Computer Science 161: Computer Security

Peyrin Kao

Ryan Lehmkuhl

Website: https://cs161.org

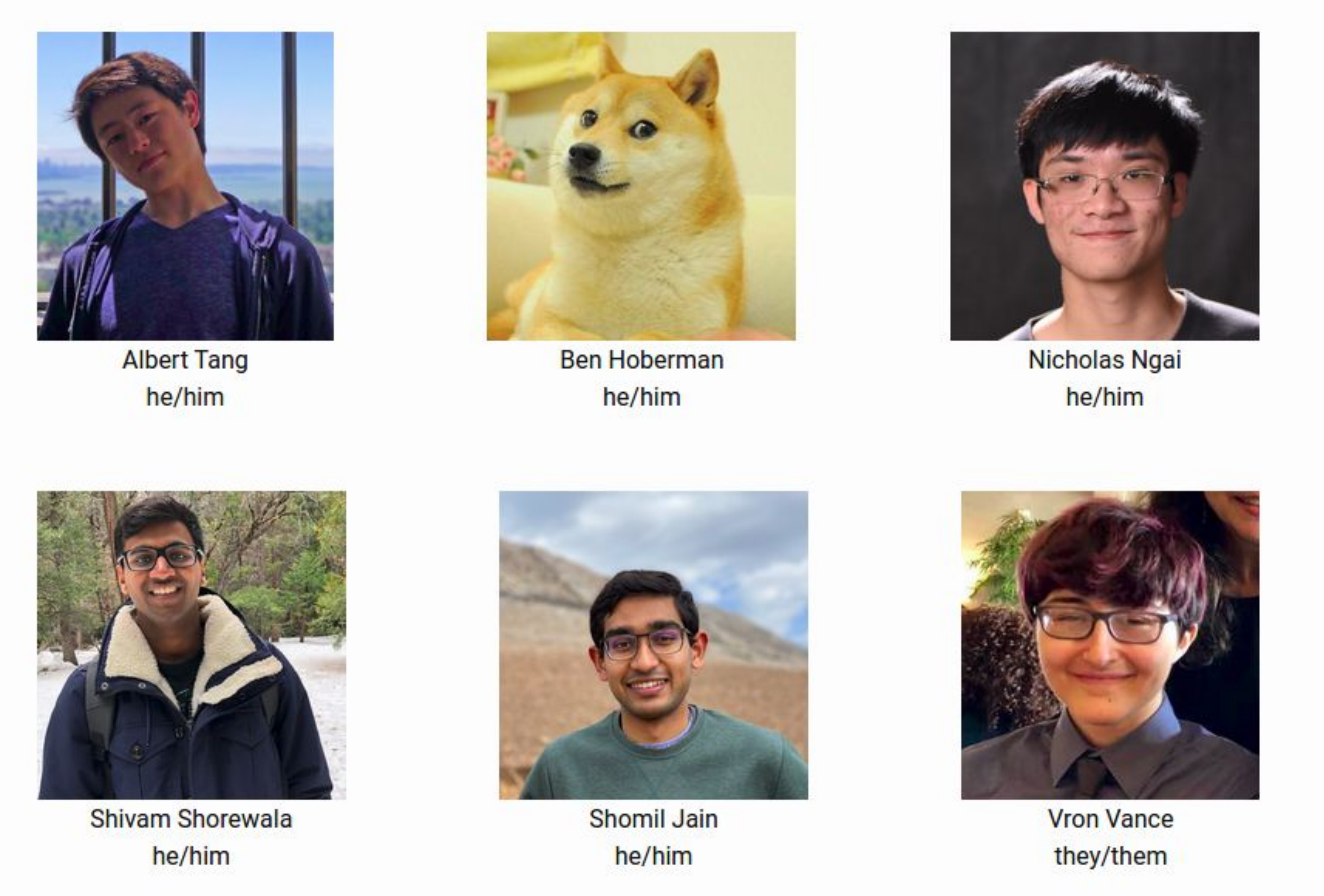
If you are here: you've finished your first 161 assignment!

