

ENG 498 FSN: Foundations in Secure Networking for Cyber-Social Systems (Fall 2023)

Course Dates: August 21 - December 16, 2023

Credits: 4 Hours (undergraduate/graduate)

CRN: 65346

Pre-Requisites: CS 124, or ECE 120, or IS 401, or instructor approval

Location: Online

Instructor: Casey W. O'Brien, Assistant Director, Cyber Defense Education and Training, Information Trust Institute

Office: Coordinated Science Laboratory (CSL) 449

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Phone: 217-265-7689

Office Hours: By appointment

Overview

This 15-week, 4-credit *fully online* course covers converging computer and communications technologies and is designed to serve the needs of those interested in understanding the field of data communications and how it relates to other areas of information technology (IT) and cybersecurity.

The course content will cover both the technical concepts and organizational and human issues related to the secure networking of systems, including their design, implementation, and administration. The course also provides the broad-based knowledge and skills necessary to prepare students for further study in other specialized networking and cybersecurity courses/fields (e.g., Network Security, CS/ECE 438: Communication Networks, CS 460/ECE 419: Security Laboratory, CS 461/ECE 422: Computer Security I).

Course Topics

Course concepts will be grouped based on the following topics:

- Networking in the Context of Cyber-Social Systems
- Components of Networked Systems
- Communications of Networked Systems
- Cyber-Social View of Network Designs and Architectures
- Organizational and Technical Implementation of Protocols (two weeks)
- Addressing of Enterprise Systems
- Switching and Routing of Modern Systems
- Organizational, Human, and Technical Aspects of Network Security

Expected Course Outcomes

Upon completion of this course, students will be able to:

- Understand the nature and consequences of vectors of disruption in cyber-social systems from the perspective of human and computer networks.
- Work collaboratively in teams to identify and address cybersecurity challenges from a networking point of view.
- Technical understandings and capabilities:
 - Utilize network diagrams.

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- Plan the topology, layout, and placement of devices.
- Implement, configure, and maintain the devices and services used to support secure communications.
- Configure and test Internet protocols.
- Configure and administer authentication and access controls.
- Perform routine maintenance to networking components/equipment.
- Design and implement various addressing and naming schemes.
- Utilize common network utilities to verify and troubleshoot networks.
- Collect and analyze network traffic.
- Document and support networks.
- Design, build, and maintain both wired and wireless internetworks.
- Situate technical challenges in the context of broader cyber-social problem sets.

Learning Resources

- All required material (e.g., narrated video lectures, readings, and labs) will be provided to students, as per the tentative schedule below.
- Campus resources (e.g., library, counselling, advising) provided as currently to online students.
- Lab Environment: This course leverages an online, hands-on lab environment. It is used to deliver the software and related tools/files, which are necessary components to not only completing the lab assignments, but also to help the learner develop their knowledge and skills.

Assignments

The course's instructional content will be made available via **Canvas**, a web-based Learning Management System (LMS), that allows institutions to manage digital learning, educators to create and present online learning materials and assess student learning, and students to engage in courses and receive feedback about skill development and learning achievement. Course site:

<https://canvas.illinois.edu>

Each week's Module may contain the following (not all weeks have the same assignments):

- Learning objectives for that week's Module.
- A Checklist with that Module's assignments.
- Discussion topic.
- Video(s).
- Required and supplemental (optional) reading material.
- Hands-on lab assignment(s).
- Extra credit assignment.
- Quiz.
- List of concepts.
- Links to supplemental materials.

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Quizzes

Tech-related courses (and the related fields in general) are full of jargon and acronyms; you must learn this language if you are to be successful in this class, or the field in general. There is no shortcut around this. However, instead of memorizing and regurgitating facts that can be easily looked up, you will create the Module 1-8 quizzes. The quiz questions (10 total per Module) should be a combination of multiple-choice, true/false, and fill in the blank. These questions are to be generated from each Module's list of concepts (at the end of each Module). You are allowed to use any resource at your disposal to create these questions. Each submitted quiz is 20 points each. See the Quiz entry in each Canvas Module for more on this.

Discussions

You will be required to participate in weekly, online discussions using the Discussions feature in Canvas. Each "posting" helps you analyze one aspect of the methodological, theoretical, or disciplinary perspective based on that week's topic, or a set of related core concepts, and respond to at least one others' post. You are encouraged to use any resource at your disposal to complete these assignments. If you do use external resources (e.g., websites, textbooks, ChatGPT, etc.), be sure to cite your sources using the APA 7th edition format. Also, feel free to include curated media elements (e.g., videos, infographics, images, attached documents, etc.). Each post is 20 points each.

Lab Assignments

The hands-on lab assignments are web-based and designed to reinforce the concepts covered in the reading material, as well as to help you develop your knowledge and skills. For more information, see *Module 0: Getting Started > Assignment: Purchasing & Redeeming Your Infosec Learning Platform Access Code* and *Assignment: Getting Started in the Infosec Learning Platform* in Canvas.

Lab assignment point totals and due dates are listed in each week's Module. If you need additional time to complete a lab assignment, you must contact me by email prior to, or on the day the lab assignment is due. *Failure to contact me by the posted date will result in an automatic 20%-point deduction from that week's lab assignment score.*

Extra credit assignments may be given during the semester. Students should do the extra credit, which is fun and designed to be challenging.

