ECE560
Computer and Information Security
Fall 2022

Introduction and Course Policies

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Instructor and TAs

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  ▪ Office Hours: see course site

• Teaching Assistants:
  ▪ See course site
Course objective: Evolve your understanding of security

- **Theory:**
  - How do I think systematically about security?
  - What constructs are available for me to use?
  - How do I understand *new* threats and defenses not covered in the course?

- **Skills:**
  - What tools are commonly used to do the above?
  - How can I manipulate data and automate things to make the above practical?

- **Practice:**
  - “Stick time”: Actually doing it.
  - Both attacking and defending.
Getting Info

• **Course Web Page**: static info
    - Syllabus, schedule, slides, assignments, rules/policies, prof/TA info, office hour info
    - Links to useful resources

• **Ed**: questions/answers
  - Post all of your questions here
  - Questions must be “public” unless good reason otherwise
  - **No code or copyable answers** in public posts!

• **GradeScope**: assignment submission/grading

• **Sakai**: submission of certain parts of assignments, gradebook
• Lecture is **in person by default**
  ▪ May be taken remotely with permission
  ▪ Valid reasons:
    • Positive (or unresolved) COVID test
    • Contact tracing hit
    • Concern over contracting COVID
  ▪ Invalid reason: Just feel like being remote
  ▪ Just email me if you want to join remotely – zoom links already posted
  ▪ Camera on is *required* in this case

• Lecture is **synchronous by default**
  ▪ Recordings posted for you to *review* – not to replace live class time
  ▪ Are you in a crazy timezone?
    • Limited support available or asynchronous mode
    • Email me in this case
• To attend in-person, you must
  1. wear a mask,
  2. practice social distancing, and
  3. be vaccinated.

This may change based on updates to Duke policy

• Local or remote: either way, you must...
Textbook

  - Get the GLOBAL EDITION, it’s the EXACT SAME BOOK for cheaper.
- The course uses the textbook highly out-of-order, see course site for readings.

If you go to addall.com, you can search all online booksellers at once.
Workload

- Homework assignments – discussed collaboratively, done individually
  - Pencil and paper problems
  - Programming problems
  - Technical exercises
  - Attack and defense scenarios
  - Data manipulation and automation tasks

- Security is broad and diverse field → Lots of different things to practice → Lots of work!!

*Some* collaboration is allowed

ALLOWED: Collaboration on approach or concepts.
DISALLOWed: Collaboration on answers.

All artifacts you submit must be entirely your own.
Advice for homework survival!

"I spent 20 hours on this one problem!"

- **Don't do that.** Put a fair bit of effort in (~2 hours), then ask for help and put that problem aside.

- **Recommended workflow (based on iterative deepening):**
  - **Do shallowest problems first** instead of proceeding sequentially: Finish all the simple problems; try the harder ones
    - Note questions that block progress; ask in Ed/class/office hours
  - **Put the assignment aside;** do other stuff. Why?
    - Your posted questions will get answered (no blocking!)
    - Your brain will work on problems subconsciously (free background processing!)
  - Now do a **deeper pass** -- finish the medium-difficulty ones and dig deep into the harder ones, asking questions and taking a break as before
  - **Loop until done:** {make progress, ask questions, switch to other tasks}

- Your operating system time slices tasks when they block to maximize throughput and efficiency, so why shouldn't you?
## Grading Breakdown

<table>
<thead>
<tr>
<th>Assignment</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homeworks</td>
<td>60%</td>
</tr>
<tr>
<td>Midterm exam</td>
<td>20%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>20%</td>
</tr>
</tbody>
</table>

Partial credit is available – provide detail in your answers to seek it!

Late homework submissions incur penalties as follows:
- Submission is 0-24 hours late: total score is multiplied by 0.9
- Submission is 24-48 hours late: total score is multiplied by 0.8
- Submission is more than 48 hours late: total score is multiplied by the Planck constant (in J·s)

NOTE: If you feel in advance that you may need an extension, contact the instructor.

These assignments are loooooooooooong. START EARLY.
Homework Zero

• Due next week!

• Designed to get you familiar with UNIX in general and Linux in particular

• UNIX skills are for more than this course – there’s a reason people use these tools!

• If you’re having trouble, post on Ed and we can help you.

This is the same Homework 0 sometimes given in ECE/COMPSCI 250.

If you’ve already done it there, you don’t need to do it again – just submit the screenshot from the training system.
Grade Appeals

• All regrade requests must be in writing via GradeScope

• After getting feedback with the TA, if you still have concerns, contact the instructor

• All regrade requests must be submitted no later than 1 week after the assignment was returned to you.
Academic Misconduct

• Academic Misconduct
  ▪ Refer to Duke Community Standard
  ▪ Homework content is individual – you do your own work
  ▪ Common examples of cheating:
    • Copying and rephrasing written answers from another student
    • Using code or answers from an outside source
  
• I will not tolerate any academic misconduct!

• “But I didn’t know that was cheating” is not a valid excuse

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Goals of This Course

- Things you will understand after this course:
  - Fundamental security objectives: **Confidentiality, Integrity, and Availability**
  - How to develop and describe a **threat model**
  - The types of **security threats and attacks** that must be dealt with
  - How to distinguish among various **types of intruders** and their behavior patterns
  - The **poor programming practices** that cause many security vulnerabilities
  - Major **networking protocols, standards, and tools**
  - **Symmetric and asymmetric cryptography** including message authentication
  - **User authentication**
  - How to reason about and implement **security policies**
  - How to secure **operating systems, databases, hypervisors, and cloud environments**
  - The role of **firewalls, intrusion detection, and intrusion prevention systems**
  - Security **auditing** and **forensics**
  - **Social engineering** attacks
  - **Ethical and legal aspects** of security
Our Responsibilities

• The instructor and TA will...
  ▪ Provide lectures/recitations at the stated times
  ▪ Set clear policies on grading
  ▪ Provide timely feedback on assignments
  ▪ Be available out of class to provide reasonable assistance
  ▪ Respond to comments or complaints about the instruction provided

• Students are expected to...
  ▪ Receive lectures/recitations at the stated times
  ▪ Turn in assignments on time
  ▪ Seek out of class assistance in a timely manner if needed
  ▪ Provide frank comments about the instruction or grading as soon as possible if there are issues
  ▪ Assist each other within the bounds of academic integrity
Computing resources

- We’ll make extensive use of VMs from the Duke Virtual Computing Manager: [https://vcm.duke.edu/](https://vcm.duke.edu/)
  - Students in this course will have their course VMs not count against their limit
  - These VMs have public internet IP addresses – practice good security!
- Later, you will be given access to VMs running Kali Linux (a distribution of Linux with many security tools pre-installed)
- We will use shared target machines from time to time
  - Treat these with respect – unless otherwise noted, you should ONLY do the prescribed actions to them. Do not “attack” systems you are not explicitly told to.
Ethics in Security

• There are three flavors of security practitioner in the world:
  ▪ **White hat**: Obey the law, work to make systems secure
  ▪ **Black hat**: Break the law, infiltrate (usually for profit)
  ▪ **Grey hat**: Does both (so still super unethical)

• There is ONE flavor of security practitioner in this course:

• All students must sign and turn in an **ethics pledge** in order to receive credit on any assignments (see course site!)