Computer and Information Security

CIS 4360 (CISE)

Class Periods: T (01:55-02:45 PM) (Period 7)
R (01:55-03:50 PM) (Period 7-8)

Locations: T-R (CSE E121)

Academic Term: Spring 2023

Instructor:
Prof. Sara Rampazzi - srampazzi (at) ufl (dot) edu
Office Hours: TUE (3:00-4:00 pm) MAE 205b or by email appointment

Teaching Assistant:
TA: Jennifer Sheldon - jsheldon (at) ufl (dot) edu
Office Hours: TBD

Course Description
Total Credit: 3.
Computer security is one of the most exciting and challenging areas in all of computer science. Many of the world's largest technology companies have made securing their computer systems one of their largest concerns. While technology has made significant inroads in many areas of society, the challenges of keeping systems and networks secure have broad implications for not just users of technology, but all citizens.

Course Pre-Requisites / Co-Requisites
COP 4600 (Operating Systems) or equivalent, programming experience necessary (e.g., C++, Python)

Course Objectives
This course provides an introduction to computer security. Students successfully completing this class will be able to evaluate works in academic and commercial security and gain expertise in fundamental topic areas. The course begins with a tutorial of the basic elements of cryptography and continues by supplementing readings in computer security with seminal papers and monographs in a wide range of security areas.

Topics covered include network security, authentication, security protocol design and analysis, security modeling, key management, intrusion detection, DDOS detection and mitigation, biometrics, web security, privacy, anonymity and other emerging topics.

Materials and Supply Fees
None.

Required Textbooks and Software
Most of the course readings will come from textbooks and a few seminal papers in the field. Links to these materials (subject to change as the term evolves) will be provided on the E-learning platform. Slides and links to critical reference materials will be provided after each lesson. We will draw heavily from the following textbook:

- Paul van Oorschot, Computer Security and the Internet: Tools and Jewels, Springer, 2021. https://www.springer.com/gp/book/9783030336486 The 2020 edition is similar, so it can be used as well.

Note that while the book should be available in the bookstore if you want a hard copy, you can also find a PDF copy of the book on Prof. van Oorschot's website at https://people.scs.carleton.ca/~paulv/toolsjewels.html
Please respect the restrictions on use noted on the web page.

Recommended Materials

If you are not familiar with C or Python and UNIX programming environments, you will need to become so. Having some exposure to reading assembly may be helpful. There are many good free online references for C and Python. For additional resources, the following are recommended for learning and using C:

- Kernighan and Ritchie, The C Programming Language. 2/E, Prentice Hall, 1988.
  Harrison and Steele, C: A Reference Manual
  A.D. Marshall, Programming in C (https://users.cs.cf.ac.uk/Dave.Marshall/C/)
  https://www.cprogramming.com/

The following is a good resource on Python programming:

- Python Programming Fundamentals: https://pythonprogramming.net/python-fundamental-tutorials/
  https://www.learnpython.org/

The following are good resources on UNIX programming:

- Stevens and Rago, Advanced Programming in the Unix Environment. 2/E, Addison Wesley, 2005.
  Kerrisk, The Linux Programming Interface. 1/E, No Starch Press, 2010.

If you are unfamiliar with using the command line, the following resource is helpful:

- https://linuxcommand.org/

You likely learned some assembly in a computer organization or architecture course. Reading x86 assembly is not tremendously different from MIPS assembly. If you want a short primer, the x86 Assembly Guide from the University of Virginia is good (http://www.cs.virginia.edu/~evans/cs216/guides/x86.html). For a canonical reference, The Art of Assembly Language is excellent.

Please contact the instructor if you have questions regarding the material or concerns about whether your background is suitable for the course.

Course Schedule
(Might change depending on time constraints and external events. Canvas will be used for announcements.)

Week 1:	Introduction to Computer security fundamental concepts
Week 2:	Cryptographic Building Blocks
Week 3:	Symmetric Cryptography
Week 4:	Asymmetric Cryptography
Week 5:	Hash functions and MAC
Week 6:	Digital Signatures and Key Agreement
Week 7:	Authentication & passwords
Week 8:	Web security
Week 9:	Web authentication protocols
Week 10:	Network security
Week 11:	Spring break (no class)
Week 12:	Access Control Protocols
Week 13:	Network-Based Attacks
Week 14:	Malwares
Week 15:	Firewalls and Intrusion Detection
Week 16:	Software Security & System attacks

Week 17: Defenses against System attacks

Attendance Policy, Class Expectations, and Make-Up Policy

Attendance is strongly recommended but not mandatory. Due to the course format, students who miss many lectures will be at a significant disadvantage.

The class lectures will be available in synchronous remote modality via Zoom (HyFlex) and available on the UF E-Learning platform after each lecture (Disclaimer: Recordings are made by the zoom platform and it is not guarantee the quality or availability of the recording. To ensure that you view the complete lecture, attend the live lecture session.)

Notice: The lectures will be audio-visually recorded for students in the course to reference after the live recorded session. Students who choose to participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. A textual "chat" feature is also available during lectures and it will be also recorded. Please note, since the lecture is in a public setting, chat messages may or may not be answerable during the live lecture.

The expectations for the course are that students will do the readings and homework assigned for class, and actively and constructively participate in class discussions. There will be class assignments, quizzes, and examinations, all of which will be taken individually. Students will be responsible for the material covered in the lectures.

The course will include one midterm and one final exam. **There are no makeups for missed or late submissions for the midterm and the final exam.**

Late submission policy for assignments (quizzes and code assignments): Late submissions will have -10 points deducted plus one point deducted for day (rounded up for partial days) after the due date until the assignment closes. After closing, no work will be accepted, but the lowest grade will be dropped at the end of the course.

