

CS 5970 Principles of Network Security

Spring 2026 Syllabus

TR 1:30 – 2:45 PM

Instructor

Dr. Yi Wu (yi.wu-1@ou.edu)

Personal Website: <https://ywu960702.github.io/>

Office hours: Tuesday & Thursday 3:00 – 4:00 PM or by appointment, DEH 210-G

Course Description

This course provides a comprehensive study of the fundamental concepts and principles of network security. It covers core topics such as symmetric and public-key cryptography, network security protocols, MAC layer, internet protocols, packet sniffing and spoofing, TCP & DNS attacks, and web security.

Prerequisites

CS 4133/5133

Students are expected to enter this course with a basic knowledge of operating systems, networking, algorithms, and data structures. Also, students should be able to program in C, Java, or Python for the programming component of the projects.

Textbook

Wenliang Du. Internet Security: A Hands-on Approach, 3rd Edition, 2022. (ISBN: 978-17330039-6-4)

Learning Outcomes

By the end of this course, students will be able to:

- **Understand fundamental security concepts**, including plaintext, ciphertext, encryption, decryption, hash functions, authentication, confidentiality, and integrity.
- **Explain and analyze common network security vulnerabilities and attacks**, such as packet sniffing, spoofing, TCP hijacking, DNS attacks, and MAC/IP layer attacks.
- **Apply appropriate cryptographic and network defense mechanisms** (e.g., secret key encryption, public key encryption, firewalls, VPNs) to protect networked systems.
- **Analyze web security threats and defenses**, including typical vulnerabilities (e.g., injection, cross-site scripting) and protection mechanisms.
- **Demonstrate hands-on cybersecurity skills** through labs, quizzes, and projects involving cryptography, packet analysis, and protocol attacks.

ABET Outcomes

Students will be able to apply principles of network security to analyze vulnerabilities, design and evaluate appropriate defensive measures, and implement protective solutions. Specifically, by the end of this course, students will be able to:

- Apply knowledge of computing fundamentals and mathematics for application of cryptography and network principles.
- Analyze network security problems and perform vulnerability analysis.
- Use current techniques, skills, and tools necessary for computing practice (packet analysis, crypto libraries, Wireshark, etc.).
- Implement at least one defensive mechanism against networking attacks in lab environments (e.g., encrypted channel, firewall rule set, sanitized web input handler).

Gradings

Quizzes * 5	10%
Labs * 3	30%
Final Project	15%
Midterm Exam	15%
Final Exam	20%
Paper Presentation	10%

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].

The instructor reserves the right to apply a grading curve if deemed appropriate.

Tentative List of Topics

- Basic security concepts
- Introduction to cryptography
- Network security basics
- The MAC layer and attacks
- The internet protocol and attacks
- Packet sniffing and spoofing
- Attacks on TCP protocol
- DNS and DNS attacks
- Web security basics

Tentative Course Schedule

Date	Topics	Projects/Labs/Quizzes
01/20	Basic Security Concepts	
01/22	Introduction to Cryptography	
01/27	Secret Key Cryptography (DES)	
01/29	Secret Key Cryptography (AES)	Quiz 1
02/03	Hash Functions	
02/05	Public Key Cryptography (RSA)	
02/09	Public Key Cryptography (D-H)	Lab 1 Assigned
02/12	Network security basics – Part 1	Quiz 2
02/16	Network security basics – Part 2	
02/19	The MAC layer and attacks – Part 1	
02/23	The MAC layer and attacks – Part 2	Lab 1 Due
02/26	Lab 1 analysis, Introduction to IP	
03/03	Midterm Review	
03/05	Midterm	Lab 2 Assigned
03/10	ICMP and Attacks	
03/12	Introduction to Web security	Quiz 3
03/17	Spring Break	
03/19	Spring Break	
03/24	Packet Sniffing	Paper Assignment Due
03/26	Packet Spoofing	Lab 2 Due
03/31	Lab 2 Analysis, TCP Protocol Basics	Project Proposal Due
04/02	TCP Rest Attack, TCP Hijacking Attack	Lab 3 Assigned
04/07	Paper Presentation	
04/09	VPN	
04/14	Introduction to DNS	Quiz 4
04/16	DNS Attacks	
04/21	Web Security – HTTP, Page, CSS	
04/23	CSRF Attacks, SQL Injection	Lab 3 Due
04/28	Lab 3 Analysis, Course Wrap Up	
04/30	Project Presentation	Quiz 5
05/05	Project Presentation	
05/07	Final Exam Review	
05/11	Final Exam	Final Project Report Due

Policies on Late Assignments

For each day an assignment is late - up to a maximum of 2 days, the grade is reduced by 15%. For example, if you submit a 90%-correct assignment 2 days late, your assignment score will be 60%. If you submit it 3 days late, your assignment score will be 0.

Attendance Policy

This course requires your attendance at all scheduled class sessions in person. Exceptions are made for illness and unforeseen caretaking duties. I do not take attendance in class, while paper & project presentations will be scheduled during the class meeting time, and they should be done in person. Quizzes and the midterm exam will also be scheduled in the class meeting time and should be done in person.

Policies on Absences and Scheduling Makeup Work

There will be no makeup 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.