- Log into Gradescope (https://www.gradescope.com/)
- Open the **Homework 1** assignment
- Find **Q2.3**
- Enter the password: **botnet**
- Do not share the password with your friends!

Who Am I:
Ryan Lehmkuhl (he/him)

- From San Diego!!
- EECS Senior
- Taught CS 161 twice
- Research interests: Cryptography/Complexity Theory (systems + zero-knowledge proofs)
- Slightly unhealthy relationship with coffee
- In a weird singing group

And a team of talented TAs...



Albert Tang
he/him

Ben Hoberman
he/him

Nicholas Ngai
he/him

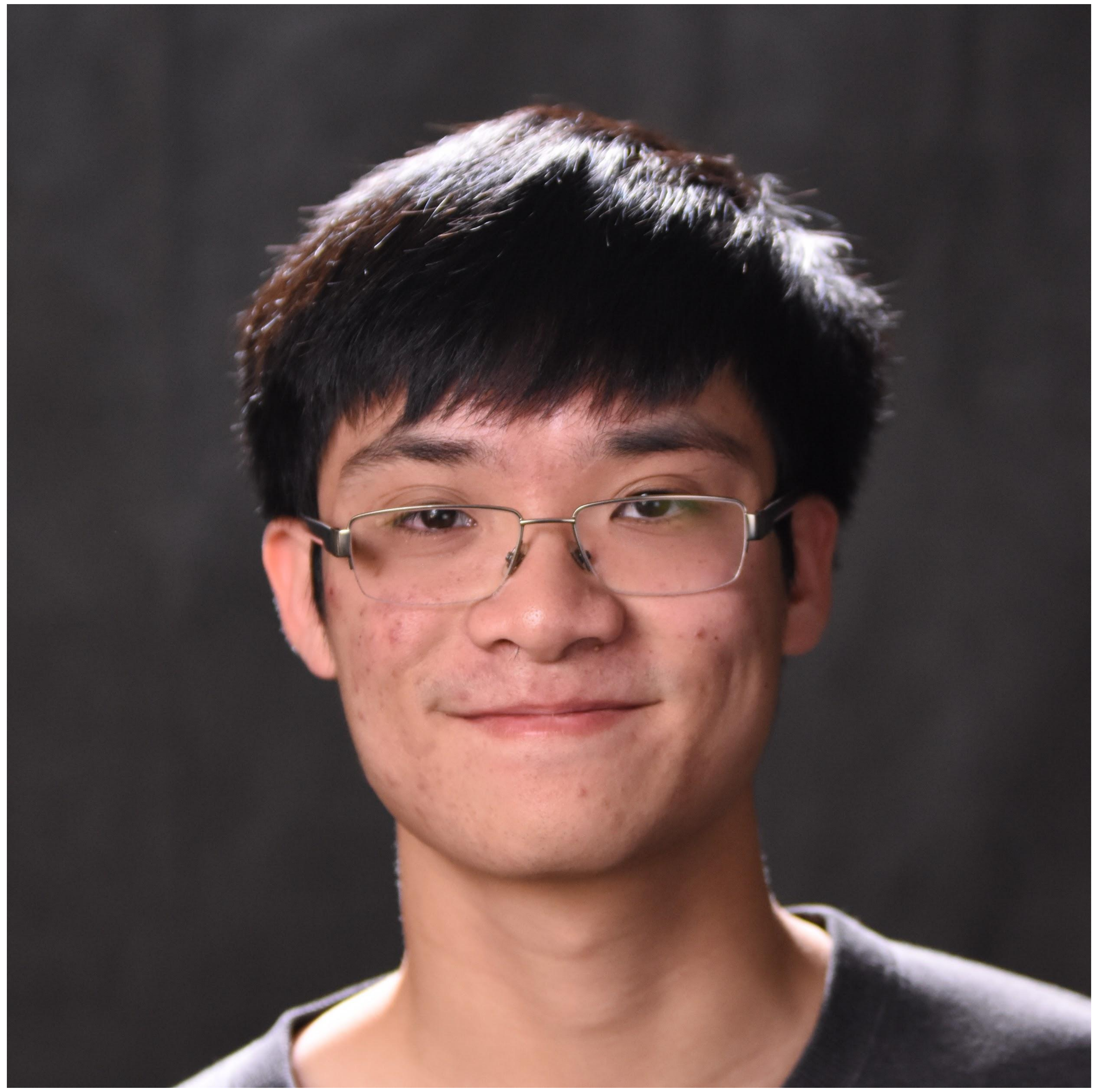
Shivam Shorewala
he/him

Shomil Jain
he/him

Vron Vance
they/them

And a team of talented TAs... Nicholas Ngai (he/him)

