

# **OU 4173/5173 Computer Security**

## **Fall 2021 Syllabus**

### **1. Instructor:**

Dr. Song Fang ([songf@ou.edu](mailto:songf@ou.edu))

Office hour: TR 1:30 – 3:00 pm, DEH 232

Class meetings: TR 3:00 – 4:15 pm, Dale Hall 0206

### **2. Teaching Assistant:**

Mr. Yan He ([heyau@ou.edu](mailto:heyau@ou.edu))

Office hour: W 2:00 – 4:00 pm, 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.
- Determine appropriate mechanisms to protect computer and networked systems.
- Identify typical security pitfalls in authentication protocols, and outline the protocols, i.e., AH and ESP protocols, for IP Security.
- Collaborate with others on a security project.

### **6. Student Learning Outcomes:**

During the semester, students will have:

- Five or six quizzes
- One exam
- Six labs: Each lab includes a report. The labs are from the [SEED labs](#)
- An in-class presentation about a research paper (5173 only)
- One semester project

## **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 & Internet Security: A Hands-on*, 2nd Edition, 2019.

## **8. Tentative Schedule:**

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

### T1. Basic Security Concepts (1 lecture)

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

### T2. Basic Cryptography (1 lecture)

- Historical background
- Transposition/Substitution, Caesar Cipher
- Introduction to Symmetric crypto primitives, Asymmetric crypto primitives, and Hash functions

### T3. Secret Key Cryptography (3 lectures)

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

### T4. Message Digests (3 lectures)

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

### T5. 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

### T6. Authentication (1 lecture)

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

### T7. Network Security (3 lecture)

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

#### T8. Software Security (3 lecture)

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

#### T9. Web Security (3 lectures)

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

### **9. Grading:**

	CS 4173	CS 5173
Quizzes	10%	10%
Labs	30%	25%
Paper Presentation	0	10%
Exam	20%	15%
Project	40%	40%

Grading scale: The scale for final letter grades is as follows, using standard notation for ranges: A ( $\infty, 90]$ ; 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 3 days, the grade is reduced 15%. For example, if you submit a 90%-correct assignment 2 days late, your overall 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**

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 at [http://integrity.ou.edu/students\\_guide.html](http://integrity.ou.edu/students_guide.html)

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 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. That student is devaluing not only their degree, but yours, too. Be aware that 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**

Students requiring academic accommodation should contact the Accessibility and Disability Resource Center for assistance at (405) 325-3852 or TDD: (405) 325-4173. For more information please visit <http://www.ou.edu/drc/home.html>. Any student in this course who has a disability that may prevent him or her from fully demonstrating his or her abilities should contact me personally as soon as possible so we can discuss accommodations necessary to ensure full participation and facilitate your educational opportunities.

### **Title IX Resources and Reporting Requirement**

For any concerns regarding gender-based discrimination, sexual harassment, sexual assault, dating/domestic violence, or stalking, the University offers a variety of resources. To learn more

or to report an incident, please contact the Sexual Misconduct Office at 405/325-2215 (8 to 5, M-F) or [smo@ou.edu](mailto:smo@ou.edu). Incidents can also be reported confidentially to OU Advocates at 405/615-0013 (phones are answered 24 hours a day, 7 days a week). Also, please be advised that a professor/GA/TA is required to report instances of sexual harassment, sexual assault, or discrimination to the Sexual Misconduct Office. Inquiries regarding non-discrimination policies can be directed to University Equal Opportunity Officer and Title IX Coordinator at 405/325-3546 or [smo@ou.edu](mailto:smo@ou.edu) . For more information, visit <http://www.ou.edu/eoo.html>.

### **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 Disability Resource Center at 405/325-3852 as soon as possible. Also, see <http://www.ou.edu/eoo/faqs/pregnancy-faqs.html> 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 (<https://apps.hr.ou.edu/FacultyHandbook#4.10>).

### **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.

[Link to Severe Weather Refuge Areas , Severe Weather Preparedness - Video](#)

### **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. *GET OUT*: 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. *HIDE OUT*: 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. *TAKE OUT*: As a last resort fight to defend yourself.

*For more information, visit <http://www.ou.edu/emergencypreparedness.html>*  
[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 <http://www.ou.edu/ucc>.

*\*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.*