CSE 4382/5382: Secure Programming

Fall 2024 – Rev -

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.
–Thomas Lawson "Trey" Jones

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Instructor Information

Instructor Name

Thomas Lawson "Trey" Jones, CISSP, CEH

Office Location

ERB 321

View Campus Map

Office Phone Number

817-272-3785 (CSE Department Office). As an adjunct, I do not have a phone in my office. Preferable to contact me via email.

Email Address

trey.jones@uta.edu

Faculty Profile

Thomas Lawson Jones - Faculty Profiles - The University of Texas at Arlington (uta.edu)
(https://www.uta.edu/academics/faculty/profile?username=jonest3)

Office Hours

Before and/or after class, as schedule permits. I try to arrive on campus on Fridays by 12:15 AM and am in the office until around 1:45 PM. While I do welcome "walk ins", please try to make an appointment so I can devote a certain amount of dedicated time to your needs. I may also be available after class on some class days.

Communication Guidelines

My preferred communication method is email.

I will respond to emails and voice messages within 48 hours.

Graduate Teaching Assistants (GTAs) will publish their contact info, schedules, and communication preferences via an announcement on Canvas once assigned to the class after the start of the semester.

Course Information

Section Information

CSE 4382-001 and CSE 5382-001

Course Delivery Method

This course is designated ON-CAMPUS, which means all lectures will be in-person. I am also utilizing Echo360 to record lectures for on-demand viewing. Attendance for lectures is highly encouraged as students get the most benefit and engagement through class interactions. All exams will be taken in person during scheduled class times.

For a full definition of the course modalities, please visit the Course Modalities page.

Time and Place of Class Meetings

All classes will be face-to-face (F2F) and will meet in **GACB 103 on Fridays 2:00 PM to 4:50 PM**.

Time Zone

This course operates on Central Time. All times listed for class meeting times, exams, and assignment deadlines are in Central Time.

Description of Course Content

This course is an introduction to methods of secure software design and development for upper-level undergraduate students and graduate students. Students will learn about the major security problems found in software today. Using this knowledge, they will work to find these bugs in software, fix the bugs, and design software so that it has fewer security problems. Static analysis tools will be a core part of the class, but students will also be exposed to black box testing tools. Topics will include input validation, buffer overflow prevention, error handling, web application issues, and XML.

Prerequisites

CSE 3310 and CSE 3320, or equivalent.

Student Learning Outcomes

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

1. The student should understand the principles necessary to develop secure software within the larger context of System Security Engineering.
2. The student will have the opportunity to apply their understanding of secure software development principles using static code analysis (both manual and automated).
3. The student will have the opportunity to apply their understanding of the implementation and exploitation of vulnerabilities that are the result of poor programming practices.

Textbooks and Other Course Materials

Required Textbooks and Materials

Computer Security: A Hands-On Approach, Third Edition
Publisher: Wenliang Du (May 2022)
Language: English
ISBN: 978-1-7330039-5-7
Price: $45.95 (new on Amazon)

Students: Additional materials for this course may range in cost depending on the project and or topic you choose to work on.

Recommended Course Materials

The textbooks and other materials listed below are optional but recommended.

Secure Programming with Static Analysis
Paperback: 624 pages, (Electronic versions also available)
Publisher: Addison-Wesley Professional (July 9, 2007)
Language: English
ISBN-10: 0321424778
ISBN-13: 978-0321424778
Price: $45.00 (new at UTA Bookstore)

Descriptions of major assignments and examinations

The course will consist of one semester long homework assignment that will be submitted for a grade. This assignment must be performed individually (no collaboration with other students). The course will also consist of numerous self-paced optional labs that will not be graded but are intended to help students solidify their understanding of course content. All graded assignments are submitted via Canvas and are due by 11:59 PM on the due date. Assignments turned in late are subject to a penalty (described later in the Late Assignments Submission section).

The course will consist of four quizzes which will be taken in person during class lecture. Quizzes are not cumulative or comprehensive and generally test over topics covered since the last quiz. All quizzes will be essay style where answers are expected to be short and concise. No notes, textbooks, or electronic aids will be allowed.

I do not intend to “teach the text”; students are expected to read and learn from the text on their own time. However, I will include key textual material in my presentations. Students should NOT assume that chapter subtopics included in lectures are to be given greater importance than others. In addition, I will include other industrial experience in my lecture presentations and these slides will be available on Canvas following the class in which they are given. Quizzes will be taken from the material in the textbook and from my lecture presentations.

