The Syllabus for CSE 4380/5380 Information Security (Fall 2018)

Instructor: Shirin Nilizadeh
Temporary Office Number: ERB 302
Email Address: shirin.nilizadeh@uta.edu
Office Hours: Friday 10:00-11:50 AM

Section Information: CSE 4380/5380, Sections 003 and 005
Time of Class Meetings: Tuesday/Thursday 3:30-4:40 PM
Place of Class Meetings: SH 333
Class Website: https://elearn.uta.edu

Lab Section Information: CSE 4380/5380, Sections 004 and 006
Time of Lab Meetings: Monday 7-10 PM, Wednesday 7-10 PM and Friday 4-6:50 PM.
Place of Lab Meetings: ERB 106

GTA: Haotian Zhang
GTA Email Address: haotian.zhang@mavs.uta.edu
Office Number: ERB 316
Office Hours: Wednesday 5:40-7 PM.

Description of Course Content:
This is the 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.

Prerequisite: Operating Systems (CSE 3320 or equivalent) is required.

Student Learning Outcomes:
- Use cryptographic primitives directly in order to understand their respective uses and how they work together to provide security.
- Develop simple malware in order to understand hooking and how hooking can be subverted for malicious purposes.
- Set up and use defensive and security testing technologies in the network and operating system in order to see how they defend against attacks.
- Exploit software vulnerabilities in order to understand how they work and how defenses could stop them.
- Study a range of concepts to gain a broad understanding of the field 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:
- In addition to the textbook, each week the instructor list some papers and articles for students to read before the class.

Course Grades: Course grades will be based on the following:
- Lab Exercises (4 in-lab with 4 pre-lab exercises): 36%
  Labs 1 & 3 are worth 7%, Labs 2 & 4 are worth 11%
- CTF Lab and Report: 15%
- Readings and blog posts: 15%
- Exams (Midterm and Final): 30%
- Presentation & Class Participation: 4%
Grades for the exam will be curved by the instructor and scaled to a standard A = 90-100, B = 80-89, C = 70-79 scale. Final grades will simply 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). Students are expected to keep track of their performance throughout the semester and seek guidance from available sources (including the instructor) if their performance drops below satisfactory levels; see “Student Support Services,” below.

Make-ups: Make-ups for graded activities may be arranged if your absence is caused by illness or 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 prior to the scheduled due date.

Class Attendance Policy: At the University of Texas at Arlington, taking attendance is not required. Rather, each faculty member is free to develop his or her own methods of evaluating students’ academic performance, which includes establishing course-specific policies on attendance. As the instructor of this section, I will be grading attendance based on your participation in each lecture. Also, in every class period, you will learn by actively participating in the process of solving problems and working in small groups. Missing class, therefore, means missing out on learning opportunities that cannot be gained from the textbook.

Lab Attendance and Completion: Attendance to your assigned lab section during lab weeks is mandatory. You are expected to come to lab having completed a pre-lab assignment that will be checked by the GTA before you may begin the lab. The lab hours are fixed. We will allow you to complete an unfinished lab by attending GTA office hours in the following week (max. 1 hour), but at the cost of 10 points (out of 100) deducted from your grade for that lab.

Descriptions of major assignments and examinations:

- Activity and assignment details will be explained in detail within each week's corresponding learning module.

- All assignments are available on blackboard, and should be submitted via blackboard.

- Readings: Each week students are required to study some materials before the class. All assigned reading should be completed 1 day before the class. You need to engage in the discussions through blackboard blogs. Then, you need to comment on your teammates’ blog before the class. The Instructor in the first week assigns students to teams of three.

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

- Labs: In the labs, you will work in pairs to learn how attacks operate and how to defend against them. Each lab exercise includes a pre-lab assignment due the Sunday before the lab week.
  - Lab 1: Cryptography: due by Sept. 10-14
  - Lab 3: Malware: due by Oct. 22-26
  - Lab 4: Buffer Overflows (2 weeks): due by Nov. 5-9 and Nov. 12-16

- Lab Assignments: Each lab exercise includes a pre-lab assignment due by the Sunday midnight before the lab week.
  - Pre-Lab 1. Cryptography: due by Sept. 9
  - Pre-Lab 2. User, System, Network Security: due by Sept. 23
  - Pre-Lab 3: Malware: due by Oct. 21
  - Pre-Lab 4: Buffer Overflows: due by Nov. 4
  - Pre-CTF: due by Nov 11.
• **CTF Lab:** In this lab exercise, students will work in teams in a jeopardy-style capture-the-flag game to earn points awarded by performing security tasks and exercises that you have learned in class and even some new ones. Students will write a team report showing how they applied class knowledge to the game. CTF Lab will be during week 16, Dec. 3-7. CTF Write-up is due by Dec. 7.

