

CS 3710: Introduction to Cybersecurity (ICS)**Spring 2023**

v1.0

Instructor

Angela Orebaugh
angelao@virginia.edu

Class Meetings

MWF 10–10:50am
Olsson 120

*class meetings are live
streamed and recorded

Course Content

Available on Canvas

Office Hours

After class and by
appointment

TAs

TBA

Course Overview

This course provides a comprehensive overview of essential cybersecurity concepts. It addresses both technical and non-technical concepts such as risks, threats, and vulnerabilities associated with the evolving cyber ecosystem. You will gain knowledge of fundamental cybersecurity principles and real world applications and examples. You will gain hands-on experience with realistic security scenarios and tools in a cloud-based lab environment.

Prerequisites

Must have completed CS 2150 or (CS 2100/CS2100 place out test **and** CS 2130) with grade of C- or higher.

Textbook and Readings

There is no required textbook for this course. Because cybersecurity is a rapidly changing field, you will be assigned relevant, current articles and papers accessible via the Internet or distributed via PDF. You are not required to purchase a textbook but if you are looking for a good resource for cybersecurity foundational concepts you may use the following book:

Fundamentals of Information Systems Security 3rd Edition, David Kim and Michael G. Solomon, 2018, ISBN-10: 128411645X.

Course Objectives

Students who complete this course will:

- Understand the ethical and policy context for cybersecurity in today's society
- Understand how to better safeguard one's personal computer
- Understand the basics of advanced topics in cybersecurity including encryption, digital forensics, binary exploits, and networks
- Understand the modern concepts in cybersecurity attacks and prevention

Required Technical Resources

You will need a computer with a web browser and high speed Internet connection with the capability to view multimedia clips, read prepared content, and run hands-on exercises.

Assessment Components

You will be evaluated by lab assignments, programming assignments, quizzes, Cyber Chat participation, and a final exam.

- **Lab Assignments (49 points)** – You will be responsible for completing 7 lab assignments (7 points each). Each assignment will have an exact due date and time that it shall be submitted on Canvas for grading. These assignments help you develop critical thinking, problem solving, analysis, and hands-on experience. Evaluation Criteria – Your lab assignments will be evaluated on completeness, applying course concepts, interpreting results, and ability to achieve the desired outcome.
- **Programming Assignments (14 points)** – You will be responsible for completing 2 programming assignments (7 points each). Each assignment will have an exact due date and time that it shall be submitted on Canvas for grading. These assignments help you develop critical thinking, problem solving, creativity, and programming skills. Evaluation Criteria – Your programming assignments will be evaluated on completeness, applying course concepts, applying critical thinking skills to create solutions to problems, and ability to achieve the desired outcome.
- **Quizzes (15 points)** – You will be responsible for completing 3 quizzes (5 points each). Each quiz will be based on posted reading assignments and class discussion and have an exact due date and time that it shall be completed on Canvas. Quizzes help assess your level of knowledge and understanding of cybersecurity topics. Evaluation Criteria – Quizzes will be evaluated using the appropriate quiz answer key.
- **Cyber Chat (7 points)** – You will be responsible for presenting 1 Cyber Chat (7 points) lightning talk. Class time on Friday is reserved for Cyber Chat presentations and other discussions. You will sign up for a day to post a video of your presentation and associated writeup to the Piazza Cyber Chat folder. Select videos will be shown in class on Cyber Chat Fridays. You may choose any cybersecurity topic that interests you (i.e. a historical event, tool, exploit, recent breach, innovative research, etc.). This assignment will help you develop research, analysis, written communication, and verbal communication skills. Evaluation Criteria – Your Cyber Chat will be evaluated on comprehensiveness, analysis, and speaking and writing clarity and succinctness.
- **CTF Final Exam (15 points)** – You will be responsible for completing a final exam (15 points). The exam will be a capture the flag style exam using problem solving techniques and tools from the lab assignments and class lectures. The examination will be used to ensure the principles of the course have been mastered at an acceptable level. Evaluation Criteria – Final exams will be evaluated on your ability to solve problems and apply cybersecurity tools and techniques to identify the flag.

Assessment Component Honor Code and Late Policy

The UVA Honor Code is in effect for all assessment components and will automatically be included for assessment components submitted on Collab. **Late submissions will receive a grade reduction of 10% per day.** If you have any special circumstances, they need to be **communicated in advance.**

It is in the best interest of everyone in our community to keep the spread of infectious disease to a minimum. **Students who are ill should stay home.** This course has a very flexible learning environment including live streaming and recordings. Please reach out to me if you have any concerns about assignments due to illness.