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Grading Policy

A	=	100 - 93%
A-	=	92 - 90%
B+	=	89 - 87%
B	=	86 - 83%
B-	=	82 - 80%
C+	=	79 - 77%
C	=	76 - 73%
C-	=	72 - 70%
D+	=	69 - 67%
D	=	66 - 63%
D-	=	62 - 60%
F	=	Below 60%

Course Policies

- Late assignments: 20% penalty per week.
- ChatGPT Usage Policy:
 - You may not type a question into ChatGPT, exactly copy and paste its response, and turn it in as your own work.
 - You can use Grammarly on any ChatGPT output once you rephrase the answer in your own words.
 - You must cite any information that comes from ChatGPT in APA 7th edition. To cite ChatGPT in the APA 7th edition style, you will need to provide a reference for the source of the information you are citing. Here is an example of how you might cite:
 - OpenAI. (n.d.). ChatGPT. Retrieved from <https://openai.com/blog/chatgpt>.
 - If you are citing specific information or ideas from ChatGPT in the text of your assignment, you will need to provide an in-text citation. Here is an example of how you might do this:
 - "According to OpenAI (n.d.), ChatGPT is a large language model that can generate human-like text when provided with a prompt." Note that in APA style, you should include the author's name (in this case, OpenAI) and the year of publication if it is available. If the year is not available, you can use the abbreviation "n.d." (no date) to indicate that the year is not known.
 - It is also important to provide a full reference for the source in your reference list at the end of any assignments. This will allow your readers to locate the source and verify the information you have cited. For example, References: OpenAI. (n.d.). ChatGPT. Retrieved from <https://openai.com/blog/chatgpt>.

Contacting the Instructor

The best way for students to reach me is via email. I will typically respond to student emails within 24 hours.

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Equal Opportunity and Access

To obtain disability-related academic adjustments and/or auxiliary aids, students with disabilities must contact the course instructor and the Disability Resources and Educational Services (DRES) as soon as possible. To contact DRES, you may visit 1207 S. Oak St., Champaign, call 217-333-4603 (V/TDD), or e-mail disability@uiuc.edu.

To ensure that disability-related concerns are properly addressed from the beginning, students with disabilities who require assistance to participate in this class are asked to see the instructor as soon as possible.

If you need accommodations for any sort of disability, please contact the instructors.

Wellness

Significant stress, mood changes, excessive worry, substance/alcohol misuse or interferences in eating or sleep can have an impact on academic performance, social development, and emotional wellbeing. The University of Illinois offers a variety of confidential services including individual and group counseling, crisis intervention, psychiatric services, and specialized screenings which are covered through the Student Health Fee. If you or someone you know experiences any of the above mental health concerns above, it is strongly encouraged to contact or visit any of the University's resources provided below. Getting help is a smart and courageous thing to do – for yourself and for those who care about you:

- Counseling Center (217) 333-3704
- McKinley Health Center (217) 333-2700
- National Suicide Prevention Lifeline (800) 273-8255
- Rosecrance Crisis Line (217) 359-4141 (available 24/7, 365 days a year)
- Anonymous Suicide Incident Referral Form:
<http://www.counselingcenter.illinois.edu/counseling/counseling-center-policies/suicide-intervention-policy>

Academic Integrity

The Illinois Student Code should also be considered as a part of this syllabus. You should pay particular attention to Article 1, Part 4: Academic Integrity. Read the Code at the following URL: <https://studentcode.illinois.edu>.

Academic dishonesty will result in a failing grade. Every student is expected to review and abide by the Academic Integrity Policy: <https://studentcode.illinois.edu>. Please note, you are responsible for reading this policy. Ignorance is not an excuse for any academic dishonesty.

Emergency Planning

Plan for emergency situations by reviewing the important material found at <https://police.illinois.edu/em>. The more prepared you are, the safer you will be.

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Tentative Schedule (Subject to change)

Check weekly assignments in the **Modules** section of Canvas.

Weeks	Modules	Assignments	Due Dates
1-2: Aug. 21 - Sep. 3	- Module 0: Getting Started - Module 1: Networking in the Context of Cyber-Social Systems	- See Canvas > Module 0 and Module 1	09-03
3: Sep. 4-10	- Module 2: Cyber-Social View of Network Designs and Architectures	- See Canvas > Module 2	09-10
4-5: Sep. 11-24	- Module 3: Communications of Networked Systems - Module 4: Components of Networked Systems	- See Canvas > Module 3 and Module 4	09-24
6-7: Sep. 25 - Oct. 8	- Module 5: Addressing of Enterprise Systems	- See Canvas > Module 5	10-08
8-11: Oct. 9 - Nov. 5	- Module 6: Organizational and Technical Implementation of Protocols	- See Canvas > Module 6	11-05
12-13: Nov. 6-19	- Module 7: Switching and Routing of Modern Systems	- See Canvas > Module 7	11-19
14: Nov. 20-26	THANKSGIVING BREAK		
15-16: Nov. 27 - Dec. 6	- Module 8: Organizational, Human, and Technical Aspects of Network Security	- See Canvas > Module 8	12-06
Dec. 8-15	FINALS WEEK		
Dec. 21	GRADES DUE BY 2PM		