OU 4173/5173 Computer Security
Fall 2023 Syllabus

1. Instructor:

Dr. Song Fang (songf@ou.edu)
Office hours: Tuesday 9:30 – 10:30 am or other times by appointment, DEH 232
Class meetings: TR 3:00 – 4:15 pm, Dale Hall 0206

2. Teaching Assistant:

Ms. Qiuye He (qiuye.he@ou.edu)
Office hours: Wednesday 4:30 – 6:00 pm or by appointment via email, DEH 115

3. Prerequisites

CS 3113 Introduction to Operating Systems

4. Course Description

The course is a study of fundamental concepts and principles of computer security. The course covers basic security topics, including symmetric and public key cryptography, digital signatures, cryptographic hash functions, authentication pitfalls, network security protocols, software security, and web security.

Note: No student may earn credit for both 4173 and 5173.

5. Course Objectives

By the end of this course, students will be able to:
- Understand basic security terms such as plaintext, ciphertext, encryption/decryption, hash function, and authentication.
- Identify typical security pitfalls (including buffer-overflow vulnerability and web security vulnerability) in different applications.
- Determine appropriate mechanisms to protect computer and networked systems.
- Show hands-on skills in cybersecurity.

6. Student Learning Outcomes:

During the semester, students will have:
- Six quizzes
- One project
- One exam
- Five labs: Each lab includes a report. The labs are from the SEED labs
- An in-class presentation about a research paper (5173 only)

7. Recommended Textbook:

Charlie Kaufman, Radia Perlman, and Mike Speciner, *Network Security: Private Communication in a Public World*, *2nd Edition*, Prentice Hall, 2002, ISBN: 0-13-0460192.

Wenliang Du. *Computer Security: A Hands-on Approach*, *3rd Edition,* 2022.

8. Tentative Schedule:

(These will be adjusted based on the actual progress in a semester.)

T1. Basic Security Concepts (2 lectures)

- Confidentiality, integrity, availability
- Security policies, security mechanisms, assurance
- Cryptography introduction

T2. Secret Key Cryptography (2 lectures)

- Data Encryption Standard (DES)
- Encrypting large messages (ECB, CBC, OFB, CFB, CTR)
- Multiple Encryption DES (EDE)

T3. Hash Function (2 lectures)

- Applications
- The Birthday Paradox
- MD5, SHA-1

T4. Public Key Cryptography (3 lectures)

- Number theory: Euclidean algorithm, Euler Theorem, Fermat Theorem, Totient functions, multiplicative and additive inverse
- RSA, Selection of public and private keys
- Blockchain

T5. Authentication (1 lecture)

- Basic concepts of identification and authentication
- Password authentication
- Authentication protocols

T6. Network Security (3 lectures)

- Packet Sniffing and Spoofing
- Attack on the TCP protocol
- TCP session hijacking attack

T7. Software Security (3 lectures)

- Set-UID, environment variables
- Buffer overflow exploits
- Mitigation of buffer overflow attacks

T8. Web Security (3 lectures)

- Introduction to web security
- Cross-Site Request Forgery (CSRF), Cross-site Scripting (XSS)
- SQL Injection

T9. Emerging Topics in Security (2 lectures)

9. Grading:

	CS 4173	CS 5173
Quizzes	10%	10%
Project	25%	25%
Labs	30%	25%
Paper Presentation	0	10%
Exam	35%	30%

Grading scale: The scale for final letter grades is as follows, using standard notation for ranges: A (∞,90]; B (90,80]; C (80,70]; D (70,60]; F (60,0].

10. Policies on Late Assignments:

For each day an assignment is late - up to a maximum of 2 days, the grade is reduced 15%. For example, if you submit a 90%-correct assignment 2 days late, your assignment score will be 60%.

11. Policies on Absences and Scheduling Makeup Work:

There will be no makeups for homework assignments. Make-up exams will not normally be permitted. Exceptions will be made if a student presents a police report or a doctor's note that shows some emergency situation.

12. Student Evaluations:

The College of Engineering utilizes student ratings as one of the bases for evaluating the teaching effectiveness of each of its faculty members. The results of these forms are important data used in the process of awarding tenure, making promotions, and giving salary increases. In addition, the faculty uses these forms to improve their own teaching effectiveness. The original request for the use of these forms came from students, and it is students who eventually benefit most from their

use. Please take this task seriously and respond as honestly and precisely as possible, both to the machine-scored items and to the open-ended questions.

13. University Policies:

In this section, include the mandatory University policies.

Copyright Syllabus Statement for In-Person or Online Courses

Sessions of this course may be recorded or live-streamed. These recordings are the intellectual property of the individual faculty member and may not be shared or reproduced without the explicit, written consent of the faculty member. In addition, privacy rights of others such as students, guest lecturers, and providers of copyrighted material displayed in the recording may be of concern. Students may not share any course recordings with individuals not enrolled in the class, or upload them to any other online environment.

Academic Integrity

Academic honesty is incredibly important within this course. Cheating is strictly prohibited at the University of Oklahoma, because it devalues the degree you are working hard to get. As a member of the OU community, it is your responsibility to protect your educational investment by knowing and following the rules. For specific definitions on what constitutes cheating, review the Student's Guide to Academic Integrity.