Excused absences must in compliance with university policies and require appropriate documentation. If the student is not able to submit the assignments for a legitimate reason (e.g., medical or travel), students should contact the instructor and provide justification a **few days ahead** of the assignment due date. Emergency situations should be notified to the instructor or the TA **before** the start of the exam or midterm.

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies. Click here to read the university attendance policies:
https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/

Evaluation of Grades

Assignment	Total Points	Percentage of Final Grade
Quizzes (5)	100 each	20%
Code assignments (3)	100 each	30%
Midterm	100	20%
Final Exam	100	30%

Grading Policy
(Might change)

Percent	Grade	Grade Points
92.0 - 100.0	A	4.00
85.0 - 91.9	A-	3.67
78.0 - 84.9	B+	3.33
71.0 – 77.9	B	3.00
64.0 - 70.9	B-	2.67
57.0 - 63.9	C+	2.33
50.0 – 56.9	C	2.00
43.0 - 49.9	C-	1.67
36.0 - 42.9	D+	1.33
29.0 - 35.9	D	1.00
22.0 - 28.9	D-	0.67
0 - 21.9	E	0.00

More information on UF grading policy may be found at:
https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

Students Requiring Accommodations
Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting https://disability.ufl.edu/students/get-started/. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

Course Evaluation
Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

In-Class Recording
Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A "class lecture" is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To "publish" means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform,

including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

Academic Integrity

Students are required to follow the university guidelines on academic conduct and the student honor code (https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code) at all times. Students failing to meet these standards will be reported to the Dean of Students, which can result in the student receiving an 'E' for the course. In particular, students are explicitly forbidden from copying anything off of the Internet (e.g., source code, text, slides) without proper attribution or citation.

Ethics Statement

This course covers topics concerning the security of many systems that are widely deployed and potentially critical. As part of this course, we will investigate methods, tools and techniques whose use may negatively impact the rights, property and lives of others. As security professionals, we rely upon the ethical use of the above technologies to perform research. However, it is easy to use such tools in an unethical manner. Unethical use includes the circumvention of existing security or privacy measurements for any purpose, or the dissemination, promotion, or exploitation of vulnerabilities of these services.

The policy of this course is that you must respect the privacy and property rights of others at all times, or else you will **fail the course**. Acting lawfully and ethically is your responsibility. Carefully read the Computer Fraud and Abuse Act (CFAA): https://www.nacdl.org/Landing/ComputerFraudandAbuseAct. This is one of several laws that govern "hacking." It is your responsibility to understand what applicable law prohibits.

This is **NOT** a class on hacking. Any activity outside of the spirit of these guidelines will be reported to the proper authorities both within and outside of UF and may result in dismissal from the class and the University. Exceptions to these guidelines may occur in the process of reporting vulnerabilities through the proper channels; however, students with any doubt should consult Professor Rampazzi for advice. **DO NOT** conduct any action which could be perceived as technology misuse anywhere or under any circumstances.

Please review the university's policy on Responsible Use of Information Resources for guidelines concerning proper use of information technology at UF, as well as the UF Honor Pledge. As members of the university, you are required to abide by these policies.

University Honesty Policy

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Conduct Code (https://sccr.dso.ufl.edu/process/student-conduct-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Commitment to a Safe and Inclusive Learning Environment

The Herbert Wertheim College of Engineering values broad diversity within our community and is committed to individual and group empowerment, inclusion, and the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture.

If you feel like your performance in class is being impacted by discrimination or harassment of any kind, please contact your instructor or any of the following:

• Your academic advisor or Graduate Program Coordinator

• Jennifer Nappo, Director of Human Resources, 352-392-0904, jpennacc@ufl.edu
• Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, taylor@eng.ufl.edu
• Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, nishida@eng.ufl.edu

Software Use
All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy
There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: https://registrar.ufl.edu/ferpa.html

Campus Resources:

Health and Wellness

U Matter, We Care:
Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

Counseling and Wellness Center: https://counseling.ufl.edu, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Discrimination, Harassment, Assault, or Violence
If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the **Office of Title IX Compliance**, located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, title-ix@ufl.edu

Sexual Assault Recovery Services (SARS)
Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or http://www.police.ufl.edu/.

COVID-19
- You are expected to wear approved face coverings at all times during class and within buildings even if you are vaccinated.
- If you are sick, stay home and self-quarantine. Please visit the UF Health Screen, Test & Protect website about next steps, retake the questionnaire and schedule your test for no sooner than 24 hours after your symptoms began. Please call your primary care provider if you are ill and need immediate care or the UF Student Health Care Center at 352-392-1161 (or email covid@shcc.ufl.edu) to be evaluated for testing and to receive further instructions about returning to campus.

- If you are withheld from campus by the Department of Health through Screen, Test & Protect, you are not permitted to use any on campus facilities. Students attempting to attend campus activities when withheld from campus will be referred to the Dean of Students Office.
- UF Health Screen, Test & Protect offers guidance when you are sick, have been exposed to someone who has tested positive or have tested positive yourself. Visit the UF Health Screen, Test & Protect website for more information.
- Please continue to follow healthy habits, including best practices like frequent hand washing. Following these practices is our responsibility as Gators.

Academic Resources

E-learning technical suppor*t*, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. https://lss.at.ufl.edu/help.shtml.

Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling; https://career.ufl.edu.

Library Support, http://cms.uflib.ufl.edu/ask. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. https://teachingcenter.ufl.edu/.

Writing Studio, 302 Tigert Hall*,* 846-1138. Help brainstorming, formatting, and writing papers. https://writing.ufl.edu/writing-studio/.

Student Complaints Campus*:* https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/;https://care.dso.ufl.edu.

On-Line Students Complaints*:* http://www.distance.ufl.edu/student-complaint-process.