CS 577 Secure Systems
CS/SES
 Fall 2015

Meeting Times: Thursdays 06:15pm-08:45pm
Classroom Location: Babbio Center 210
Instructor: Georgios Portokalidis
Contact Info: Lieb 213
Office Hours: By appointment
Course Web Address: http://www.cs.stevens.edu/~gportoka/cs577.html
Prerequisite(s):   Graduate students: CS 506 Introduction to IT Security (test-out option available) and CS 590 Algorithms / Undergraduate students: CS 385 Algorithms or CS 182 Introduction to Computer Science Honors II
Corequisite(s):   CS 576 Secure Systems

COURSE DESCRIPTION

Attacks on computer systems have become part of everyday life. It is the goal of this class to teach a thorough understanding of the possible security failures, as well as the protection mechanism. The class will cover network and host security concepts and mechanisms; basic cryptographic algorithms and protocols; authentication and authorization protocols; access control models; common network (wired and wireless) attacks; typical protection approaches, including firewalls and intrusion detection systems; and operating systems and application vulnerabilities, exploits, and countermeasures; distributed denial of service attacks and botnets. The class will not only cover the subjects in theory but instead also provide the students with an extensive hands-on experience. The class will involve a fair amount of programming. Those who take the class are expected to be able to program in C/C++, have some basic knowledge of assembly language, and be familiar with network basics and programming, as well as Unix-like operating systems.

LEARNING OBJECTIVES

After successful completion of this course, students will be able to
- Implement simple attacks on basic cryptographic algorithms and protocols in the context of networked computer systems.
- Implement security models, including the access control matrix and role-based access control.
- Explain where cryptography cannot help with system security.

- Explain the limits of intrusion detection (both signature-based and anomaly-based) and firewalls. In particular how do intrusion detection systems and firewalls fail?
- Demonstrate exploits of systems and networks (including DDoS attacks and botnets), and why they still affect us today.
- Deploy some countermeasures to system and network attacks, including deceptive techniques.
- Explain the intricacies of malware, including obfuscation techniques to defeat detection at both host and network levels.
- Demonstrate the use of both technical and non-technical means of securing a networked site.

FORMAT AND STRUCTURE

The course involves lab assignments that are given in the class, where students begin working on them under the supervision of the instructor and the TA.

COURSE MATERIALS

None.

COURSE REQUIREMENTS

Participation Participating in the lab is very important to ensure everyone has a good understanding of the given assignments.

Homework The lab assignments given in class need to be completed individually and submitted through canvas in a week's time

GRADING PROCEDURES

Grades will be based on:

Participation	(20%)
Homework	(80%)

You will not need a 97% to get an A in this course. Generally, A corresponds to excellent performance, B to good, C to fair, indicating certain understanding problems, but understanding of the basics, and F to failure to understand the basics.

ACADEMIC INTEGRITY

Undergraduate Honor System

Enrollment into the undergraduate class of Stevens Institute of Technology signifies a student's commitment to the Honor System. Accordingly, the provisions of the Stevens Honor System apply to all undergraduate students in coursework and Honor Board proceedings. It is the responsibility of each student to become acquainted with and to uphold the ideals set forth in the Honor System Constitution. More information about the Honor System including the constitution, bylaws, investigative procedures, and the penalty matrix can be found online at http://web.stevens.edu/honor/

The following pledge shall be written in full and signed by every student on all submitted work (including, but not limited to, homework, projects, lab reports, code, quizzes and exams) that is assigned by the course instructor. No work shall be graded unless the pledge is written in full and signed.

"I pledge my honor that I have abided by the Stevens Honor System."

Reporting Honor System Violations
Students who believe a violation of the Honor System has been committed should report it within ten business days of the suspected violation. Students have the option to remain anonymous and can report violations online at www.stevens.edu/honor.

Graduate Student Code of Academic Integrity

All Stevens graduate students promise to be fully truthful and avoid dishonesty, fraud, misrepresentation, and deceit of any type in relation to their academic work. A student's submission of work for academic credit indicates that the work is the student's own. All outside assistance must be acknowledged. Any student who violates this code or who knowingly assists another student in violating this code shall be subject to discipline.

All graduate students are bound to the Graduate Student Code of Academic Integrity by enrollment in graduate coursework at Stevens. It is the responsibility of each graduate student to understand and adhere to the Graduate Student Code of Academic Integrity. More information including types of violations, the process for handling perceived violations, and types of sanctions can be found at www.stevens.edu/provost/graduate-academics.

Special Provisions for Undergraduate Students in 500-level Courses

The general provisions of the Stevens Honor System do not apply fully to graduate courses, 500 level or otherwise. Any student who wishes to report an undergraduate for a violation in a 500-level course shall submit the report to the Honor Board following the protocol for undergraduate courses, and an investigation will be conducted following the same process for an appeal on false accusation described in Section 8.04 of the Bylaws of the Honor System. Any student who wishes to report a graduate student may submit the report to the Dean of Graduate Academics or to the Honor Board, who will refer the report to the Dean. The Honor Board Chairman will give the Dean of Graduate Academics weekly updates on the progress of any casework relating to 500-level courses. For more information about the scope, penalties, and procedures pertaining to undergraduate students in 500-level courses, see Section 9 of the Bylaws of the Honor System document, located on the Honor Board website.

LEARNING ACCOMODATIONS

Stevens Institute of Technology is dedicated to providing appropriate accommodations to students with documented disabilities. Student Counseling and Disability Services works with undergraduate and graduate students with learning disabilities, attention deficit-hyperactivity disorders, physical disabilities, sensory impairments, and psychiatric disorders in order to help students achieve their academic and personal potential. They facilitate equal 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 SCDS staff. The SCDS staff will facilitate the provision of accommodations on a case-by-case basis. These academic accommodations are provided at no cost to the student.

Disability Services Confidentiality Policy
Student Disability Files are kept separate from academic files and are stored in a secure location within the office of Student Counseling, Psychological & 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.

For more information about Disability Services and the process to receive accommodations, visit https://www.stevens.edu/sit/counseling/disability-services. If you have any questions please contact:
>Lauren Poleyeff, Psy.M., LCSW - Disability Services Coordinator and Staff Clinician in Student Counseling and Disability Services at Stevens Institute of Technology at lpoleyef@stevens.edu or by phone (201) 216-8728.

INCLUSIVITY STATEMENT

Stevens Institute of Technology believes that diversity and inclusiveness are essential to excellence in education and innovation. Our community represents a rich variety of backgrounds, experiences, demographics and perspectives and Stevens is committed to fostering a learning environment where every individual is respected and engaged. To facilitate a dynamic and inclusive educational experience, we ask all members of the community to:
- be open to the perspectives of others
- appreciate the uniqueness their colleagues
- take advantage of the opportunity to learn from each other
- exchange experiences, values and beliefs
- communicate in a respectful manner
- be aware of individuals who are marginalized and involve them
- keep confidential discussions private

TENTATIVE COURSE SCHEDULE

Week #	Topics
1	Logistics, environment setup
2	Man-in-the-middle attacks, message integrity.
3	Password cracking.
4	Buffer overflows attacks.
5	Buffer overflow defenses.
6	Penetration testing.
7	CS-576 midterm instead of lab.
8	Malware obfuscation

9	Evaluating control-flow integrity.
10	(Continued)
11	Mobile security.
12	XSS and SQL injection.
13	Sandboxing using system call filters. -- Thanksgiving, lab will be done on CS-576's slot
14	(Continued)
15	Open lab