

CSC 466/566 - Computer Security, Spring 2022

M W 3:30PM - 4:45PM, Gould-Simpson (Rm 906)

Description of the Course:

This is an introductory course covering the fundamentals of computer security. In particular, the course will cover basic concepts of computer security such as threat models and security policies and will show how these concepts apply to specific areas such as communication security, software security, operating systems security, network security, and web security. This course will also cover some of the advanced topics i.e., security in machine learning, privacy, etc.

Course Prerequisites:

Required: Systems Programming & UNIX (CSC 352).

Recommended: Prior exposure to Compilers and Systems Software (CSC 453), Principles of Operating Systems (CSC 452) is expected but not required.

Instructor and Contact Information:

Instructor:	Sazzadur Rahaman (sazz@cs.arizona.edu)
Time:	M W 3:30PM - 4:45PM
Location:	Gould-Simpson (Rm 906).
Instructor Office Hours:	T F 4:00 PM - 5:00 PM or by appointment.
Office Hour Location:	Gould-Simpson (Rm 734).
TA:	Yang Hong (hong1@email.arizona.edu)
TA Office Hours:	M W 2:00 PM - 3:00 PM
Office Hours Location:	Gould-Simpson (Rm 934)
Instructor Home Page:	https://www.sazzadur.com
D2L:	https://d2l.arizona.edu/d2l/home/1134061
Piazza:	https://piazza.com/arizona/spring2022/csc466566
Zoom:	https://arizona.zoom.us/j/84249674207

Course Format and Teaching Methods:

Lectures and in-class discussions with assignments and semester-long term projects. The teaching modality will be hybrid (in-person and via Zoom). Students need to log in through the Arizona authentication system to join the class.

Obtaining Help

1. **Advising:** If you have questions about your academic progress this semester, or your chosen degree program, consider contacting your graduate program coordinator and faculty advisor. Your program coordinator, faculty advisor, and the **Graduate Center** can guide you toward university resources to help you succeed. Computer Science students are encouraged to email gradadvising@cs.arizona.edu for advising related questions.

2. **CS Tutor Center:** The Department of Computer Science offers FREE tutoring for students enrolled in CSC courses. You can view tutor schedules and sign up for tutoring sessions by visiting our CS Tutoring Page.
3. **Life challenges:** If you are experiencing unexpected barriers to your success in your courses, please note the **Dean of Students Office** is a central support resource for all students and may be helpful. The Dean of Students Office can be reached at 520-621-2057 or DOS-deanofstudents@email.arizona.edu.
4. **Physical and mental-health challenges:** If you are facing physical or mental health challenges this semester, please note that Campus Health provides quality medical and mental health care. For medical appointments, call (520-621-9202. For After Hours care, call (520) 570-7898. For the Counseling & Psych Services (CAPS) 24/7 hotline, call (520) 621-3334.

Class Recordings

For lecture recordings, which are used at the discretion of the instructor, students must access content in D2L only. Students may not modify content or re-use content for any purpose other than personal educational reasons. All recordings are subject to government and university regulations. Therefore, students accessing unauthorized recordings or using them in a manner inconsistent with **UArizona values** and educational policies (**Code of Academic Integrity** and the **Student Code of Conduct**) are also subject to civil action.

Course Objectives and Expected Learning Outcomes

At the end of the course, you should be able to recognize potential threats to confidentiality, integrity, and availability, and have a basic understanding of the tools and techniques available to adversaries to violate the security of a system as well as the tools and techniques available to defend against such attacks.

Absence and Class Participation Policy

The UA's policy concerning Class Attendance, Participation, and Administrative Drops is available at <http://catalog.arizona.edu/policy/class-attendance-participation-and-administrative-drop>

The UA policy regarding absences for any sincerely held religious belief, observance or practice will be accommodated where reasonable: <http://policy.arizona.edu/human-resources/religious-accommodation-policy>.

Absences pre-approved by the UA Dean of Students (or dean's designee) will be honored. See <https://deanofstudents.arizona.edu/absences>

Participating in the course and attending lectures and other course events are vital to the learning process. As such, attendance is required at all lectures. Absences may affect a student's final course grade. If you anticipate being absent, are unexpectedly absent, or are unable to participate in class online activities, please contact me as soon as possible. To request a disability-related accommodation to this attendance policy, please contact the Disability Resource Center at (520)

621-3268 or drc-info@email.arizona.edu. If you are experiencing unexpected barriers to your success in your courses, the Dean of Students Office is a central support resource for all students and may be helpful. The Dean of Students Office is located in the Robert L. Nugent Building, room 100, or call 520-621-7057.