• **Exam 1:** in-class, Thursday Oct. 18
  Covers everything discussed up to and including Week 8

• **Final Exam:** Tuesday Dec. 11
  Comprehensive; focus on Malware and Buffer Overflows

<table>
<thead>
<tr>
<th>Week</th>
<th>Class Dates</th>
<th>Course Schedule (Subject to Change):</th>
<th>Activity</th>
<th>Due Dates</th>
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<tbody>
<tr>
<td>1</td>
<td>Aug. 23</td>
<td>Class overview, motivation and overview of computer security</td>
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<tr>
<td>2</td>
<td>Aug. 28, Aug. 30</td>
<td>Cryptography: symmetric encryption and Message Authentication and Hash Functions</td>
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<td>3</td>
<td>Sep. 4, Sep. 6</td>
<td>Cryptography: Public-Key Encryption and Homomorphic Encryption</td>
<td>Pre-Lab 1</td>
<td>Sep. 9</td>
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<td>4</td>
<td>Sep. 11, Sep. 13</td>
<td>User Authentication</td>
<td>Lab 1</td>
<td></td>
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<td>5</td>
<td>Sep. 18, Sep. 20</td>
<td>Access Control</td>
<td>Pre-Lab 2</td>
<td>Sep. 23</td>
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<td>6</td>
<td>Sep. 25, Sep. 27</td>
<td>Internet vulnerability: malware, viruses, worms (Guest Lecturer on Sep. 27)</td>
<td>Lab 2.1</td>
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<td>7</td>
<td>Oct. 2, Oct. 4</td>
<td>Internet vulnerability: Denial-of-Service Attacks Securing the Internet: Intrusion Detection</td>
<td>Lab 2.2</td>
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<td>8</td>
<td>Oct. 9, Oct. 11</td>
<td>Securing the Internet: firewalls, intrusion detection systems</td>
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<td>9</td>
<td>Oct. 16, Oct. 18</td>
<td>EXAM 1 (No class on Oct 16)</td>
<td>Pre-Lab 3</td>
<td>Oct. 21</td>
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<td>10</td>
<td>Oct. 23, Oct. 25</td>
<td>Software security: principles</td>
<td>Lab 3</td>
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<td>11</td>
<td>Oct. 30, Nov. 1</td>
<td>Software security: buffer/heap overflow</td>
<td>Pre-Lab 4</td>
<td>Nov. 4</td>
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<tr>
<td>12</td>
<td>Nov. 6, Nov. 8</td>
<td>Compiler prime on run-time program environment. Defense for buffer overflow</td>
<td>Lab 4.1 + Pre-CTF</td>
<td>Nov. 11</td>
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<td>13</td>
<td>Nov. 13, Nov. 15</td>
<td>OS security: overview, access control, setuid, etc.</td>
<td>Lab 4.2</td>
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<td>14</td>
<td>Nov. 20, Nov. 22</td>
<td>Advanced Topics + THANKSGIVING (No class on Nov. 22)</td>
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<td>15</td>
<td>Nov. 27, Nov. 29</td>
<td>Advanced Topics + Student Feedback Survey</td>
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<td>16</td>
<td>Dec. 4, Dec. 6</td>
<td>CTF</td>
<td>CTF</td>
<td>Dec. 7</td>
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<td>17</td>
<td>Dec. 11</td>
<td>Final Exam (2 – 4:30 p.m.)</td>
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*The instructor reserves the right to modify course policies, the course calendar, and assignment or project point values and due dates.* — Shirin Nilizadeh
**Drop Policy:** Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. **Students will not be automatically dropped for non-attendance.** Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. For more information, contact the Office of Financial Aid and Scholarships (http://wweb.uta.edu/aa0/fao/).