Expectations for Out-of-Class Study

Beyond the time required to attend each class meeting, students enrolled in this 3 credit-hour course should expect to spend at least an additional 9 hours per week of their own time in course-related activities, including reading required materials, completing assignments, preparing for exams, etc.

Technology Requirements

This class will depend heavily on the use of Canvas for submission of assignments, viewing of grades, and collaboration. While I will be available in person for office hours, I will also support

office hours online via Microsoft Teams (possibly at other times of the week if required and by appointment).

Each student is strongly recommended to have an x64 64-bit computer (laptop preferred for portability reasons but not required) with a 64-bit Operating System: LINUX OS, MAC OS, or Windows OS (the ordering is alphabetical, not in order of preference). Assignments will require the use of a virtualization environment, such as Oracle VirtualBox or VMware Workstation. Students are responsible for purchasing (if necessary), downloading, and installing virtualization software on their computer. Many of the labs performed in class will use a specific virtual machine image. Information about downloading this image and instructions for setting up the environment will be posted on the course page in Canvas. Students owning computers with a different CPU architecture, such as the newer Apple Silicon based Apple Macintosh computers (M1, M2, M3, or M4-based) may alternatively use a cloud-based virtual machine for the lab environment. Most cloud providers offer a free or inexpensive plan for students to use for class assignments.

Visit the UTA Libraries Technology page for a list of items that can be checked out or used at the library.

Recording of Classroom and Online Lectures

Faculty maintain the academic right to determine whether recording of classroom and online lectures is permitted by students. Recordings of classroom lectures, if permitted by the instructor or pursuant to an ADA accommodation, may only be used for academic purposes related to the specific course and may not be used for commercial purposes or shared with non-course participants except in connection with a legal proceeding.

As the instructor of this course, I elect to prohibit recording of classroom or online lectures other than what is already being recorded via Echo360.

Grading Information

All grades will be maintained on the UTA electronic learning management system Canvas (uta.instructure.com) so students can see course scores. All course assignments/projects will be submitted via Canvas. Specific instructions for each assignment/project will be provided via Canvas as well.

I typically grade on a curve when determining the final letter grade, which will be determined based on the distribution of final grades, not individual assignments or quizzes.

Graded Assignments & Values

The following table provides a breakdown of the grading scheme for this class:

Assignment Name	Value (pts or %)
Quiz 1	15%
Quiz 2	15%
Quiz 3	15%
Quiz 4	15%
Project/Assignment	30%

Assignment Name	Value (pts or %)
Attendance/Participation	10%
Total	**100%**

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.

While all attempts are made to give sufficient time to complete assignments, extenuating circumstances may occur in which the class deems that more time is necessary. Any such extensions are at the professor’s discretion.

Final Grade Calculation

The final letter grade scheme is not static and varies from semester to semester based on the distribution of grades. The following is a starting point but will generally shift downwards once all grades are tabulated (for example, an A might be 85-100 instead of 90-100).

Range (pts or %)	Letter Grade
90 - 100	A
80 - <90	B
70 - <80	C
60 - <70	D
<60	F

Make-Up Quizzes & Late Work Policy

Make-Up Quizzes

Make up quizzes will be handled on a case-by-case basis. Students need to inform the professor as soon as possible via email, describing the reason for missing scheduled exams. If the professor determines the exam can be made up, arrangements will be made. In general, the expectation is that the student requesting to make up the exam will be required to take the exam prior to the regularly scheduled exam date, not after.

Late Work Policy

Assignment submissions will be accepted up to 4 days late. Late assignments will be subject to a grading penalty as defined below.

Days Late	Penalty
1 or less	-10 points
2	-20 points
3	-30 points
4	-50 points
5 or later	Grade of 0

If the resulting grade after applying the late penalty is less than 0, a grade of 0 will be assigned.

Extra Credit Policy

To conform with all applicable laws and regulations and to be fair and equitable in the grading opportunities for all students, I do not generally offer any extra credit to individuals for augmenting or enhancing their academic performance in this course. If I offered it to one student, I would have to offer it to all students which creates an undue burden on myself and the GTAs to grade extra credit assignments. However, I do offer numerous bonus point opportunities on the already graded quizzes and assignments as well as class participation in the student feedback survey. Finally, I curve the grades at the end of the semester.

