Course Overview

CS166
Introduction to Computer Systems Security

Goals

- Provide an introduction to computer security
- Overview security threats and defenses in cyber and physical systems
- Help you develop a security-aware mindset

Course Staff

- Roberto Tamassia (Instructor)
- Bernardo Palazzi (Guest Lecturer)
- Nina Polshakova (HTA)
- Jearson Alfajardo (TA)
- Adam Horowitz (TA)
- Julia Kim (TA)
- Harjasleen Malvai (TA)
- Isaac Semaya (TA)

Lectures

- Security Principles
- Cryptography
- Authentication
- Operating Systems Security
- Applications Security
- Cloud Security
- Web Security
- Network Security
- Physical Security

Live Demos

- See in class hands-on demonstrations of basic attack and defense techniques
- Try it yourself and show it to your friends
- Keep in mind that attack demos should be done in an ethical and legal manner

Assignments

- Homeworks (40%)
- Projects (36%)
  - Cryptography Breaking
  - OS Hacking
  - Web Hacking
- Final Project (24%)
  - Designing, building, and testing secure systems

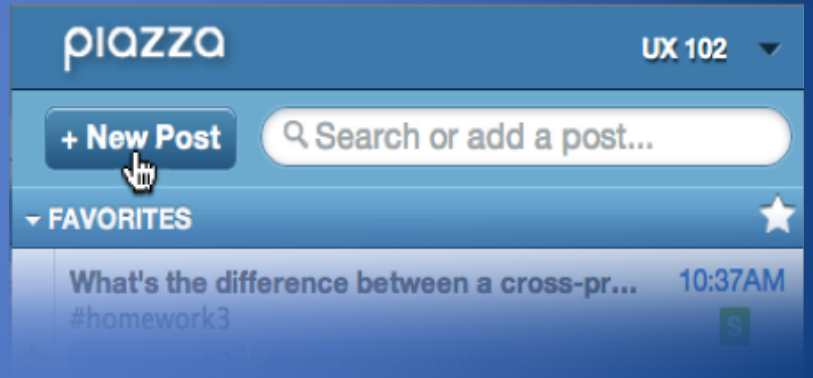
- Late Policy
  - Five late days toward the first three projects
  - No late days for homeworks and final project
  - Contact the instructor in case of extenuating circumstances

Learning Security

- We teach the principles, you study the details
  - Research a bit on your own
  - Be comfortable with new systems and languages
- Take advantage of class discussions
- Develop and share your own ideas

Piazza

- Official communication tool
- All questions related to course materials should be posted (publicly or privately) on Piazza



CS 162

- Must be taken concurrently with 166
- Half-credit course
- Requires instructor permission
- Provides capstone credit and 2000-level credit for 166

- Harder projects
  - Trickier vulnerabilities
  - More real-world scenarios
  - Automation
- Help sessions in class
  - See calendar
- Same grade for 166 and 162
  - Homeworks (32%)
  - Projects (42%)
  - Final Project (26%)

Safety

- Basic model of safety
  - Assets: what you want to protect
  - Threats: what could damage your assets
- Safety is ensuring threats don't damage assets
- We will see soon how security differs from safety

Air Travel Scenario

- Assets
  - Passengers
  - Crew
  - Luggage
  - Aircraft
  - …
- Threats
  - Engine failure
  - Pilot failure
  - ATC failure
  - Wind
  - …
- How likely are they?

Air Travel Scenario

- Threats
  - Engine failure
  - Pilot failure
  - ATC failure
  - Wind
  - Ice
- Safety measures
  - Two or more engines, maintenance
  - Two or more pilots, rest periods, checklists
  - Communication protocols, automated collision avoidance systems
  - Multiple runways, weather forecasting, ground stops
  - Aircraft deicing systems

Safety vs. Security

- Another threat to air travel
  - Terrorism
- This type of threat is called an attacker
  - Intelligent
  - Motivated
- Security is like safety, but it deals with attackers
- Defending against attackers is more difficult than mitigating natural threats

Security Design

- Evaluate risk
  - Capabilities of attackers
  - Likelihood of obtaining such capabilities
- Identify defenses
  - Develop risk mitigation measures
  - Assess cost of such measures
- Manage risk
  - Implement specific defenses taking into account risk and cost