

CSE 4380: Information Security I

Spring 2023

Instructor Information

Instructor and GTA: Mohit Singhal

Office Number: ERB 504

Email Address:

mohit.singhal@mavs.uta.edu

Office Hours: Friday 1:00- 3:30 PM

Course Information

Section Information: CSE 4380, Section 001

Time of Class Meetings: Friday 4 PM – 6:50 PM

Place of Class Meetings: TBA

Lab Information

Lab Section Information: CSE 4380, Section 002 and Section 003

Time of Class Meetings: Tuesdays, 7- 10 PM and Thursday, 5:30-8:30 PM

Place of Lab Meetings: ERB 106

Course Description

Description of Course Content:

This is a hands-on introduction to the basics of security for upper-level undergraduate students and graduate students. Includes system security, buffer overflows, a high-level overview of cryptography, firewalls and intrusion detection/prevention, malware, penetration testing, forensics, and system administration.

Student Learning Outcomes:

- Use cryptographic primitives directly to understand their respective uses and how they work together to provide security.
- Develop simple malware to understand how hooking can be subverted for malicious purposes.
- Set up and use defensive and security testing technologies in the network and operating system to see how they defend against attacks.
- Exploit software vulnerabilities to understand how they work and how defenses could stop them.
- Study a range of concepts to gain a broad understanding of information security.
- Apply class knowledge in a capture-the-flag simulation exercise at the end of the semester.

Required Textbooks and Other Course Materials (**The PDF version is available online**):

- *Computer Security: Principles and Practices* by William Stallings and Lawrie Brown (3rd edition)
ISBN-13: 978-0133773922, ISBN-10: 0133773922
- In addition to the textbook, the instructor may provide some papers and articles each week.

Technology Requirements

Slides and materials are shared through Canvas.

Grading Information

Grading:

Exams (2 in-class):	40%
Lab Exercises (4 in-labs with 4 pre-lab exercises):	36%
Labs 1 & 3 worth 7%, Labs 2 & 4 are worth 11%	
CTF Lab:	11%
CTF Write-up:	4%
Security News Presentation:	5%
Certification Quiz:	4%

Grades for the exam will be curved by the instructor and scaled to a standard A = 90-100, B = 80-89, and C = 70-79 scale. Final grades will be the weighted average of the scores based on the percentages shown above. Small amounts of extra credit may be available, but only on a class-wide basis (no individual requests will be granted). No grade bumps will be offered; 89.99 is a B in this class.

Students are expected to keep track of their performance throughout the semester, which Canvas facilitates, and seek guidance from available sources (including the instructor) if their performance drops below satisfactory levels; see “Student Support Services” below.

Expectations for Out-of-Class Study: Beyond the time required to attend each class meeting, students enrolled in this course should expect to spend at least additional 9 hours per week.

Make-up Exams: Make-ups for graded activities may be arranged if your absence is caused by illness or a personal emergency. A written explanation (including supporting documentation) must be submitted to your instructor; if the explanation is acceptable, an alternative to the graded activity will be arranged. Make-up arrangements must be arranged before the scheduled due date.

Grace periods: To accommodate unavoidable circumstances, **you will be given a 3-day grace period for your assignments.** Beyond the deadline (and grace period if applicable), you will be penalized 25% a day. For example, if you score 73% and are 5 minutes late, you will be penalized 25% for one day,

resulting in a score of $73 - 25 = 48\%$). Use these freebies wisely—for circumstances such as falling ill or interviewing. I will not grant any additional extensions.

Attendance: At the University of Texas at Arlington, taking attendance is not required, but attendance is a critical indicator of student success. Each faculty member is free to develop their methods of evaluating students' academic performance, including establishing course-specific attendance policies. **As the instructor of this section, I will be grading attendance based on your participation in each lecture.** However, while UT Arlington does not require instructors to take attendance in their courses, the U.S. Department of Education requires that the University have a mechanism to verify Federal Student Aid recipients' course attendance. UT Arlington instructors should be prepared to report the last date of attendance as part of the final grading process. Specifically, when assigning a student a grade of F, faculty must report the last date a student attended their class based on evidence of academic engagement such as a test, participation in a class project or presentation, or an engagement online via Canvas. This data is reported to the Department of Education for federal financial aid recipients.

Lab Attendance and Completion: **Attendance to your assigned lab section during lab weeks is mandatory.** You are expected to come to the lab having completed a pre-lab assignment that the GTA will check before you may begin the lab. No make-up lab except for illness or personal emergency. A written explanation must be submitted to your instructor at least one day before your assigned lab time.

Descriptions of major assignments and examinations:

Presentations: **Students will give a 5-minute brief presentation in class** to discuss a couple of recent security vulnerabilities or defenses related to the class's topic that week. The instructor arranges the date for each student.

Labs: You will work in pairs to learn how attacks operate and how to defend against them.

