

16:332:507: Security Engineering

Spring 2024

Instructor Information

Name: Demetrios Lambropoulos
Office: EE-216
Email: dpl60@soe.rutgers.edu
Office Hours: Wednesday 6:00 PM

Class Information

Time: Monday & Thursday 12:10PM–1 :30PM
Classroom: SEC-212

Additional individual meetings to discuss course material or any other concerns can be scheduled by contacting me via email, after class, or during office hours. On occasion, if I am on campus with free time available, I will post where I can be located along with the times I will be there on my 'Office Hours' tab on my webpage.

Pre-Requisite Courses

None

Pre-Requisite Knowledge by Topic

- Data Structures and Algorithms
- Familiarity with Operating Systems

Course Description

This class teaches essential principles, techniques, tools, and methods for systems security engineering. Students work in small collaborative design teams to propose, build, and document a project focused on securing systems. Additional assignments include several small projects. Students document their work through a series of written and oral proposals, progress reports, and final reports. Covers the basics of security engineering, usability and psychology, human factors in securing systems, mobile systems security, intersection of security and privacy, security protocols, access control, password security, and biometrics.

Overall Educational Objective

To introduce students to security engineering: how to think and analyze security from systems perspective. To create a foundation for further study and professional practice in security engineering.

Course Learning Outcomes

A student who successfully fulfills the course requirements will have demonstrated:

1. An ability to analyze security and privacy of systems
2. An ability to conduct user-centered design for security engineering
3. An ability to understand programming constraints with systems security
4. An ability to understand the limitations and advantages of security protocols, biometric systems, password authentication and various alternative systems

Topics Covered

The course outline is as follows:

- Topic 0: Course Introduction.
- Topic 1: What is Security Engineering? How security engineering overlaps and is distinct from other fields of engineering.
- Topic 2: Security Protocols: Fundamentals, design and analysis. Modern protocols. Human aspects and ceremonies in protocols. Changing the environment.
- Topic 3: Usability and Psychology: Usable Security and Privacy: Attacks based on psychology. Insights from psychology research. System issues.
- Topic 4: Mobile Device Security. Mobile platform security. Mobile app distribution and security. Mobile OS security. Privacy issues with applications.
- Topic 5: Password Authentication: Difficulties with reliable password entry. Difficulties with remembering the password. Password research. Measuring password security.
- Topic 6: Access Control: Groups and Roles, Access Control Lists, Sandboxing Virtualization
- Topic 7: Biometric Systems and Alternative Topics: Handwritten signatures, Face recognition, Fingerprints, Voice Recognition
- Topic 8: Evaluating Security: Assurance, Economic Incentives, Evaluation
- Topic 9: Recent Topics in Security Engineering

Texts

Ross Anderson, "Security Engineering, 3rd Edition", Wiley, 2020

Topical scientific publications in security engineering

Course Grading

The course grade will be broken down as follows:

- Homework/Projects 20%
- Midterm 30%

- Quizzes 10%
- Final Project/Paper 40%

Class Attendance Policy

Lectures will be given in person and will not be recorded. Attendance of lectures is strongly recommended to achieve the objectives of the course. You are responsible for learning all the materials covered in class (written or orally transmitted), which can appear in examinations.

General Policies

Attendance at tests is mandatory. Absence from an examination will not be excused except in cases of an illness or other emergency. Unexcused absence from an examination will result in a grade of zero. It is the student's responsibility to see the instructor as soon as possible regarding an excused absence. All approved make-up work must be scheduled no later than the last day of classes in the semester. Students are responsible for all materials covered in lectures and announcements for homework assignments, assignment due dates, and test dates.

Academic Integrity at Rutgers

The principles of academic integrity require that a student:

- Make sure that all work submitted in a course, academic research, or other activity is the student's own and created without the aid of impermissible technologies, materials, or collaborations.
- Treat all other students ethically, respecting their integrity and right to pursue their educational goals without interference. This principle requires that a student neither facilitate academic dishonesty by others nor obstruct their academic progress.
- Uphold the ethical standards and professional code of conduct in the field for which the student is preparing.
- <http://newbrunswick.rutgers.edu/chancellor-provost/academic-integrity-students>
- Please also read over the IEEE code of ethics <https://www.ieee.org/about/corporate/governance/p7-8.html>