Assessment Component Allocation

Component	Points
Lab exercises	49 points (7 @7pts each)
Programming assignments	14 points (2 @7pts each)
Quizzes	15 points (3 @5pts each)
Cyber Chat	7 points (1 @7pts each)
Final Exam	15 points (1 @15pts each)

Grading

A+	100	B	83–86	C-	70–72
A	95–99	B-	80–82	D+	67–69
A-	90–94	C+	77–79	D	63–66
B+	87–89	C	73–76	D-	60–62
				F	Below 60 (no credit)

Course Code of Ethics

All students in this course are expected to abide by ethical guidelines in their use of the information taught in the course. It is not the intent of the Department of Computer Science to teach any student how to create malicious code or how to exploit any software vulnerabilities. However, in order to teach students how to defend against malicious attacks upon computer systems, it is necessary to provide a certain amount of information about how such attacks are devised. Students are not to use any of this information to construct any such attacks themselves, or to render any computer system vulnerable to such attacks.

You are required to agree to abide by the following rules. If you cannot abide with these rules, you will have to drop this course.

1. You will not use the knowledge gained in this course to alter program or data or any other files belonging to another person without the express consent of that person.
2. You will not use the knowledge gained in this course to gain access to any computer system that you are not authorized, by the administrators of that system, to access.
3. You will not use the knowledge gained in this course to use any computer resources (e.g. processing time, disk space, network bandwidth, etc.) that you are not authorized, by the administrators of the affected systems, to use.

Course Schedule

Week	Date	Topic and Readings	Activities
Week 1	W–Jan 18	Course Overview and Introduction Chapter 1	
	F–Jan 20	Introduction to Virginia Cyber Range How to Join a Course, Student Quick Start, Linux Command Cheat Sheet (on Collab) Prep for Lab #1 John the Ripper	Create account on Virginia Cyber Range Sign up for Cyber Chat
Week 2	M–Jan 23	Internet of Things Chapter 2	
	W–Jan 25	Networking, Recon, Scanning Prep for Lab #2 Nmap	
	F–Jan 27	Friday Cyber Chat	Cyber Chat Presentations Lab #1 due Jan 27 @11:59pm
Week 3	M–Jan 30	Malicious Attacks, Threats, and Vulnerabilities Chapter 3	
	W–Feb 1	Malicious Attacks, Threats, and Vulnerabilities - continued	
	F–Feb 3	Friday Cyber Chat	Cyber Chat Presentations Lab #2 due Feb 3 @11:59pm
Week 4	M–Feb 6	Access Controls Chapter 5	
	W–Feb 8	Sniffing Prep for Lab #3 Wireshark	
	F–Feb 10	Friday Cyber Chat	Cyber Chat Presentations
Week 5	M– Feb 13	Quiz #1	
	W–Feb 15	Exploits Prep for Lab #4 Metasploit	
	F–Feb 17	Friday Cyber Chat	Cyber Chat Presentations Lab #3 due Feb 17 @11:59pm
Week 6	M–Feb 20	Security Operations and Administration Chapter 6	
	W–Feb 22	Security Operations and Administration – continued Prep for Programming Assignment #1	
	F–Feb 24	Friday Cyber Chat	Cyber Chat Presentations Lab #4 due Feb 24 @11:59pm
Week 7	M–Feb 27	Auditing, Testing, and Monitoring Chapter 7	
	W–Mar 1	Web Vulnerabilities Prep for Lab #5	
	F–Mar 3	Friday Cyber Chat	Cyber Chat Presentations Programming Assignment #1 due Mar 3 @11:59pm
Week 8	M–Mar 6	Spring Break – no class	
	W–Mar 8	Spring Break – no class	

Week	Date	Topic and Readings	Activities
	F–Mar 10	Spring Break – no class	
Week 9	M–Mar 13	Cryptography Chapter 9	
	W–Mar 15	Cryptography – continued	
	F–Mar 17	Cryptography – continued Prep for Lab #6 <u>Mcrypt</u> & <u>GnuPG</u>	Lab #5 due Mar 17 @11:59pm
Week 10	M–Mar 20	Quiz #2	
	W–Mar 22	Networks and Telecommunications Chapter 10	
	F–Mar 24	Friday Cyber Chat	Cyber Chat Presentations Lab #6 due Mar 24 @11:59pm
Week 11	M–Mar 27	Malicious Code and Activity Chapter 11	
	W–Mar 29	Malicious Code and Activity – continued	
	F–Mar 31	Malicious Code and Activity – continued Prep for Programming Assignment #2	
Week 12	M–Apr 3	Binary Analysis	
	W–Apr 5	Snort & iptables Prep for Lab #7 <u>Snort</u> <u>iptables</u>	
	F–Apr 7	Friday Cyber Chat	Cyber Chat Presentations Programming Assignment #2 due Apr 7 @11:59pm
Week 13	M– Apr 10	Information Systems Security Education and Training Information Security Professional Certifications Chapters 13 & 14	
	W–Apr 12	Guest speaker	
	F–Apr 14	Friday Cyber Chat	Cyber Chat Presentations Lab #7 due Apr 14 @11:59pm
Week 14	M–Apr 17	Quiz #3	
	W–Apr 19	Guest speaker	
	F–Apr 21	Friday Cyber Chat	Cyber Chat Presentations
Week 15	M–Apr 24	Cybersecurity research	
	W–Apr 26	Cybersecurity research	
	F–Apr 28	Friday Cyber Chat	Cyber Chat Presentations
Week 16	M–May 1	Work on final exam – no class	Final exam due May 2 by 11:59pm