AI Policy

Students can use Large Language Models (LLMs) and AI-based tools, such as GitHub Copilot, to assist in completing their programming projects. The choice of LLM or AI tool is left entirely to the student. However, these tools may not always produce correct or optimal code. The student must ensure their final code is functional, accurate, and meets all project requirements. As part of the project evaluation, students must submit any prompts they used to generate or refine their code. This submission should be included as a separate document accompanying the project submissions.

Proper Academic Conduct

Feel free to discuss all assignments with the instructors or the TAs. Code (projects and assignment): you may discuss code solutions with other students. However: 1. You may not look at or share code with others; 2. If you discuss a solution with anyone, you must document their names in your assignment. 3. You must document this in your code if you use external resources (e.g., Piazza, StackOverflow.com, ChatGPT, or other LLMs).

Academic Integrity

All students are expected to adhere to the University of Oklahoma's policies on academic integrity, as outlined in the Student Code. Any form of academic misconduct—including, but not limited to, plagiarism, cheating on assignments or exams, or facilitating academic dishonesty—will not be tolerated. For specific definitions, please visit <https://www.ou.edu/integrity>.

University Policies

Mental Health Support Services

Support is available for any student experiencing mental health issues that are impacting their academic success. Students can either be seen at the University Counseling Center (UCC) located on the second floor of Goddard Health Center or receive 24/7/365 crisis support from a licensed mental health provider through [TELUS Health](#). To schedule an appointment or receive more information about mental health resources at OU please call the UCC at 405-325-2911 or

visit [University Counseling Center](#). The UCC is located at 620 Elm Ave., Room 201, Norman, OK 73019.

Title IX Resources and Reporting Requirement

The University of Oklahoma faculty are committed to creating a safe learning environment for all members of our community, free from gender and sex-based discrimination, including sexual harassment, domestic and dating violence, sexual assault, and stalking, in accordance with Title IX. There are resources available to those impacted, including: speaking with someone confidentially about your options, medical attention, counseling, reporting, academic support, and safety plans. If you have (or someone you know has) experienced any form of sex or gender-based discrimination or violence and wish to speak with someone confidentially, please contact [OU Advocates](#) (available 24/7 at 405-615-0013) or [University Counseling Center](#) (M-F 8 a.m. to 5 p.m. at 405-325-2911).

Because the University of Oklahoma is committed to the safety of you and other students, and because of our Title IX obligations, 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 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. You may also choose to report directly to the Institutional Equity Office. After a report is filed, the Title IX Coordinator will reach out to provide resources, support, and information and the reported information will remain private. For more information regarding the University's Title IX Grievance procedures, reporting, or support measures, please visit [Institutional Equity Office](#) at 405-325-3546.

Reasonable Accommodation Policy

The University of Oklahoma (OU) is committed to the goal of achieving equal educational opportunity and full educational participation for students with disabilities. If you have already established reasonable accommodations with the Accessibility and Disability Resource Center (ADRC), please [submit your semester accommodation request through the ADRC](#) as soon as possible and contact me privately, so that we have adequate time to arrange your approved academic accommodations.

If you have not yet established services through ADRC, but have a documented disability and require accommodations, please complete [ADRC's pre-registration form](#) to begin the registration process. ADRC facilitates the interactive process that establishes reasonable accommodations for students at OU. For more information on ADRC registration procedures, please review their [Register with the ADRC](#) web page. You may also contact them at (405)325-3852 or adrc@ou.edu, or visit www.ou.edu/adrc for more information.

Note: disabilities may include, but are not limited to, mental health, chronic health, physical, vision, hearing, learning and attention disabilities, pregnancy-related. ADRC can also support students experiencing temporary medical conditions.

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.

Persons with Disability or Special Accommodation or Accommodation for any reason:

The Accessibility and Disability Resource Center is committed to supporting students with disabilities to ensure that they can 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 accommodation, please contact the ADRC at 730 College Avenue, (ph.) 405.325.3852, or adrc@ou.edu.

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 the Accessibility and Disability Resource Center at 405/325-3852 and/or the Institutional Equity Office at 405/325-3546 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.

The University of Oklahoma Active Threat Guidance

The University of Oklahoma embraces a Run, Hide, Fight strategy for active threats on campus. This strategy is well known, widely accepted, and proven to save lives. To receive emergency campus alerts, be sure to update your contact information and preferences in the account settings section at one.ou.edu.

RUN: Running away from the threat is usually the best option. If it is safe to run, run as far away from the threat as possible. Call 911 when you are in a safe location and let them know from which OU campus you're calling from and location of active threat.

HIDE: If running is not practical, the next best option is to hide. Lock and barricade all doors; turn off all lights; turn down your phone's volume; search for improvised weapons; hide behind solid objects and walls; and hide yourself completely and stay quiet. Remain in place until law enforcement arrives. Be patient and remain hidden.

FIGHT: If you are unable to run or hide, the last best option is to fight. Have one or more improvised weapons with you and be prepared to attack. Attack them when they are least expecting it and hit them where it hurts most: the face (specifically eyes, nose, and ears), the throat, the diaphragm (solar plexus), and the groin.

Please save OUPD's contact information in your phone.

NORMAN campus: *For non-emergencies call (405) 325-1717. For emergencies call (405) 325-1911 or dial 911.*

TULSA campus: *For non-emergencies call (918) 660-3900. For emergencies call (918) 660-3333 or dial 911.*

Fire Alarm/General Emergency: (required)

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](#)

**Every part of this syllabus is subject to adjustment as the semester progresses.*