CSCE 3560/5562 – Cloud Security
Spring 2024
(MoWe 9:30AM-10:50AM in NTDP E265)

Dual numbered course: This is a dual numbered course (for both undergraduates and graduates). Unless otherwise mentioned, the syllabus below applies for everybody.

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Communication Expectations
In this course, we will be using Canvas actively. For any questions about the clarification of a lecture material, assignment, or project, it is recommended to use Canvas Discussions first and then you can message us through Canvas messages. Please avoid using emails for the class-related discussions; instead use Canvas messages. For non-class related topics, you can definitely email us.

The messages will be generally replied in one day (if not in hours); however, due to unexpected reasons, it may end up a bit longer (if you are not receiving any response in two days, please email me again). And please be patient!

For grading, the grades are expected to be provided within two weeks.

Course Description
This course will introduce theoretical and practical aspects of computer systems security and present ways to protect a computer system with an additional focus on the distributed computing systems. Topics include operating system security, hypervisors, virtualization security, storage security, trusted hardware, trusted platform modules, application isolation, hardware security modules, cryptoprocessors, and cloud and IoT security. Students will also explore emerging security challenges facing computer systems based on recent research papers.

Course Structure
This course will be in-person. The expected schedule is provided below.

Course Schedule
- **Week: Midterm Exam (will be discussed later)**
- **Final Exam**: May 8, 2024 at 8AM-10AM in E265 based on https://registrar.unt.edu/exams/final-exam-schedule/spring.html

Note: This is a tentative schedule and may change during the semester.
- Review of the Intro to Computer Security
- Operating Systems
- Authentication and Authorization and solutions – distributed solutions.
- Trusted Hardware and Trusted Platform Modules (TPM)
- Storage and data security
- Hypervisors and Containers
- Virtualization Security
- Cloud Computing and Security
    - Intro to Cloud Computing and models
    - OpenStack
    - NIST SP 800-144
    - Cloud service providers and their architectures and security solutions
    - Best practices for different services
- IoT and Security (if time permits)

Course Prerequisites or Other Restrictions
There are no prerequisites required for this class. However, it is strongly suggested that you have the following backgrounds: networking basics, programming, operating system basics, basic knowledge of Linux.

Course Outcomes
Upon successful completion of this course, the student will be able to:

1. Examine different layers of the computer system and identify their operations and connections with the other layers.
2. Describe and analyze the vulnerabilities in computer system layers including operating system, applications, hypervisors, storage, etc.
3. Demonstrate how to detect and prevent existing vulnerabilities in a computer system.
4. Analyze and address/mitigate the detected vulnerabilities in hardware modules.
5. Incorporate various defense techniques to protect a computer system.

Materials
There is no required textbook for this course as the material covered are too broad for a single textbook. Instead, the course material will be drawn from a number of books and papers from various sources as well as Internet-based resources.

Suggested optional reference text(s)

- Computer Security: Principles and Practice (4th Edition), William Stallings and Lawrie Brown, Prentice Hall, 2018, ISBN-13: 978-0134794105.
- Principles of Computer Security: CompTIA Security+ and Beyond, Fifth Edition, Wm Arthur Conklin, Greg White, Chuck Cothren, Roger Davis, and Dwayne Williams, McGraw-Hill Education, 2018, ISBN-13: 978-1260026016.
- Security in Computing, 5th Edition, Charles P. Pfleeger, Shari Lawrence Pfleeger, and Jonathan Margulies, Prentice Hall, 2015, ISBN 978-0-13-408504-3.

Teaching Philosophy

Cybersecurity is a growing concern that cannot be solved through a holistic solution; hence, we need to understand individual items in cyberspace and act accordingly. To do this, we need to have both theoretical and hands-on experience. Throughout this course, we will be learning both.

