



# Computer & Multimedia Network Security (CPE-592WS)

Schaefer School of Engg. & Science  
Dept of Electrical and Computer Engg.  
Fall 2023

Instructor: Vidya Sagar

Canvas Course Address: <https://sit.instructure.com/courses/67840>

Course Schedule: Course material will be updated weekly

Contact Info: [vsagar@stevens.edu](mailto:vsagar@stevens.edu)

Virtual Office Hours: Thursday 10am -12pm

Virtual session URL: <https://stevens.zoom.us/j/99795709662>

Prerequisite(s): Probability, Signal Processing and Statistics

## COURSE DESCRIPTION

This is an introductory course on security issues in multimedia content (digital image, video), wireless and wired network security. Topics such as digital watermarking, digital steganography, basic cryptography, wireless security protocols, etc. will be discussed.

## STUDENT LEARNING OUTCOMES

- Students will understand security issues and threats against computer and multimedia networks.
- Students will learn to design digital watermarking algorithms for multimedia data.
- Students will implement digital watermarking algorithms.
- Students will understand the basic concepts of encryption and decryption.
- Students will learn to implement at least one encryption and decryption algorithm.
- Students will understand the issues related to wireless security protocols.
- Students will be able to present security issues related to emerging wireless technologies.

## **COURSE FORMAT AND STRUCTURE**

This course is organized in three broader yet interrelated sections 1) Watermarking and Steganography 2) Computer and Network Security 3) Wireless Network Security. We will have one week for literature review and discussion upon completion of each of these sections.

There will be one Midterm examination and one final Project.

Assignments will have some coding tasks. Please feel free to code in any common programming language (C/C++/JAVA/Matlab/JavaScript). This is not a computer language course; therefore, coding assignments will be graded mainly of algorithm and methodologies.

Please reach out for any question and query you may have. I am available over email ([vsagar@stevens.edu](mailto:vsagar@stevens.edu)) and Canvas.

## **TENTATIVE COURSE SCHEDULE**

Topics Covered Each Week:

- Introduction to digital watermarking and steganography
- Digital watermarking algorithms, analyses, and implementation
- Attacks against digital watermarking techniques
- State-of-the-art applications of digital watermarking
- Introduction to cryptography
- Cryptography algorithms and analyses
- Implementation of cryptography algorithms
- Application of cryptography in the real-world
- Mid-term exam
- Wireless networking and protocols
- Security issues in wireless networks

- Security vulnerabilities in wireless networks
- Emerging wireless networking standards and related security issues
- Review of the course material
- Final project

## **COURSE MATERIALS**

This course requires no textbook. Lecture slides and various literature will be provided weekly.

## **COURSE REQUIREMENTS**

There will be 5 homework assignments, 1 mid-term and final project. Please submit them timely fashion. I will accept email-based submission only on case-to-case basis. Most of assignments will be open-ended. Coding assignments will be optional. Breakdown of various assignments and final project will be as follows.

- ☐ Homework #1: 10
- ☐ Homework #2: 10
- ☐ Homework #3: 10
- ☐ Mid-term Exam #: 50
- ☐ Homework #4: 10
- ☐ Homework #5: 10
- ☐ Final Project: 50

## **GRADING PROCEDURES**

- ☐ A      100 % to 94.0%
- ☐ A-     94.0 % to 90.0%
- ☐ B+     90.0 % to 87.0%
- ☐ B      87.0 % to 84.0%
- ☐ B-     84.0 % to 80.0%
- ☐ C+     80.0 % to 77.0%
- ☐ C      77.0 % to 74.0%
- ☐ C-     74.0 % to 60.0%
- ☐ F      60.0 % to 0.0%

## **ACCOMMODATIONS**

Stevens Institute of Technology is dedicated to providing appropriate accommodations to students with documented disabilities. The Office of Disability Services (ODS) works with undergraduate and graduate students with learning disabilities, attention deficit-hyperactivity disorders, physical disabilities, sensory impairments, psychiatric disorders, and other disabilities to help students achieve

their academic and personal potential. They facilitate equitable access to the educational programs and opportunities offered at Stevens and coordinate reasonable accommodations for eligible students. These services are designed to encourage independence and self-advocacy with support from the ODS staff. The ODS staff will facilitate the provision of accommodations on a case-by-case basis.