- From San Jose (well, close enough)
- EECS sophomore
- Took CS 161 in Spring 2020 (and definitely over-engineered Project 2)
- Far too interested in cryptography
- Far too paranoid about privacy



And a team of talented TAs...
Vron Vance (they/them)

- from san carlos and san diego
- comp sci senior
- academic interests: accessibility, safety, security in computer science
- personal interests: cats, turtles, succulents

...and readers...

Caroline Liu
she/her

Evan Sum
he/him

Arvind Sridhar
he/him

Sid Bansal
he/him

...and professors
David Wagner

- Worked on software security, mobile security, cryptography, security of electronic voting, usable security, system security
- Currently excited about security for machine learning

...and professors
Raluca Ada Popa

- Lead the system security research group, and co-run RISELab at UC Berkeley
- Research topics: **broadly** systems security and applied cryptography, and **more specifically**: secure analytics, databases, IoT and ML; decentralized security via blockchains/ledgers
- CTO & co-founder of a cybersecurity company, PreVeil
- Taught this class 3 times

What Will You Learn In This Class?

- How to think adversarially about computer systems
- How to assess threats for their significance
- How to build programs & systems with robust security properties
- How to gauge the protections and limitations provided by today’s technology
- How attacks work in practice

Prerequisites

- CS 61B (Data Structures)
- For experience working with large codebases (500-1000 lines of code) and basic data structures
- Relevant for Project 2 (weeks 4-6)

Prerequisites

- CS 61C (Machine Structures)
- For understanding of C memory layout and hex/binary number representation
- Relevant for the memory safety unit (Project 1, weeks 1-2)
- See optional review lecture if you want a refresher

Prerequisites

- CS 70 (Discrete Math and Probability Theory)
- For basic understanding of modular arithmetic/set notation and some mathematical intuition
- Relevant in the cryptography unit (weeks 2-3)
- We’ll do our best to review any CS 70 prerequisite material during lecture

Prerequisites

- Q: Do I need to already know a coding language?
- A: Basic understanding of C and Python is recommended
- Project 2 (500-1000 lines of code) is in Go
- You don’t need to know Go as a prerequisite, but you should be able to learn a new language on your own (we won’t have lectures on Go syntax)

Engage!

- In office hours, section, etc.
- Feedback is highly valuable: https://cs161.org/feedback
- Participate in Piazza (use same name as Gradescope)
- For private matters, contact instructors using ***private Piazza posts***

Course structure

- Intro to Security
- Memory Safety
- Cryptography
- Network Security
- Web Security
- Miscellaneous Topics

Course structure

- Lectures
- Discussions
- Office hours
- Exams

Lecture

- Lectures will be pre-recorded and split into small chunks with short questions to check your understanding
- Will reuse many lectures from Spring 2020 (Raluca Popa and David Wagner)
- A few lectures will be live (will be recorded as well)

Live lecture time

- Lecture time is 5pm-6pm PT
- Any interactive live lectures will be at this time
- When there's no live lecture, Ryan and/or Peyrin will be around to answer any questions
- May also be used as extra office hours during project weeks

Discussion

- Discussions will start Wednesday, June 24:
- Synchronous sections over Zoom (everyone attends a meeting at the scheduled time)
- LOST section (2 hours long)
- Discussion worksheet recording

Discussion schedule

- See the course website: https://cs161.org/calendar
- We tried to accommodate everyone's time preferences: According to the form you filled out, everyone should have at least one discussion they can attend
- Possible minor change: the 7am section may be moved to 8am starting next week

Office hours

- Online queue at https://cs161.org/oh
- When it’s your turn, you will join a Zoom meeting with a TA
- We tried to accommodate everyone’s time preferences: According to the form you filled out, everyone should have at least one OH they can attend
- Extra office hours might be added during project weeks

If you are here: you've finished your first 161 assignment!