Lab 1: Cryptography: Feb 7th, 9th

Lab 2: User, system, network security (2 weeks): Feb 28th, Mar 2nd, and Mar 7th, 9th

Lab 3: Malware: Apr 4th, 6th

Lab 4: Buffer overflows (2 weeks): Apr 11th, 13th, and Apr 18th, 20th

CTF: Apr 25th and Apr 27th

Assignments: Each lab exercise includes a pre-lab assignment due by Monday midnight before the lab week.

Pre-Lab 1: Cryptography: Feb 6th

Pre-Lab 2: User, System, Network Security: Feb 27th

Pre-Lab 3: Malware: Apr 3rd

Pre-Lab 4: Buffer Overflows: Apr 10th

Pre-CTF: Apr 24th

CTF Write-up: May 8th

Exam 1: **in-class, March 24th**

It covers everything discussed up to and including Week 8

Exam 2: **in-class, May 5th**

Comprehensive; focus on Malware, Buffer Overflows, and Web Security

Quiz: **in-class, Apr. 28th**

(Information Assurance Education Certificate)

The quiz covers administrative issues in securing networks.

Course Schedule (Subject to Change)

Week	Class Dates	Topic	Activity	Due Dates
1	Jan. 20	Class overview, motivation, and overview of computer security. (Online Pre-Recorded Video)		
2	Jan. 27	Symmetric encryption		
3	Feb. 3	Cryptography: Message Authentication and Hash Functions	Pre-Lab 1	Feb 6 th
4	Feb. 10	Cryptography: Public-Key Encryption and Homomorphic Encryption	Lab 1	
5	Feb. 17	User Authentication	Pre-Lab 2	Feb 27 th
6	Feb. 24	Access Control		
7	Mar. 3	Internet vulnerability: Denial-of-Service Attacks Securing the Internet: firewalls, intrusion detection systems	Lab 2.1	
8	Mar. 10	Securing the Internet: firewalls, intrusion detection systems + Exam Review	Lab 2.2	
9	Mar. 17	Spring Break (No Class)		
10	Mar. 24	Exam 1	Pre-Lab 3	Apr 3rd
11	Mar. 31	Internet vulnerability: malware, viruses, worms, social engineering, and phishing		
12	Apr. 7	Software security: Memory architecture + buffer overflow	Lab 3 Pre-Lab4	Apr 10th
13	Apr. 14	Defense for buffer overflow, + common attacks	Lab 4.1 pre-CTF	Apr 24th
14	Apr. 21	Web Security: Injection Attacks	Lab 4.2	
15	Apr. 28	Advance Topics + Exam Review +Quiz	CTF	
16	May. 5	Exam 2		

As the instructor for this course, I reserve the right to adjust this schedule in any way that serves the educational needs of the students enrolled in this course. — Mohit Singhal

Institution Information

UTA students are encouraged to review the institutional policies and informational sections below and contact the specific office with any questions. To view this institutional information, please visit the [Institutional Information](http://www.uta.edu/provost/administrative-forms/course-syllabus/index.php) page (<http://www.uta.edu/provost/administrative-forms/course-syllabus/index.php>), which includes the following policies, among others:

- Drop Policy
- Disability Accommodations

- Title IX Policy
- Academic Integrity
- Student Feedback Survey
- Final Exam Schedule

Additional Information

Face Covering Policy

Face coverings are not mandatory; all students and instructional staff are welcome to wear face coverings while they are on campus or in the classroom.

Emergency Exit Procedures:

Should we experience an emergency event that requires evacuation of the building, students should exit the room and move toward the nearest exit. When exiting the building during an emergency, do not take an elevator but use the stairwells instead. Faculty members and instructional staff will assist students in selecting the safest evacuation route and make arrangements to assist individuals with disabilities.

Academic Success Center

The Academic Success Center (ASC) includes a variety of resources and services to help you maximize your learning and succeed as a student at the University of Texas at Arlington. ASC services include supplemental instruction, peer-led team learning, tutoring, mentoring, and TRIO SSS. Academic Success Center services are provided at no additional cost to UTA students. For further information, visit. To request disability accommodations for tutoring, please complete this [form](#).

The IDEAS Center (<https://www.uta.edu/ideas/>) (2nd Floor of Central Library) offers **FREE** tutoring and mentoring to all students with a focus on transfer students, sophomores, veterans, and others undergoing a transition to UT Arlington. Students can drop in or check the schedule of available peer tutors at www.uta.edu/IDEAS or call (817) 272-6593.

The English Writing Center (411LIBR):

[Optional.] The Writing Center offers **FREE** tutoring in 15-, 30-, 45-, and 60-minute face-to-face and online sessions to all UTA students on any phase of their UTA coursework. Register and make appointments online at the Writing Center (<https://uta.mywconline.com>). Classroom visits, workshops, and specialized services for graduate students and faculty are also available. Please see Writing Center: OWL for detailed information on all our programs and services.

Librarian to Contact:

Each academic unit has access to Librarians by Academic Subject that can assist students with research projects, plagiarism and citation reference tutorials, and support with databases and course reserves.

Emergency Phone Numbers

In case of an on-campus emergency, call the UT Arlington Police Department at **817-272-3003** (non-campus phone) and **2-3003** (campus phone). You may also dial 911. Non-emergency number 817-272-3381