Grades & Feedback Timeline

Grades will be posted to Canvas with appropriate feedback by no later than 2 weeks after the due date.

Grade Grievances

Any appeal of a grade in this course must follow the procedures and deadlines for grade-related grievances as published in the current University Catalog Grades and Grading Policies.

University & Course Policies

UTA students are encouraged to review the below institutional policies and informational sections and reach out to the specific office with any questions. To view this institutional information, please visit the Institutional Information page (https://resources.uta.edu/provost/course-related-info/institutional-policies.php) which includes the following policies among others:

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

Attendance

Attending class sessions is a critical predictor and indicator of student success. The University of Texas at Arlington does not recognize a single attendance policy but encourages faculty to establish class-specific policies on attendance. As the instructor of this section, I have established the following attendance policy: 10% of the final grade is based on attendance and participation. Attendance is important and strongly encouraged. While classes are recorded using Echo360 for on demand viewing after the fact, it is not intended as a substitute for being present in class and contributing to class discussions.

The U.S. Department of Education requires that UT Arlington have a mechanism in place to verify Federal Student Aid recipients' attendance in courses. UT Arlington instructors are expected to report the last date of attendance when submitting students' final course grades; specifically, when a student earns a course grade of F, instructors must report the last date a student attended their class. For on-campus classes, last date of attendance can be based on attendance rosters or on academic engagements—a test, participation in a class project or presentation, or Canvas-based activity. Online or distance education courses require regular

and substantive online interaction and participation. Students must participate in online course activities in Canvas to demonstrate attendance; logging into an online class is not sufficient by itself to demonstrate attendance. The last date of attendance is reported to the U.S. Department of Education for federal financial aid recipients.

Generative AI Use in This Course

The use of Generative AI (GenAI) in course assignments and assessments must align with the guidelines established by the instructor. Unauthorized use of GenAI could result in breaches of academic integrity. Instructors bear the responsibility of clearly delineating the permissible uses of GenAI in their courses, underscoring the importance of responsible and ethical application of these tools.

The UTA Office of Community Standards articulate the university's stance on academic integrity and scholastic dishonesty. These standards extend to the use of GenAI. Unauthorized or unapproved use of GenAI in academic work falls within the scope of these policies and will be subject to the same disciplinary procedures.

As the instructor of this course, I have adopted the following policy on Student use of GenAI:
Prohibition of GenAI Use

In this course, the focus is on the development of independent critical thinking and the mastery of subject-specific content. To ensure that all submitted work accurately reflects personal understanding and original thought, the use of Generative AI (GenAI) tools in completing assignments or assessments is strictly prohibited. This policy supports our commitment to academic integrity and the direct measurement of each student's learning against the course's Student Learning Outcomes (SLOs). Any work found to be generated by AI will be subject to academic review.

Academic & Wellness Resources

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 additional information visit: Academic Success Center (https://www.uta.edu/student-success/course-assistance). To request disability accommodations for tutoring, please complete this tutoring request form (https://www.uta.edu/student-success/course-assistance/tutoring/request).

The English Writing Center (411LIBR)

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 (http://www.uta.edu/owl) for detailed information on all our programs and services.

Academic Plaza

The Library's 2nd floor Academic Plaza (http://library.uta.edu/academic-plaza) offers students a central hub of support services, including IDEAS Center, University Advising Services, Transfer UTA and various college/school advising hours. Services are available during the library's hours (https://library.uta.edu/hours) of operation.

UTA CARE Team

UT Arlington is committed to the safety, success, and well-being of our students. To support our community, UTA has created a CARE Team, which is a dedicated group of campus professionals responsible for helping students who could benefit from academic, emotional, or psychological support, as well as those presenting risk to the health or safety of the community. If you know of someone experiencing challenges, appearing distressed, needing resources, or causing a significant disruption to the UTA community, please submit a CARE Referral by visiting the Behavior Intervention Team (https://www.uta.edu/student-affairs/dos/behavior-it) page. You may also submit a referral for yourself if you would like additional support.

NOTE: If a person's behavior poses an immediate threat to you or someone else, contact UTA Police at 817-272-3303 or dial 911. If you or someone you know needs to speak with a crisis counselor, please reach out to the MAVS TALK 24-hour Crisis Line (https://www.uta.edu/student-affairs/caps/crisis)at 817-272-8255 or the National Suicide and Crisis Lifeline (https://988lifeline.org/) at 988.

