

# ISA-656: Network Security

Fall 2023

Department of Computer Science, George Mason University

August 14, 2023

*(This syllabus may be updated throughout the semester)*

## Time and location:

- Fridays 10:30 pm - 1:10 pm

- **Horizon Hall, Room 1009 / Blackboard Collaborate Ultra - Online**

*Lectures will be in-person, by default. However, **be prepared to go on-line** on any lecture day, to accommodate any health concern / situation that arises. This will only be for exceptional circumstances, the primary/expected format for this course is in-person. For virtual sessions, students should have convenient access to audio/visual and computing facilities. For virtual sessions, click on the "Lecture 'Classroom'" link*

## Instructor:

- [Professor Eric Osterweil](#)
- Email: [eoster@gmu.edu](mailto:eoster@gmu.edu)
- Office hours: TBD, or by appointment
- Office: Engineering building, Room 5346

## TA:

- None

## Description:

This course will delve into the network security considerations and solutions that work between unaffiliated parties (e.g., on the Internet). We will learn from real/modern protocols and systems, and take a principled approach to learning about them. We will cover their underlying issues, their techniques, tradeoffs, and how well they work.

Topics will include Internet networking fundamentals, cryptography fundamentals, Public Key Infrastructures (PKIs), the Domain Name System Security Extensions (DNSSEC), email security, Secure Inter-Domain Routing (SIDR), Named-Data Networking, and Distributed Denial of Service (DDoS) mitigation techniques.

## **Prerequisites:**

- Courses
  - ISA-562 (minimum Grade of B- or XS) + INFS 612 (minimum Grade of B- or XS)  
or
  - CS 555 (minimum Grade of B- or XS)
- Ability to program in C or Python

## **Objectives:**

Gain basic understandings of issues, concepts, principles, and techniques used in inter-administrative Internet cybersecurity

- Basic security concepts
- Understanding of cryptographic fundamentals
- Secure cryptographic key learning
- Object-security
- Transmission-security
- Routing security

## **Readings:**

Readings will be assigned on an ongoing basis throughout the course. The course's webpage (listed on blackboard) will be updated as reading material is assigned.

Other recommended textbook for reference

- James Kurose and Keith Ross, "**Computer Networking: A Top-Down Approach**", 8th Edition, Pearson, 2021
- Charlie Kaufman, Radia Perlman, Mike Speciner, Ray Perlner, "**Network Security: Private Communications in a Public World**," 3rd Edition

## **Topics:**

Topics will include:

- Internet networking fundamentals
- Cryptography fundamentals
- Public Key Infrastructures (PKIs)
- Domain Name System Security Extensions (DNSSEC)
- Email security
- Secure Inter-Domain Routing (SIDR)
- Named-Data Networking
- Distributed Denial of Service (DDoS) mitigation techniques

## Grading:

Your grade will be calculated using the following percentages:

- Homework (20%) - To be done individually
- Programming assignments (25%) - Can be done with a partner (team of two students)
- Course project (15%) – Can be done with a partner (team of two students), same as or different than partner on programming assignments
- Midterm exam (20%)
- Final exam (15%)
- Participation (5%)

## Policies:

- Late submission:
  - Late submissions of homework and programming assignments will be penalized at 15% each day, and will not be accepted after 2 days of the due date
  - There will be no makeups for homework, projects, and other assignments
- Exams:
  - The midterm will be closed notes/book/etc.
  - No early exams will be given. If you must miss an exam, you should provide official/verifiable proof of why you are missing the exam before the exam. Once it is validated, instructor can arrange a make exam.
  - If you receive permission to take a makeup exam, you will get a single opportunity.
- Honor code:
  - *Zero tolerance to cheating!*
  - All students must adhere to the [GMU Honor Code](#) and the [Computer Science Department's Honor Code](#) Policies.
  - The students are supposed to work individually on the homeworks, assignments projects, unless told otherwise.
  - We reserve the right to use [MOSS](#) to detect plagiarism. Violation of the Honor Code will result in an F.
  - Use of public code repositories such as GitHit, GitLab, or any other is **not** allowed for course projects
    - This is true during the semester and after the semester is over (to avoid plagiarism in future classes).
  - Use of assistive/AI/other tools for assignments in this course (such as, but not limited to ChatGPT) is **not** permitted in this course. Violation of this aspect of the CS Honor Code will result in an F in this course.
- Accommodations for disabilities:

- If you have a documented learning disability or other condition that may affect academic performance, you should: 1) make sure this documentation is on file with Office for Disability Services (SUB I, Rm. 4205; 993-2474; <http://ods.gmu.edu>) to determine the accommodations you need; and 2) talk with me within the first week of the semester to discuss any accommodation needs.
- *Students must be prepared to attend virtual instruction on any given day. As much notice as is possible will be given.*
- Campus Closure
  - *If the campus closes or class is canceled due to weather or other concern, students should check Blackboard [or other instruction as appropriate] for updates on how to continue learning and information about any changes to events or assignments.*
- Basic Course Technology Requirements
  - *Activities and assignments in this course will regularly use the Blackboard learning system, available at <https://mymason.gmu.edu>. Students are required to have regular, reliable access to a computer with an updated operating system (recommended: Windows 10 or Mac OSX 10.13 or higher) and a stable broadband Internet connection (cable modem, DSL, satellite broadband, etc., with a consistent 1.5 Mbps [megabits per second] download speed or higher. You can check your speed settings using the speed test on that website.)*
- Course Materials and Student Privacy
 

Video recordings of class meetings that are shared only with the instructors and students officially enrolled in a class do not violate FERPA or any other privacy expectation. Video recordings that only include the instructor (no student names, images, voices, or identifiable texts) may be shared without violating FERPA (but see below, University Policies: Privacy, for some qualifications and recommendations)

  - *All course materials posted to Blackboard or other course site are private to this class; by federal law, any materials that identify specific students (via their name, voice, or image) must not be shared with anyone not enrolled in this class.*
  - *Video recordings — whether made by instructors or students — of class meetings that include audio, visual, or textual information from other students are private and must not be shared outside the class*
  - *Live video conference meetings (e.g. Collaborate, WebEx, Zoom, etc.) that include audio, textual, or visual information from other students must be viewed privately and not shared with others in your household or recorded and shared outside the class*
  - *Some/All of our synchronous meetings in this class will be recorded to provide necessary information for students in this class. Recordings will be stored on*

*Blackboard [or other secure site] and will only be accessible to students taking this course during this semester.*

- *The **School of Integrative Studies**, an intentionally inclusive community, promotes and maintains an equitable and just work and learning environment. We welcome and value individuals and their differences including race, economic status, gender expression and identity, sex, sexual orientation, ethnicity, national origin, first language, religion, age, and disability.*
- *As a faculty member and designated "Responsible Employee," I am required to report all disclosures of sexual assault, interpersonal violence, and stalking to Mason's [Title IX Coordinator](#) per [university policy 1412](#). If you wish to speak with someone confidentially, please contact the [Student Support and Advocacy Center](#) (703-380-1434) or [Counseling and Psychological Services](#) (703-993-2380). You may also seek assistance from [Mason's Title IX Coordinator](#) (703-993-8730; [titleix@gmu.edu](mailto:titleix@gmu.edu)).*
- *Students must use their MasonLive email account to receive important University information, including communications related to this class. I will not respond to messages sent from or send messages to a non-Mason email address.*