Students with disabilities or learning needs

It is my goal to create a learning experience that is as accessible as possible. If you anticipate any issues related to the format, materials, or requirements of this course, please meet with me outside of class so we can explore potential options. Students with disabilities may also wish to work with the Student Disability Access Center (SDAC) to discuss a range of options to removing barriers in this course, including official accommodations. We are fortunate to have an SDAC advisor, Courtney MacMasters, physically located in Engineering. You may email her at cmacmasters@virginia.edu to schedule an appointment. For general questions please visit the [SDAC website: sdac.studenthealth.virginia.edu](http://sdac.studenthealth.virginia.edu). If you have already been approved for accommodations through SDAC, please send me your accommodation letter and meet with me so we can develop an implementation plan together.

Harassment, Discrimination, and Interpersonal Violence

The University of Virginia is dedicated to providing a safe and equitable learning environment for all students. If you or someone you know has been affected by power-based personal violence, more information can be found on the [UVA Sexual Violence website](http://www.virginia.edu/sexualviolence) that describes reporting options and resources available - www.virginia.edu/sexualviolence.

The same resources and options for individuals who experience sexual misconduct are available for discrimination, harassment, and retaliation. [UVA prohibits discrimination and harassment](#) based on age, color, disability, family medical or genetic information, gender identity or expression, marital status, military status, national or ethnic origin, political affiliation, pregnancy (including childbirth and related conditions), race, religion, sex, sexual orientation, veteran status. [UVA policy](#) also prohibits retaliation for reporting such behavior.

If you witness or are aware of someone who has experienced prohibited conduct, you are encouraged to submit a report to [Just Report It \(justreportit.virginia.edu\)](http://justreportit.virginia.edu) or [contact EOCR](#), the office of Equal Opportunity and Civil Rights.

If you would prefer to disclose such conduct to a confidential resource where what you share is not reported to the University, you can turn to [Counseling & Psychological Services \(“CAPS”\)](#) and [Women’s Center Counseling Staff and Confidential Advocates](#) (for students of all genders).

As your professor and as a person, know that I care about you and your well-being and stand ready to provide support and resources as I can. As a faculty member, I am a responsible employee, which means that I am required by University policy and by federal law to report certain kinds of conduct that you report to me to the University's Title IX Coordinator. The Title IX Coordinator's job is to ensure that the reporting student receives the resources and support that they need, while also determining whether further action is necessary to ensure survivor safety and the safety of the University community.

Religious accommodations

It is the University's long-standing policy and practice to reasonably accommodate students so that they do not experience an adverse academic consequence when sincerely held religious beliefs or observances conflict with academic requirements.

Students who wish to request academic accommodation for a religious observance should submit their request to me by email as far in advance as possible. Students who have questions or concerns about academic accommodations for religious observance or religious beliefs may contact the [University’s Office for Equal Opportunity and Civil Rights](#) (EOCR) at UVAEOCR@virginia.edu or 434-924-3200.

Support for your career development

Engaging in your career development is an important part of your student experience. For example, presenting at a research conference, attending an interview for a job or internship, or participating in an extern/shadowing experience are not only necessary steps on your path but are also invaluable lessons in and of themselves. I wish to encourage and support you in activities related to your career development. To that end, please notify me by email as far in advance as possible to arrange for appropriate accommodations.

Student support team

You have many resources available to you when you experience academic or personal stresses. In addition to your professor, the School of Engineering and Applied Science has staff members located in Thornton Hall who you can contact to help manage academic or personal challenges. Please do not wait until the end of the semester to ask for help!

Learning

[Lisa Lampe](#), Director of Undergraduate Education

[Blake Calhoun](#), Director of Undergraduate Success

Courtney MacMasters, Accessibility Specialist, cmacmasters@virginia.edu

[Free tutoring](#) is available for most classes.

Health and Wellbeing

[Assistant Dean of Students](#), Student Safety and Support

[Elizabeth Ramirez-Weaver](#), CAPS counselor

[Katie Fowler](#), CAPS counselor

You may schedule time with the CAPS counselors through [Student Health](#) (<https://www.studenthealth.virginia.edu/getting-started-caps>). When scheduling, be sure to specify that you are an Engineering student. You are also urged to use [TimelyCare](#) for either scheduled or on-demand 24/7 mental health care.

Community and Identity

The [Center for Diversity in Engineering](#) (CDE) is a student space dedicated to advocating for underrepresented groups in STEM. It exists to connect students with the academic, financial, health, and community resources they need to thrive both at UVA and in the world. The CDE includes an open study area, event space, and staff members on site. Through this space, we affirm and empower equitable participation toward intercultural fluency and provide the resources necessary for students to be successful during their academic journey and future careers.

Version change control:

12/28/22 v1.0 syllabus created.