- Log into Gradescope (https://www.gradescope.com/)
- Open the **Homework 1** assignment
- Find **Q2.3**
- Enter the password: **botnet**
- Do not share the password with your friends!

Grading structure

- 3 projects (30%)
- 7 homeworks (20%)
- One midterm (20%)
- A comprehensive final exam (30%)

Class Policies

- Late homeworks are not accepted - You get one drop
- You have 3 project slip days
- Late project without slip days:
  <24 hours: -10%, <48 hours: -20%,
  <72 hours: -40%, >72 hours: no credit
- We will release a form for extenuating circumstances:
  https://cs161.org/accommodations

Midterms and Final Policy

- Midterm and Final are *synchronous* (everyone takes them at the same time)
- Midterm: July 13th (4pm-6pm PT)
- Final: August 13th (4pm-7pm PT)
- If you need DSP accommodations (extra time on exams, etc) process them **ASAP**

Midterms and Final Policy

- Q: I can’t take the exam at the scheduled time.
- A: If you absolutely can’t take the scheduled exam, we have one alternate time:
- Midterm: July 13th (8pm-10pm PT)
- Final: August 13th (7pm-10pm PT)
- If you absolutely can’t make these times either, please message us on Piazza to discuss alternate exam times
- We might ask you to take a short verbal exam if you choose an alternate exam time

Exam Proctoring

- Both exams will have video proctoring: as you take the exam, we should be able to see your computer screen and your paper answer sheet.
- Midterm: record a video that you upload after the exam
- Final: join a Zoom meeting during the exam
- If you don't feel comfortable with video proctoring, please reach out to us and we will discuss alternatives (most likely an additional verbal exam).

Exam Proctoring

- Q: Is Zoom secure for exam proctoring?
- A: More secure alternatives exist, but Zoom is what administration has authorized us to use (and paid for).

Online Resources & Accounts...

- Course website: https://cs161.org
- We will use **Gradescope** for HWs, projects, and exams
- Gradescope entry code: **MZ6KZX**
- We will use **Piazza** for class announcements
- We will use **Zoom** for sections, office hours, and exams

Intellectual Honesty Policy: Detection and ***Retribution***

Nicholas Weaver

Intellectual Honesty Policy: Detection and ***Retribution***

- We view those who would cheat as “attackers”
  - This includes sharing code on homework or projects, midterms, finals, etc…
  - But through this class we (mostly) assume rational attackers
    - Benefit of attack > ***Expected*** cost of the attack
      - Cost of launching attack + cost of getting caught * probability of getting caught
- We take a detection and response approach
  - We use many tools to detect violations
    - "Obscurity is not security", but obscurity ***can help***.
      Just let it be known that "We Have Ways"
  - We will go to DEFCON 1 (aka "launch the nukes") ***immediately***
    - You will, ***at minimum***, receive negative points
    - “Nick doesn’t make threats. ***He keeps promises***”