**Disability Accommodations:** UT Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including The Americans with Disabilities Act (ADA), The Americans with Disabilities Amendments Act (ADAAA), and Section 504 of the Rehabilitation Act. All instructors at UT Arlington are required by law to provide “reasonable accommodations” to students with disabilities, so as not to discriminate on the basis of disability. Students are responsible for providing the instructor with official notification in the form of a letter certified by the Office for Students with Disabilities (OSD). Only those students who have officially documented a need for an accommodation will have their request honored. Students experiencing a range of conditions (Physical, Learning, Chronic Health, Mental Health, and Sensory) that may cause diminished academic performance or other barriers to learning may seek services and/or accommodations by contacting: The Office for Students with Disabilities, (OSD) http://www.uta.edu/disability/ or calling 817-272-3364. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at www.uta.edu/disability.

**Counseling and Psychological Services (CAPS)** www.uta.edu/caps/ or calling 817-272-3671 is also available to all students to help increase their understanding of personal issues, address mental and behavioral health problems and make positive changes in their lives.

**Non-Discrimination Policy:** The University of Texas at Arlington does not discriminate on the basis of race, color, national origin, religion, age, gender, sexual orientation, disabilities, genetic information, and/or veteran status in its educational programs or activities it operates. For more information, visit uta.edu/eos.

**Title IX Policy:** The University of Texas at Arlington (“University”) is committed to maintaining a learning and working environment that is free from discrimination based on sex in accordance with Title IX of the Higher Education Amendments of 1972 (Title IX), which prohibits discrimination on the basis of sex in educational programs or activities; Title VII of the Civil Rights Act of 1964 (Title VII), which prohibits sex discrimination in employment; and the Campus Sexual Violence Elimination Act (SaVE Act). Sexual misconduct is a form of sex discrimination and will not be tolerated. For information regarding Title IX, visit www.uta.edu/titleix or contact Ms. Michelle Willbanks, Title IX Coordinator at (817) 272-4585 or titleix@uta.edu

**Academic Integrity:** Students enrolled all UT Arlington courses are expected to adhere to the UT Arlington Honor Code:

I pledge, on my honor, to uphold UT Arlington’s tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence.

I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.

UT Arlington faculty members may employ the Honor Code in their courses by having students acknowledge the honor code as part of an examination or requiring students to incorporate the honor code into any work submitted. Per UT System Regents’ Rule 50101, §2.2, suspected violations of university’s standards for academic integrity (including the Honor Code) will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in
the student’s suspension or expulsion from the University. Additional information is available at https://www.uta.edu/conduct/.

Additionally, there is a special ethics form for this course about malicious hacking that you must sign and uphold.

**Electronic Communication:** UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and are responsible for checking the inbox regularly. There is no additional charge to students for using this account, which remains active even after graduation. Information about activating and using MavMail is available at http://www.uta.edu/oit/cs/email/mavmail.php.

**Campus Carry:** Effective August 1, 2016, the Campus Carry law (Senate Bill 11) allows those licensed individuals to carry a concealed handgun in buildings on public university campuses, except in locations the University establishes as prohibited. Under the new law, openly carrying handguns is not allowed on college campuses. For more information, visit http://www.uta.edu/news/info/campus-carry/

**Student Feedback Survey:** At the end of each term, students enrolled in face-to-face and online classes categorized as “lecture,” “seminar,” or “laboratory” are directed to complete an online Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be sent directly to each student through MavMail approximately 10 days before the end of the term. Each student’s feedback via the SFS database is aggregated with that of other students enrolled in the course. Students’ anonymity will be protected to the extent that the law allows. UT Arlington’s effort to solicit, gather, tabulate, and publish student feedback is required by state law and aggregate results are posted online. Data from SFS is also used for faculty and program evaluations. For more information, visit http://www.uta.edu/sfs.

**Final Review Week:** for semester-long courses, a period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week *unless specified in the class syllabus*. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. During this week, classes are held as scheduled. In addition, instructors are not required to limit content to topics that have been previously covered; they may introduce new concepts as appropriate.

**Emergency Exit Procedures:** Should we experience an emergency event that requires us to vacate the building, students should exit the room and move toward the nearest exit. When exiting the building during an emergency, one should never take an elevator but should use the stairwells. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist individuals with disabilities. Evacuation plans may be found at http://www.uta.edu/campus-ops/ehs/fire/Evac_Maps_Buildings.php. Students should subscribe to the MavAlert system that will send information in case of an emergency to their cell phones or email accounts. Anyone can subscribe at https://mavalert.uta.edu/ or https://mavalert.uta.edu/register.php

**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 https://uta.mywconline.com.

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**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 817-272-338