Illnesses and Emergencies

- If you feel sick, or may have been in contact with someone who is infectious, stay home. Except for seeking medical care, avoid contact with others and do not travel.
- Notify your instructor(s) if you will be missing up to one week of course meetings and/or assignment deadlines.
- If you must miss the equivalent of more than one week of class and have an emergency, the Dean of Students is the proper office to contact (DOS-deanofstudents@email.arizona.edu). The Dean of Students considers the following as qualified emergencies: the birth of a child, mental health hospitalization, domestic violence matter, house fire, hospitalization for physical health (concussion/emergency surgery/coma/COVID-19 complications/ICU), death of immediate family, Title IX matters, etc.
- Please understand that there is no guarantee of an extension when you are absent from class and/or miss a deadline.

Statement on compliance with COVID-19 mitigation guidelines

As we enter the Spring semester, your and my health and safety remain the university's highest priority. To protect the health of everyone in this class, students are required to follow the university guidelines on COVID-19 mitigation. Please visit www.covid19.arizona.edu.

Makeup Policy for Students Who Register Late

Statement on whether students who register after the first class meeting may make up missed assignments/quizzes and the deadline for doing so.

Course Communications

We will be using <https://piazza.com> as a Q/A platform. All questions related to presentations, projects and general questions related to the course should be directed there. If you would like to provide anonymous comments please use discussion forums at <http://d2l.arizona.edu>.

Required Texts or Readings

Book: Introduction to Computer Security, by Goodrich and Tamassia. Also, various manuals and papers may be handed out during class.

Expected Work

- **Participation:** Students are expected to attend all classes. Please inform the instructor beforehand via email if you cannot attend class(es) due to personal reasons.
- **News of the week:** At the beginning of every class 1-2 undergraduate students will present a security-related story they've found in the news. Each undergraduate student has to present one story during the course of the semester. I will pass around a signup sheet at the beginning of the semester. Ideally, you should find a story that you can relate to what we're talking about in class, but it's not absolutely necessary.
- **Survey paper:** Masters and Ph.D. students enrolled in the class will pair up to research a topic and present it to the class. This is not the normal "read a paper and present it in class" type of assignment. Rather, you will be given a fairly broad topic that you will research thoroughly throughout the semester. Thus, the last few lectures will be given by graduate students. At the end of the semester you will have:
 - collected a comprehensive set of resources (books, papers, tools, etc.) relevant to the topic;
 - become an expert on your chosen topic,
 - written a 5-page paper summarizing the topic,
 - created a 15-20-slide presentation on the topic,
 - delivered a 15-minute (+ 5 minutes for questions) presentation on the topic.

Following is the timeline for 5-page summary submission.

Item	Due Date
Topic Selection:	21:59, Jan 14
Resource Collection:	21:59, Jan 28
First draft:	23:59, Mar 4
Second draft:	23:59, Mar 25
Peer review:	23:59, Apr 1
Final submission:	23:59, Apr 8

- **Assignments:** There will be 5 take-home assignments.
- **Exams:** There will be a mid-term and a final exam.

Scheduled Topics/Activities

Date	Topic	Note
Jan 12	Administrivia	
Jan 17	No class	
Jan 19	Introduction	
Jan 24		
Jan 26	Introduction to Cryptography	

Jan 31	PRF and Hash Functions	
Feb 2	Pseudorandom Generators and Symmetric Key Cryptography	Assignment 1 Due
Feb 7	Asymmetric Key Cryptography	
Feb 9		
Feb 14	Digital Signatures	
Feb 16	Homomorphic encryption	
Feb 21	Operating System Security	
Feb 23		Assignment 2 Due
Feb 28	Buffer Overflow	
Mar 2	Mid-term	
Mar 7	No class	
Mar 9	No class	
Mar 14	Return Oriented Programming	
Mar 16	Secure Coding Practices	Assignment 3 Due
Mar 21	Program Analysis	
Mar 23		
Mar 28	Network Security	
Mar 30		
Apr 4		
Apr 6	Web Security	Assignment 4 Due
Apr 11		
Apr 13		
Apr 18	Security in ML	
Apr 20		
Apr 25	Privacy	
Apr 27	Lecture by Graduate Students	Assignment 5 Due
May 2	Lecture by Graduate Students	
May 4	Lecture by Graduate Students	
May 16	Final Exam	

Grading Scale and Policies

Undergraduate students:

Assignments: 40%, News story presentation: 10%, Mid-term: 25%, Final : 25%

MS/Ph.D. students:

Assignments: 40%, Topic presentation: 20%, Mid-term: 20%, Final : 20%

Late submission and plagiarism policy. All the submission materials must be submitted by 12:00 AM of the referred deadline. Late submissions on the next day (24 hours) will be penalized by 10%. Submission within second and third day (24-72 hours) will penalized by 50%. Plagiarism will be checked on each of the submission materials. A medium and high similarity with any internal or external sources will be subject to 50% and 100% reduction of the submission grade.