For more information about Disability Services and the process to receive accommodations, visit <https://www.stevens.edu/student-diversity-and-inclusion/disability-services>. If you have any questions please contact the Office of Disability Services at [disabilityservices@stevens.edu](mailto:disabilityservices@stevens.edu) or by phone: 201.216.3748.

### **Disability Services Confidentiality Policy**

Student Disability Files are kept separate from academic files and are stored in a secure location within the Office of Disability Services. The Family Educational Rights Privacy Act (FERPA, 20 U.S.C. 1232g; 34CFR, Part 99) regulates disclosure of disability documentation and records maintained by Stevens Disability Services. According to this act, prior written consent by the student is required before our Disability Services office may release disability documentation or records to anyone. An exception is made in unusual circumstances, such as the case of health and safety emergencies.

## **INCLUSIVITY**

Stevens Institute of Technology believes that diversity and inclusiveness are essential to excellence in academic discourse and innovation. In this class, the perspective of people of all races, ethnicities, gender expressions and gender identities, religions, sexual orientations, disabilities, socioeconomic backgrounds, and nationalities will be respected and viewed as a resource and benefit throughout the semester. Suggestions to further diversify class materials and assignments are encouraged. If any course meetings conflict with your religious events, please do not hesitate to reach out to your instructor to make alternative arrangements.

You are expected to treat your instructor and all other participants in the course with courtesy and respect. Disrespectful conduct and harassing statements will not be tolerated and may result in disciplinary actions.

### **Name and Pronoun Usage**

As this course includes group work and class discussion, it is vitally important for us to create an educational environment of inclusion and mutual respect. This includes the ability for all students to have their chosen gender pronoun(s) and chosen name affirmed. If the class roster does not align with your pronouns and/or name, please inform the instructor of the necessary changes.

### **Religious Holidays**

Stevens is a diverse community that is committed to providing equitable educational opportunities and supporting students of all ethnicities and belief systems. Religious observance is an essential reflection of that rich diversity. Students will not be subject to any grade penalties for missing a class, examination, or any other course requirement due to religious observance. In addition, students will not be asked to choose between religious observance and academic work. Therefore, students should inform the instructor at the beginning of the semester if a requirement for this course conflicts with religious observance so that accommodations can be made for students to observe religious practices and complete the requirements for the course.

## **MENTAL HEALTH RESOURCES**

Part of being successful in the classroom involves a focus on your whole self, including your mental health. While you are at Stevens, there are many resources to promote and support mental health. The Office of Counseling and Psychological Services (CAPS) offers free and confidential services to all

enrolled students who are struggling to cope with personal issues (e.g., difficulty adjusting to college or trouble managing stress) or psychological difficulties (e.g., anxiety and depression). Appointments can be made by phone (201-216-5177), online at <https://stevensportal.pointnclick.com/confirm.aspx>, or in person on the 2<sup>nd</sup> Floor of the Student Wellness Center.

## **EMERGENCY INFORMATION**

In the event of an urgent or emergent concern about your own safety or the safety of someone else in the Stevens community, please immediately call the Stevens Campus Police at 201-216-5105 or on their emergency line at 201-216-3911. These phone lines are staffed 24/7, year-round. For students who do not reside near the campus and require emergency support, please contact your local emergency response providers at 911 or via your local police precinct. Other 24/7 national resources for students dealing with mental health crises include the National Suicide Prevention Lifeline (1-800-273-8255) and the Crisis Text Line (text “Home” to 741-741). If you are concerned about the wellbeing of another Stevens student, and the matter is *not* urgent or time sensitive, please email the CARE Team at [care@stevens.edu](mailto:care@stevens.edu). A member of the CARE Team will respond to your concern as soon as possible.