Lec 00: Hello!

Prof. Adam J. Aviv

GW

CSCI 1311 Discrete Structures I
Spring 2020

Welcome!

This class is **CSCI 1311 Discrete Structures I** — are you in the right place?

Good!

Who am I? – Prof. Adam J. Aviv

- Assoc. Prof. of Computer Science
  - ▶ Joined GW in Fall 2019
  - ▶ Before GW, I was a faculty member at USNA and Swarthmore
- Research Areas
  - ▶ Usable Security and Privacy
  - ▶ . . . and privacy and security, more generally
  - ▶ Worked in broad areas, including Network Security, Applied Cryptography, and HCI
- Always looking for self-motivated and interested students to participant in research projects, including undergraduates!
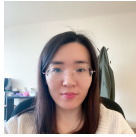
email: aaviv@gwu.edu
office: SEH 5810

office hours:
Tue. 1130-1230pm
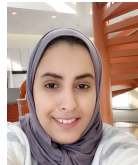**Thr. 130-230pm**
and by appt.
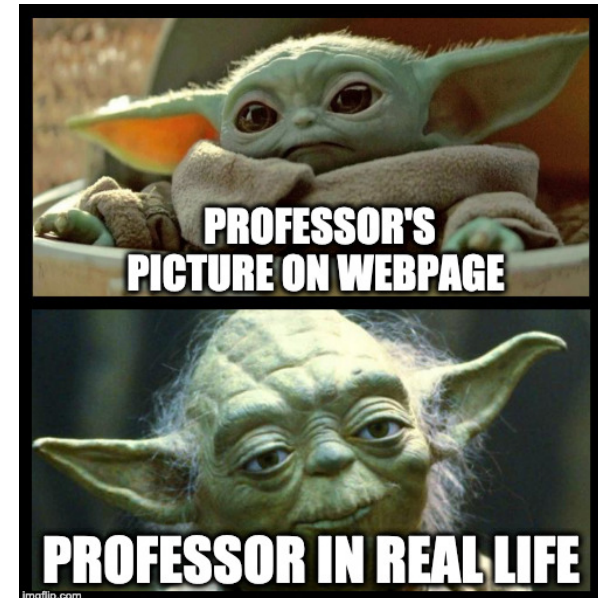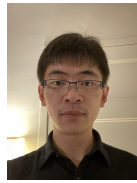
Teaching Assistants

Thinh Dang
office hours:
Mon: 330-430pm
Wed: 330-430pm
SEH 4th Floor

Honglu Jiang
office hours:
Mon: 930-1030am
Tue: 1230-130pm
SEH 4th Floor

Rehab Alahmadi
office hours:
Mon: 1230-130pm
Thu: 1100-1200pm
SEH 3400

Linsheng Liu
office hours:
Tue: 230-330pm
Wed: 400-500pm
SEH 4th Floor

Learning Assistants

*All LA office hours on the 4th floor couch areas of SEH

Oliver Broadrick
office hours:
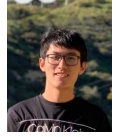Tue: 1015-1215pm
Fri: 230-430pm

Linnea Dierksheide
office hours:
Tue: 100-300pm
Thu: 100-300pm

Grant McClearn
office hours:
Mon: 1215-115pm

Genevieve Flynn
office hours:
Fri: 100-200pm

Owen Wu
office hours:
Mon: 300-400pm
Wed: 400-500pm

ACM Study Hall – Topmkins 402 – Sunday, 2-4pm

Who are you?

Say your name, where you're from, and your favorite number

(that's not 7 :)

Course Webpage

`https://csci1311-s20.adamaviv.com/`

The quickest way to find it is to google my name "Adam Aviv", go to my web page (`https://adamaviv.com`), and then click on the "Current Classes" link.

You can find the course calendar, problem sets, and other handouts here.

Will the slides be posted before class?

Unfortunately, no. I'm making and editing slides nearly right up until lectures.

But! I will be posting them after class so you can have them to review.

Course Resources and Tools

Gradescope
- Problem set submission (**No hardcopy submission!**)
- Online grading tool
- Receive grading feedback

Piazza
- Announcements and discussions
- Good first place to ask questions

Course Webpage
- Calendar, syllabus, problem sets (and solutions), quiz solutions

Blackboard
- Grades (only)
- Used as sparingly as possible – I hate Blackboard.

Where to go for what

Questions on a problem set or more explanation for a concept
TA/LA/Prof. Office Hours, Labs, Piazza

Submissions, grading feedback, regrade requests
Gradescope.

Class issues and personal matter
Email the professor or go to professor's office hours.

Grading

Problem Sets – 43%
- 7 problem sets, top 6 count towards your grade (7% each)
- Problem Set 0 worth 1% to practice using github and gradescope

Quizzes – 7%
- 10 Quizzes, top 7 count toward your grade (1% each)
- Administered during lab sections

Midterm – 25%
- Two midterms, each worth 12.5% of your grade
- Midterm 1: Week 5 (Feb 13), Midterm 2: Week 11 (Apr 2)

Final – 25%
- Comprehensive final covering all topics
- But, extra focus on topics not covered in Midterms

Problem Set Submission Policy

- **Late problem sets will NOT be accepted**
  - ▶ Solutions will be released the following day
  - ▶ You can drop your lowest problem set score
- All problem sets must be submitted via gradescope as a single PDF.
  - ▶ Submission in hard-copy or as a non-PDF document will not be accepted
- You **must type** your homework submissions.
  - ▶ You can use Word, Google Doc, or latex (most recommended!)
  - ▶ Try out overleaf!