Department of Computer Science Grading Policy:

- Instructors will explicitly promise when every assignment and exam will be graded and returned to students. These promised dates will appear in the syllabus, associated with the corresponding due dates and exam dates.
- Graded homework will be returned before the next homework is due.
- Exams will be returned “promptly”, as defined by the instructor (and as promised in the syllabus).
- Grading delays beyond promised return-by dates will be announced as soon as possible with an explanation for the delay.

Incomplete (I) or Withdrawal (W)

Requests for incomplete (I) or withdrawal (W) must be made in accordance with University policies, which are available at <http://catalog.arizona.edu/policy/grades-and-grading-system#incomplete> and <http://catalog.arizona.edu/policy/grades-and-grading-system#Withdrawal> respectively.

Department of Computer Science Code of Conduct

The Department of Computer Science is committed to providing and maintaining a supportive educational environment for all. We strive to be welcoming and inclusive, respect privacy and confidentiality, behave respectfully and courteously, and practice intellectual honesty. Disruptive behaviors (such as physical or emotional harassment, dismissive attitudes, and abuse of department resources) will not be tolerated. The complete Code of Conduct is available on our department web site. We expect that you will adhere to this code, as well as the UA Student Code of Conduct, while you are a member of this class.

Classroom Behavior Policy

To foster a positive learning environment, students and instructors have a shared responsibility. We want a safe, welcoming, and inclusive environment where all of us feel comfortable with each other and where we can challenge ourselves to succeed. To that end, our focus is on the tasks at hand and not on extraneous activities (e.g., texting, chatting, reading a newspaper, making phone calls, web surfing, etc.).

Students are asked to refrain from disruptive conversations with people sitting around them during lecture. Students observed engaging in disruptive activity will be asked to cease this behavior. Those who continue to disrupt the class will be asked to leave lecture or discussion and may be reported to the Dean of Students.

Threatening Behavior Policy

The UA Threatening Behavior by Students Policy prohibits threats of physical harm to any member of the University community, including to oneself. See <http://policy.arizona.edu/education-and-student-affairs/threatening-behavior-students>.

Notification of Objectionable Materials

This course will contain material of a mature nature, which may include explicit language, depictions of nudity, sexual situations, and/or violence. The instructor will provide advance notice when such materials will be used. Students are not automatically excused from interacting with such materials, but they are encouraged to speak with the instructor to voice concerns and to provide feedback.

Accessibility and Accommodations

At the University of Arizona, we strive to make learning experiences as accessible as possible. If you anticipate or experience barriers based on disability or pregnancy, please contact the Disability Resource Center (520-621-3268, <https://drc.arizona.edu/>) to establish reasonable accommodations.

Code of Academic Integrity

Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of independent effort unless otherwise instructed. Students are expected to adhere to the UA Code of Academic Integrity as described in the UA General Catalog. See <http://deanofstudents.arizona.edu/academic-integrity/students/academic-integrity>.

Uploading material from this course to a website other than D2L (or the class piazza) is strictly prohibited and will be considered a violation of the course policy and a violation of the code of academic integrity. Obtaining material associated with this course (or previous offerings of this course) on a site other than D2L (or the class piazza), such as Chegg, Course Hero, etc. or accessing these sites during a quiz or exam is a violation of the code of academic integrity. Any student determined to have uploaded or accessed material in an unauthorized manner will be reported to the Dean of Students for a Code of Academic Integrity violation, with a recommended sanction of a failing grade in the course.

The University Libraries have some excellent tips for avoiding plagiarism, available at <http://www.library.arizona.edu/help/tutorials/plagiarism/index.html>.

Selling class notes and/or other course materials to other students or to a third party for resale is not permitted without the instructor's express written consent. Violations to this and other course rules are subject to the Code of Academic Integrity and may result in course sanctions. Additionally, students who use D2L or UA e-mail to sell or buy these copyrighted materials are subject to Code of Conduct Violations for misuse of student e-mail addresses. This conduct may also constitute copyright infringement.