Course Grading

Course grade will be a weighted average according to the following:

- Assignments: 15%
- Labs: 20%
- Group project: 20%
- Midterm: 20%
- Final exam: 25%

Final Grading

- A = [90%, 100%]
- B = [80%, 90%)
- C = [70%-80%)
- D = [60%-70%)
- F = [0%-60%)

Course Policies

Assignment Policy

Each assignment will be uploaded to Canvas. The assignment can be theoretical and/or hands-on questions that may require writing some code or installing a software and running it, analyzing some data, etc. You will be uploading your answers through Canvas drop box. Submissions through emails or through comments, or through links will NOT be reviewed.

Late Work

Late submissions will result in losing 1 point per hour for the first two days only; after two days, the late submissions will not be accepted. The late submissions for the projects will never be accepted.

For special circumstances (e.g., health) with the proper documents, contacting the professor in advance is suggested.

Examination Policy

The midterm and final exams will be closed-book/closed-notes exams. There will be no cheat-sheet, no books, no computers, etc. Other than emergencies (such as health), there will be no make-up exams, and, in case of a make-up exam, we will be discussing the policy and time individually case by case.

Feedback

The feedback (for the assignments, labs, midterm, etc.) will be provided within two weeks approximately. Please note that we have a large class and there can be some delays.

The students can request for a review of their answers only within 10 days of grade announcements. Late requests may not be considered.

Attendance Policy

The student is responsible for regular and punctual attendance and is expected to participate in all courses in which the student is enrolled. Not attending the courses timely may result in missing materials. Please note that you are responsible of all the course materials whether you attend to the lecture or not. Please arrive on time to find a seat, prepare your materials, etc.

Class Participation

Class participation is highly suggested. Even though the attendance may not be directly involved in the grading policy, the discussions and examples throughout the semester may be a part of the exams. Correct participation may help you gain some bonus points. Nevertheless, disrespecting behavior in the class (e.g., noise, chatting, spending time on phone/computer) will not be accepted.

Syllabus Change Policy

This is a tentative syllabus that might be changed. Upon a change, I will be notifying everybody through Canvas announcements.

UNT Policies

Academic Integrity Policy
Academic Integrity Standards and Consequences: According to UNT Policy 06.003, Student Academic Integrity, academic dishonesty occurs when students engage in behaviors **including, but not limited to cheating, fabrication, facilitating academic dishonesty, forgery, plagiarism, and sabotage**. A finding of **academic dishonesty may result in a range of academic penalties or sanctions ranging from admonition to expulsion from the University**.
Based on the Student Academic Integrity Policy (UNT Policy 6.003), any form of "unauthorized assistance" constitutes cheating.
If the use of artificial intelligence is not authorized for the assignment in question, the violation is "cheating".
All the students are expected to read: https://policy.unt.edu/policy/06-003

Course Evaluation
Student Perceptions of Teaching (SPOT) is the student evaluation system for UNT and allows students the ability to confidentially provide constructive feedback to their instructor and department to improve the quality of student experiences in the course.

ODA Policy
The University of North Texas makes reasonable academic accommodations for students with disabilities. Students seeking reasonable accommodation must first register with the Office of Disability Access (ODA) to verify their eligibility. If a disability is verified, the ODA will provide you with a reasonable accommodation letter to be delivered to faculty to begin a private discussion regarding your specific needs in a course. You may request reasonable accommodations at any time, however, ODA notices of reasonable accommodation should be provided as early as possible in the semester to avoid any delay in implementation. Note that students must obtain a new letter of reasonable accommodation for every semester and must meet with each faculty member prior to implementation in each class. Students are strongly encouraged to deliver letters of reasonable accommodation during faculty office hours or by appointment. Faculty members have the authority to ask students to discuss such letters during their designated office hours to protect the privacy of the student. For additional information, refer to the Office of Disability Access website (Links to an external site.) at http://www.unt.edu/oda. You may also contact ODA by phone at (940) 565-4323.

Emergency Notification & Procedures
UNT uses a system called Eagle Alert to quickly notify students with critical information in the event of an emergency (i.e., severe weather, campus closing, and health and public safety emergencies like chemical spills, fires, or violence). In the event of a university closure, please refer to Blackboard for contingency plans for covering course materials.