Student Services

Everything you need to make the most of your time as a student (and beyond) is all on campus. Below are a few resources to get you started.

- Student Services Home
- Student Access and Resource (SAR) Center
- Military and Veteran Services
- Health Services
- Counseling and Psychological Services (CAPS)
- Activities and Organizations
- Recreation

Librarian to Contact

Each academic unit has access to Librarians by Academic Subject (https://libraries.uta.edu/research/librarians) that can assist students with research projects, tutorials on plagiarism and citation references as well as support with databases and course reserves.

Safety Information & Resources

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 route for evacuation and will make arrangements to assist individuals with disabilities.

MavAlert System

The MavAlert system sends information in case of an emergency to cell phones or email accounts of subscribed users. Anyone can subscribe to MavAlerts at Emergency Communication System (https://www.uta.edu/uta/emergency.php).

Emergency Phone Numbers

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

Course Schedule

The following schedule is provided for the students to plan participation and study as needed. It is highly likely that I will need to adjust topics and course lectures on an ongoing basis. When that occurs, I will upload an updated version of the course schedule on Canvas in the Syllabus link and send out an announcement of the new schedule. It is also expected and recommended that students should review relevant textbook material prior to the date it is covered in class.

Class Date(s)	Class Topics / Activities
Week 1 8/23/2024	Introductions and Course Overview, The Software Security Problem [Chapter 1, Secure Programming Book] {Start of material for Quiz 1}
Week 2 8/30/2024	Privileged Programs (SetUID) [Chapter 2, Computer Security Book], **Lab Assignment 1 Posted (Environment Variables and SetUID Programs)**
Week 3 9/6/2024	Environment Variables [Chapter 3, Computer Security Book], Shellshock [Chapter 16, Computer Security Book] {End of material for Quiz 1}, Buffer Overflow (Part 1) [Chapter 4, Computer Security Book] {Start of material for Quiz 2}, **Lab Assignment 2 Posted (Shellshock)**
Week 4 9/13/2024	Buffer Overflow (Part 2) [Chapter 4, Computer Security Book] Return-to-libc [Chapter 5, Computer Security Book], **Lab Assignment 3 Posted (Buffer Overflow),** **Quiz 1**
Week 5 9/20/2024	Format Strings [Chapter 6, Computer Security Book], Race Condition [Chapter 7, Computer Security Book], **Lab Assignment 4 Posted (Return-to-libc)**
Week 6 9/27/2024	Dirty COW Attack [Chapter 8, Computer Security Book], Input Validation [Chapter 5, Secure Programming Book] {Covered on Quiz 4}, **Lab Assignment 5 Posted (Format Strings),** **Project Posted (Input Validation)**
Week 7 10/4/2024	Errors and Exceptions [Chapter 8, Secure Programming Book] {End of material for Quiz 2}, Web CSRF [Chapter 12, Computer Security Book] {Start of material for Quiz 3}, Web XSS [Chapter 13, Computer Security Book], **Lab Assignment 6 Posted (Race Condition)**
Week 8 10/11/2024	Telemetry and Monitoring, **Lab Assignment 7 Posted (Web CSRF),** **Quiz 2**
Week 9 10/18/2024	Web SQL Injection [Chapter 14, Computer Security Book], More Web Security Considerations (Part 1), **Lab Assignment 8 Posted (Web XSS)**

Class Date(s)	Class Topics / Activities
Week 10 10/25/2024	More Web Security Considerations (Part 2), Heartbleed {End of material for Quiz 3}, **Lab Assignment 9 Posted (Web SQL Injection),** ***Last day to drop classes (4 PM)***
Week 11 11/1/2024	Introduction to Static Analysis [Chapter 2, Secure Programming Book] {Start of material for Quiz 4}, **Lab Assignment 10 Posted (Understanding and Using Static Code Analysis Tools)**
Week 12 11/8/2024	Static Analysis as Part of the Code Review Process [Chapter 3, Secure Programming Book], NSA SCA Studies, **Quiz 3**
Week 13 11/15/2024	Static Analysis Internals [Chapter 4, Secure Programming Book], Mobile Application Security, **Project Due**
Week 14 11/22/2024	Attack Surface Analysis, Threat Modeling, Supply Chain Risk Management {End of material for Quiz 4}
11/292024	***Thanksgiving Break (no class)***
Week 15 12/6/2024	**Final Exam Day (Quiz 4) at TBD**