Nondiscrimination and Anti-harassment Policy

The University of Arizona is committed to creating and maintaining an environment free of discrimination. In support of this commitment, the University prohibits discrimination, including harassment and retaliation, based on a protected classification, including race, color, religion, sex, national origin, age, disability, veteran status, sexual orientation, gender identity, or genetic information. For more information, including how to report a concern, please see [http:](http://)

[//policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy](http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy)

Our classroom is a place where everyone is encouraged to express well-formed opinions and their reasons for those opinions. We also want to create a tolerant and open environment where such opinions can be expressed without resorting to bullying or discrimination of others.

Additional Resources for Students

UA Academic policies and procedures are available at <http://catalog.arizona.edu/policies>

Campus Health

<http://www.health.arizona.edu/>

Campus Health provides quality medical and mental health care services through virtual and in-person care.

Phone: 520-621-9202

Counseling and Psych Services (CAPS)

<https://health.arizona.edu/counseling-psych-services>

CAPS provides mental health care, including short-term counseling services.

Phone: 520-621-3334

The Dean of Students Office's Student Assistance Program

<http://deanofstudents.arizona.edu/student-assistance/students/student-assistance>

Student Assistance helps students manage crises, life traumas, and other barriers that impede success. The staff addresses the needs of students who experience issues related to social adjustment, academic challenges, psychological health, physical health, victimization, and relationship issues, through a variety of interventions, referrals, and follow up services.

Email: DOS-deanofstudents@email.arizona.edu

Phone: 520-621-7057

Survivor Advocacy Program

<https://survivoradvocacy.arizona.edu/>

The Survivor Advocacy Program provides confidential support and advocacy services to student survivors of sexual and gender-based violence. The Program can also advise students about relevant non-UA resources available within the local community for support.

Email: survivoradvocacy@email.arizona.edu

Phone: 520-621-5767

Campus Pantry

Any student who has difficulty affording groceries or accessing sufficient food to eat every day, or who lacks a safe and stable place to live and believes this may affect their performance in the course, is urged to contact the Dean of Students for support. In addition, the University of Arizona Campus Pantry is open for students to receive supplemental groceries at no cost. Please see their website at: campuspantry.arizona.edu for open times.

Furthermore, please notify me if you are comfortable in doing so. This will enable me to provide any resources that I may possess.

Preferred Gender Pronoun

This course affirms people of all gender expressions and gender identities. If you prefer to be called a different name than what is on the class roster, please let me know. Feel free to correct instructors on your preferred gender pronoun. If you have any questions or concerns, please do not hesitate to contact me directly in class or via email (instructor email). If you wish to change your preferred name or pronoun in the UAccess system, please use the following guidelines:

Preferred name: University of Arizona students may choose to identify themselves within the University community using a preferred first name that differs from their official/legal name. A student's preferred name will appear instead of the person's official/legal first name in select University-related systems and documents, provided that the name is not being used for the purpose of misrepresentation. Students are able to update their preferred names in UAccess.

Pronouns: Students may designate pronouns they use to identify themselves. Instructors and staff are encouraged to use pronouns for people that they use for themselves as a sign of respect and inclusion. Students are able to update and edit their pronouns in UAccess. More information on updating your preferred name and pronouns is available on the Office of the Registrar site at <https://www.registrar.arizona.edu/>.

Safety on Campus and in the Classroom

Familiarize yourself with the (insert college building name here) Evacuation and Active Shooter plans specific to (insert classroom building name here): <https://cals.arizona.edu/fcs/sites/cals.arizona.edu.fcs/files/McClelland-Park-Evacuation-Plan.pdf> (replace by instructor depending on location of classroom)

<https://cals.arizona.edu/fcs/sites/cals.arizona.edu.fcs/files/McClelland-Park-Emergency-Action-Plan%20-%20Active-Shooter.pdf> (replace by instructor depending on location of classroom)

Also watch the video available at <https://ua-saem-aiss.narrasys.com/#/story/university-of-arizona-cert/active-shooter>

Confidentiality of Student Records

<http://www.registrar.arizona.edu/personal-information/family-educational-rights-and-privacy-act-1974-ferpa?topic=ferpa>

Subject to Change Statement

Information contained in the course syllabus, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructor.

Land Acknowledgement Statement

The University of Arizona sits on the original homelands of indigenous peoples who have stewarded this land since time immemorial. Aligning with the university's core value of a diverse and inclusive community, it is an institutional responsibility to recognize and acknowledge the people, culture, and history that make up the Wildcat community. At the institutional level, it is important to be proactive in broadening awareness throughout campus to ensure our students feel represented and valued.