Retention of Student Records
Student records pertaining to this course are maintained in a secure location by the instructor of record. All records such as exams, answer sheets (with keys), and written papers submitted during the duration of the course are kept for at least one calendar year after course completion. Course work completed via the Blackboard online system, including grading information and comments, is also stored in a safe electronic environment for one year. Students have the right to view their individual record; however, information about student's records will not be divulged to other individuals without proper written consent. Students are encouraged to review the Public Information Policy and the Family Educational Rights and Privacy Act (FERPA) laws and the University's policy. See UNT Policy 10.10, Records Management and Retention for additional information.

Acceptable Student Behavior
Student behavior that interferes with an instructor's ability to conduct a class or other students' opportunity to learn is unacceptable and disruptive and will not be tolerated in any instructional forum at UNT. Students engaging in unacceptable behavior will be directed to leave the classroom and the instructor may refer the student to the Dean of Students to consider whether the student's conduct violated the Code of Student Conduct. The University's expectations for student conduct apply to all instructional forums, including University and electronic classroom, labs, discussion groups, field trips, etc. Visit UNT's Code of Student Conduct (Links to an external site.) (https://deanofstudents.unt.edu/conduct) to learn more.

Access to Information - Eagle Connect
Students' access point for business and academic services at UNT is located at: my.unt.edu (Links to an external site.). All official communication from the University will be delivered to a student's Eagle Connect account. For more information, please visit the website that explains Eagle Connect and how to forward e-mail Eagle Connect (Links to an external site.) (https://it.unt.edu/eagleconnect).

Student Evaluation Administration Dates
Student feedback is important and an essential part of participation in this course. The student evaluation of instruction is a requirement for all organized classes at UNT. The survey will be made available during weeks 13, 14 and 15 of the long semesters to provide students with an opportunity to evaluate how this course is taught. Students will receive an email from "UNT SPOT Course Evaluations via IASystem Notification" (no-reply@iasystem.org) with the survey link. Students should look for the email in their UNT email inbox. Simply click on the link and complete the survey. Once students complete the survey they will receive a confirmation email that the survey has been submitted. For additional information, please visit the SPOT website (Links to an external site.) (http://spot.unt.edu/) or email spot@unt.edu.

Sexual Assault Prevention
UNT is committed to providing a safe learning environment free of all forms of sexual misconduct, including sexual harassment sexual assault, domestic violence, dating violence, and stalking. Federal laws (Title IX and the Violence Against Women Act) and UNT policies prohibit discrimination on the basis of sex, and therefore prohibit sexual misconduct. If you or someone you know is experiencing sexual harassment, relationship violence, stalking, and/or sexual assault, there are campus resources available to provide support and assistance. UNT's Survivor Advocates can assist a student who has been impacted by violence by filing protective orders, completing crime victim's compensation applications, contacting professors for absences related to an assault, working with housing to facilitate a room change where appropriate, and connecting students to other resources available both on and off campus. The Survivor Advocates can be reached at SurvivorAdvocate@unt.edu or by calling the Dean of Students Office at 940-565- 2648. Additionally, alleged sexual misconduct can be non-confidentially reported to the Title IX Coordinator at oeo@unt.edu or at (940) 565 2759.

Technical Requirements & Skills

Minimum Technology Requirements
- Computer (*a computer that can run multiple virtual machines is suggested; if you don't/can't have a computer with the required computational resources, please contact me and we will be looking for the solutions*)
- Reliable Internet access
- [Canvas Technical Requirements (Links to an external site.)](https://clear.unt.edu/supported-technologies/canvas/requirements) (https://clear.unt.edu/supported-technologies/canvas/requirements)
  The University is committed to providing a reliable course system for all users. However, in the event of an unexpected server outage or any unusual technical difficulty which prevents students from completing a time-sensitive assessment activity, the instructor will extend the time windows and provide an appropriate accommodation based on the situation. Students should immediately report any problems to the instructor and contact the UNT Student Help Desk: helpdesk@unt.edu or 940.565.2324 and obtain a ticket number. The instructor and the UNT Student Help Desk will work with the student to resolve any issues at the earliest possible time.