To be successful in this class, all work on exams and quizzes must be yours and yours alone. You may not receive outside help on assessments. On examinations and quizzes, you will never be permitted to use your notes, textbooks, calculators, or any other study aids. Should you see someone else engaging in this behavior, I encourage you to report it to myself or directly to the Office of Academic Integrity Programs. I encourage this because when someone else cheats, it can negatively impact the reputation of our entire program. It is my professional obligation to report academic misconduct, which I will not hesitate to do. Sanctions for academic misconduct can include expulsion from the University and an F in this course, so don't cheat. It's simply not worth it.

Religious Observance

It is the policy of the University to excuse the absences of students that result from religious observances and to reschedule examinations and additional required classwork that may fall on religious holidays, without penalty.
[See Faculty Handbook 3.15.2]

Reasonable Accommodation Policy

The Accessibility and Disability Resource Center is committed to supporting students with disabilities to ensure that they are able to enjoy equal access to all components of their education. This includes your academics, housing, and community events. If you are experiencing a disability, a mental/medical health condition that has a significant impact on one or more life functions, you can receive accommodations to provide equal access. Possible disabilities include, but are not limited to, learning disabilities, AD(H)D, mental health, and chronic health. Additionally, we support students with temporary medical conditions (broken wrist, shoulder

surgery, etc.) and pregnancy. To discuss potential accommodations, please contact the ADRC at 730 College Avenue, (ph.) 405.325.3852, or adrc@ou.edu.

Title IX Resources and Reporting Requirement

Anyone who has been impacted by gender-based violence, including dating violence, domestic violence, stalking, harassment, and sexual assault, deserves access to resources so that they are supported personally and academically. The University of Oklahoma is committed to offering resources to those impacted, including: speaking with someone confidentially about your options, medical attention, counseling, reporting, academic support, and safety plans. If you would like to speak with someone confidentially, please contact OU Advocates (available 24/7 at 405-615-0013) or another confidential resource (see "Can I make an anonymous report?"). You may also choose to report gender-based violence and discrimination through other means, including by contacting the Institutional Equity Office (ieo@ou.edu, 405-325-3546) or police (911). Because the University of Oklahoma is committed to the safety of you and other students, I, as well as other faculty, Graduate Assistants, and Teaching Assistants, are mandatory reporters. This means that we are obligated to report gender-based violence that has been disclosed to us to the Institutional Equity Office. This includes disclosures that occur in: class discussion, writing assignments, discussion boards, emails and during Student/Office Hours. For more information, please visit the Institutional Equity Office.

Adjustments for Pregnancy/Childbirth Related Issues

Should you need modifications or adjustments to your course requirements because of documented pregnancy-related or childbirth-related issues, please contact your professor or the Accessibility and Disability Resource Center at 405/325-3852 as soon as possible. Also, see the Institutional Equity Office FAQ on Pregnant and Parenting Students' Rights for answers to commonly asked questions.

Final Exam Preparation Period

Pre-finals week will be defined as the seven calendar days before the first day of finals. Faculty may cover new course material throughout this week. For specific provisions of the policy please refer to OU's Final Exam Preparation Period policy.

Emergency Protocol

During an emergency, there are official university procedures that will maximize your safety.
Severe Weather: If you receive an OU Alert to seek refuge or hear a tornado siren that signals severe weather.
1. Look for severe weather refuge location maps located inside most OU buildings near the entrances
2. Seek refuge inside a building. Do not leave one building to seek shelter in another building that you deem safer. If outside, get into the nearest building.
3. Go to the building's severe weather refuge location. If you do not know where that is, go to the lowest level possible and seek refuge in an innermost room. Avoid outside doors and windows.
4. Get in, Get Down, Cover Up
5. Wait for official notice to resume normal activities.
Additional Weather Safety Information is available through the Department of Campus Safety.

Armed Subject/Campus Intruder

If you receive an OU Alert to shelter-in-place due to an active shooter or armed intruder situation or you hear what you perceive to be gunshots:
1. Avoid: If you believe you can get out of the area WITHOUT encountering the armed individual, move quickly towards the nearest building exit, move away from the building, and call 911. 2. Deny: If you cannot flee, move to an area that can be locked or barricaded, turn off lights, silence devices, spread out, and formulate a plan of attack if the shooter enters the room. 3. Defend: As a last resort fight to defend yourself.
For more information, visit OU's Emergency Preparedness site.
Shots Fired on Campus Procedure – Video

Fire Alarm/General Emergency

If you receive an OU Alert that there is danger inside or near the building, or the fire alarm inside the building activates: *1. LEAVE* the building. Do not use the elevators. *2. KNOW* at least two building exits *3. ASSIST* those that may need help *4. PROCEED* to the emergency assembly area *5 ONCE safely outside, NOTIFY first responders of anyone that may still be inside building due to mobility issues. 6. WAIT* for official notice before attempting to re-enter the building.
OU Fire Safety on Campus

Mental Health Support Services

If you are experiencing any mental health issues that are impacting your academic performance, counseling is available at the University Counseling Center (UCC). The Center is located on the second floor of the Goddard Health Center, at 620 Elm Rm. 201, Norman, OK 73019. To schedule an appointment call (405) 325-2911. For more information, please visit University Counseling Center.

Every part of this syllabus is subject to adjustment as the semester progresses. If you are dissatisfied with the course policies, grading, and assignments, please contact the instructor. Reasonable requests for modifications may be accommodated at the instructor's discretion.