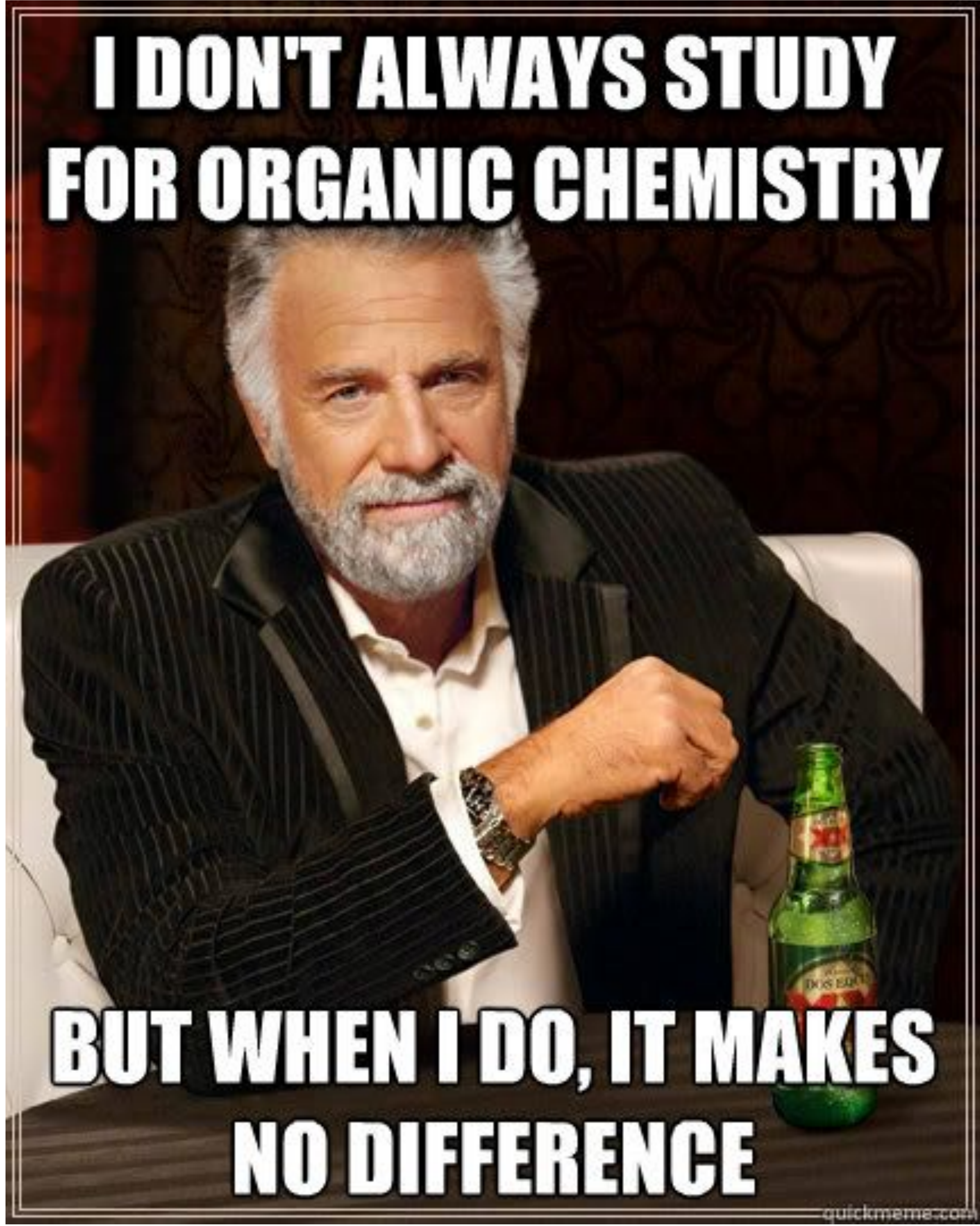
Ethics Guide for Defense Against the Dark Arts

- Of necessity, this class has a fair amount of "dark arts" content
  - As defenders you must understand the offense:
    You can't learn defense against the dark arts without including the dark arts
  - But a lot of "don't try this at home" stuff
- Big key is ***consent***
  - Its usually OK to break into ***your own stuff***
    - Its a great way to evaluate systems
  - Its usually OK to break into someone else's stuff ***with explicit permission to do so***
  - It is both grossly unethical and often ***exceedingly criminal*** to access systems without authorization

Stress Management & Mental Health...

- We'll try to not over-stress you too much
  - But there really is a lot to cover
- If you feel overwhelmed, please use the resources available
  - Academically: Ask on Piazza, Office hours
  - Non-Academic: Take advantage of University Health Services if you need to

These are hard times. We as staff recognize that and want to do our best to accommodate all of you.


I DON'T ALWAYS STUDY FOR ORGANIC CHEMISTRY
BUT WHEN I DO, IT MAKES NO DIFFERENCE
quickmeme.com