by taking into account the final numerical grade and, in borderline cases, class participation. Students taking both CS166 and CS162 will receive the same letter grade in both courses.

The default thresholds for letter grades are $A = 90$, $B = 80$, and $C/S = 70$. Depending on the overall performance of the class, the thresholds may be adjusted downwards (but never upwards). Class participation will be especially important for borderline cases.

Late Policy

Midterms Late midterms will *not* be accepted.

Homeworks and Projects Students are given *five* late passes to use on Homeworks 1 through 4 and Projects 1 through 4, though no more than *two* late passes may be applied to any deadline. Each late pass extends the deadline by 24 hours.

If you have no more late passes, every 24 hours a project or homework is submitted late will subtract 25% from that assignment's grade. We do not grade submissions that are more than 48 hours late, regardless of whether or not late passes remain.

There are some special cases to the late policy:

- Some homeworks may contain a *discussion* portion where you asynchronously interact with students on a message board. Because the discussions involve responding to other students, all discussion portions must be completed on time according to the homework instructions in order to count for credit, regardless of whether or not you are using a late pass on the homework.
- Project 4 is a partner project that contains multiple deadlines. Late passes may not be applied to the intermediate deadlines of Project 4. On the final deadline, your group will be allowed to use the *minimum* of you and your partner's remaining late days (up to the two late pass allowed on a project deadline, stated earlier).

Late passes and penalties are automatically applied at the end of the semester in an optimal fashion; that is, we will apply late passes in such a way that gives you the highest grade.

CS162 students receive two additional late passes (*seven* total). However, students who drop CS162 lose the additional passes and receive late penalties under the default CS166 policy.

Extenuating Circumstances If there are extenuating circumstances preventing you from completing an assignment on time (e.g., sudden illness, other emergencies), please contact the instructor and Graduate TA *before the assignment is due*. We will provide a form to contact the instructor regarding such circumstances and request special arrangements.

Please note that only the instructor and the Graduate TA are the only staff members authorized to discuss or grant extensions for the course. The Head TAs and UTAs will not comment on the likelihood of or approve extension requests.

Collaboration Policy

All Brown students are responsible for understanding and following the *Brown Academic Code* and the *Code of Student Conduct*. Additionally, students are responsible for following the CS166 and CS162 *Collaboration Policy*—the official policy is posted on the course website.

In many places, the *Collaboration Policy* is purposely relaxed and encourages collaboration because we have found that working with others (in those specific places) is extremely beneficial to learning and the general camaraderie of the department. However, this also means that we *strictly* enforce (and check) the places in which the *Collaboration Policy* is non-relaxed. We use a variety of automated tools as well as manual statistical checks to detect violations of the collaboration policy in this course. The TAs are also trained to recognize anomalies in submissions. In all situations, flagged cases are investigated by hand by the instructor, and, when needed, are referred to the *Academic Code Committee* for further review.

Capstone and 2000-Level Credit

Capstone CS166 can be used as a capstone course for senior undergraduates. Students wishing to take CS166 for capstone credit *must* take CS162, and should register for both CS166 and CS162 in Banner. If you are planning on using CS166 as your capstone course, please email the Head TA list.

2000-Level Credit CS166 and CS162 can be taken together by master's students for 2000-level credit. Students wishing to do this should only register for CS166 (not CS162) in Banner, and should email the Head TA list.

Staff

The Head TAs can be reached at `cs1660headtas@lists.brown.edu`.

Instructor Bernardo Palazzi (`bpalazzi`)

Grad TA Lilika Markatou (`emarkato`)

Head TAs William Schor (`wschor`)
Zachary Espiritu (`zespirt`)

UTAs Abigail Siegel (`as130`)
Charles Somerville (`csomerv1`)
Charlotte Whatley (`cwhatley`)
Erica Li (`eli32`)
Jian Cong Loh (`jloh4`)
Kento Nambara (`knambara`)
Marcus Mitchell (`mmitch15`)
Sierra Rowley (`srowley2`)
Willem Speckmann (`wspeckma`)

Accessibility

Brown University is committed to full inclusion of all students. Students who, by nature of a documented disability, require academic accommodations should contact the professor. The staff of the office of *Student Accessibility Services* can be reached at 401-863-9588 or `SEAS@brown.edu` to request accommodations.

Additionally, the departmental *Health and Wellness Advocates* are available as a resource for you to discuss any concerns and to help you find options and accommodations.

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