Computer Skills & Digital Literacy
- Using Canvas
- Using email with attachments
- Downloading and installing software
- Using office programs
- Creating, configuring, and using virtual machines
- Programming experience with Python or C/C++ and Bash is recommended
- Basic experience with Linux is recommended

Rules of Engagement
- Treat your instructor and classmates with respect in email or any other communication.
- Always use your professors' proper title: Dr. or Prof., or if in doubt use Mr. or Ms.
- Unless specifically invited, don't refer to your instructor by first name.
- Use clear and concise language.
- Remember that all college-level communication should have correct spelling and grammar (this includes discussion boards).
- Avoid slang terms such as "wassup?" and texting abbreviations such as "u" instead of "you."
- Use standard fonts such as Ariel, Calibri or Times New Roman and use a size 10, 11 or 12 point font
- Avoid using the caps lock feature AS IT CAN BE INTERPRETED AS YELLING.
- Limit and possibly avoid the use of emoticons like :) or J.
- Be cautious when using humor or sarcasm as the tone is sometimes lost in an email or discussion post and your message might be taken seriously or sound offensive.
- Be careful with personal information (both yours and others').
- Do not send confidential information via e-mail

See these [Engagement Guidelines (Links to an external site.)](https://clear.unt.edu/online-communication-tips) (https://clear.unt.edu/online-communication-tips) for more information.

Getting Help

Technical Assistance
UIT Help Desk: http://www.unt.edu/helpdesk/index.htm (Links to an external site.)
Email: helpdesk@unt.edu
Phone: 940-565-2324
In-Person: Sage Hall, Room 130
Walk-In Availability: 8am-9pm
Telephone Availability:
- Sunday: noon-midnight
- Monday-Thursday: 8am-midnight
- Friday: 8am-8pm
- Saturday: 9am-5pm

Laptop Checkout: 8am-7pm
For additional support, visit Canvas Technical Help (Links to an external site.) (https://community.canvaslms.com/docs/DOC-10554-4212710328 (Links to an external site.))

Student Support Services
UNT provides mental health resources to students to help ensure there are numerous outlets to turn to that wholeheartedly care for and are there for students in need, regardless of the nature of an issue or its severity. Listed below are several resources on campus that can support your academic success and mental well-being:
- Student Health and Wellness Center (Links to an external site.) (https://studentaffairs.unt.edu/student-health-and-wellness-center)
- Counseling and Testing Services (Links to an external site.) (https://studentaffairs.unt.edu/counseling-and-testing-services)
- UNT Care Team (Links to an external site.) (https://studentaffairs.unt.edu/care)
- UNT Psychiatric Services (Links to an external site.) (https://studentaffairs.unt.edu/student-health-and-wellness-center/services/psychiatry)
- Individual Counseling (Links to an external site.) (https://studentaffairs.unt.edu/counseling-and-testing-services/services/individual-counseling)

Other student support services offered by UNT include
- Registrar (https://registrar.unt.edu/registration)
- Financial Aid (Links to an external site.) (https://financialaid.unt.edu/)
- Student Legal Services (Links to an external site.) (https://studentaffairs.unt.edu/student-legal-services)
- Career Center (Links to an external site.) (https://studentaffairs.unt.edu/career-center)
- Multicultural Center (Links to an external site.) (https://edo.unt.edu/multicultural-center)
- Counseling and Testing Services (Links to an external site.) (https://studentaffairs.unt.edu/counseling-and-testing-services)
- Pride Alliance (Links to an external site.) (https://edo.unt.edu/pridealliance)
- UNT Food Pantry (Links to an external site.) (https://deanofstudents.unt.edu/resources/food-pantry)

Academic Support Services
- Academic Resource Center (Links to an external site.) (https://clear.unt.edu/canvas/student-resources)
- Academic Success Center (Links to an external site.) (https://success.unt.edu/asc)
- UNT Libraries (Links to an external site.) (https://library.unt.edu/)
- Writing Lab (Links to an external site.) (http://writingcenter.unt.edu/)
- MathLab (Links to an external site.) (https://math.unt.edu/mathlab)