Problem Set Formatting

Problem sets must be formatted a particular way to help with grading

- Cover page only including your full name, date, and GW email address. No answers to questions should appear on the cover page.
- Try and organize your submission such that answers to questions (or parts of questions) do not span multiple pages. This will make it much easier to grade. Ideally, each page will start with a new question (or part of question).

Exams

- Two Midterms (25%) and One Final (25%)
- "Cheat Sheets"
  - ▶ You are allowed to bring in one page, double sided of hand written notes for each exam to be used as your "cheat sheet"
  - ▶ Only 8.5x11 inch paper is acceptable
  - ▶ No, you can't type them!
  - ▶ You will get to keep your cheat sheet as a study aid for future exams.

Quizzes

- Quizzes will be administered during the lab section
- 3-5 short questions, 10-15 minutes, graded out of 10 points
- Will be reviewed during lab – don't share details with others!
- Total of 10 quizzes throughout the semester, top 7 count.
- Quizzes must be taken during your registered lab section.
- Cannot make up a missed quiz – but not all quizzes will count.

Academic Integrity

Academic dishonesty is plainly defined as cheating of any kind, including misrepresenting one's own work, taking credit for the work of others without crediting them and without appropriate authorization, aiding others in cheating by providing solutions or assistance, and the fabrication of information.

Violations may result in the following actions:
- Receiving a 0% on the assignment in which a violation is found
- Dismissal from the course
- Receiving a failing grade in the class

Further action may occur, including referring the case to the Academic Integrity Council for further adjudication.

Wellness

If any issue arises that may limit your ability to participate in class, for example, personal illness, family emergency, etc., please be sure to discuss these matters with your instructor as soon as possible and accommodations will be made available to you as appropriate.

Feelings of being overwhelmed are unfortunately quite common in the University environment and something we have all dealt with. GW offers counseling services, and also consider also reaching out to a friend, faculty or family member you trust for help getting connected to the support that can help.

If you or someone you know is feeling suicidal or in danger of self-harm, call someone immediately, day or night:
- Student Counseling : 202-994-5300.
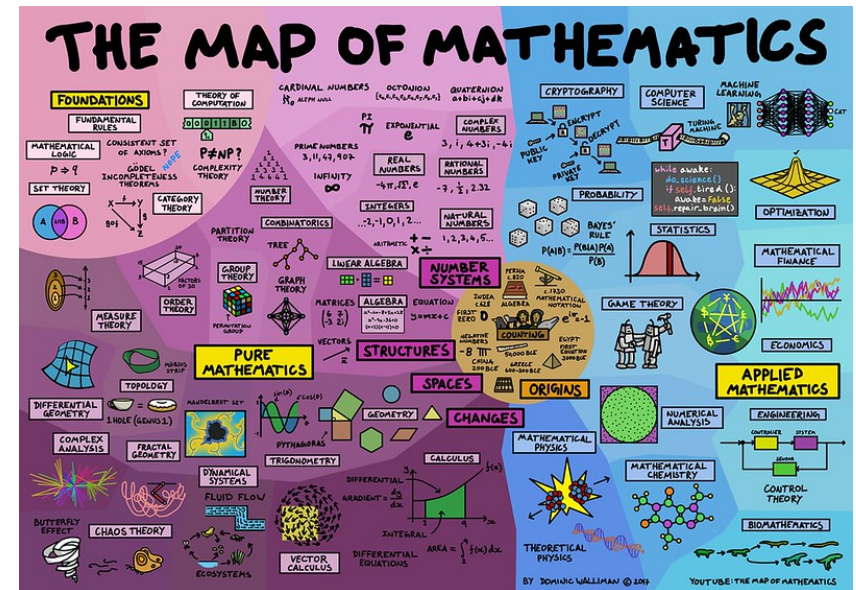- National Suicide Prevention Lifeline: 1-800-273-8255

Laptop Policy — no laptops during lecture

- Laptops are distracting to you, and others, and me!
  - ▶ Even if you are taking notes, flashy, bright things can distract your neighbor.
  - ▶ Very tempting to do other things . . .
  - ▶ I get distracted — wondering what you are doing, or if you are paying attention.
  - ▶ Everyone typing is really loud!

- Taking notes by hand increases comprehension, understanding, and retention (science!)
  - ▶ Using digital writing tools, e.g., ipads, remarkable, etc., are ok
  - ▶ Try using pen and paper — seriously.

How to succeed in this class

- Come to class and take notes
- Practice, practice, practice
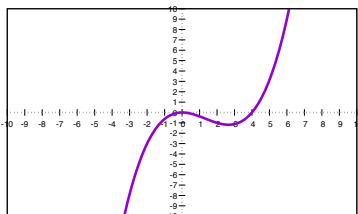- Problem sets are some of the best practice, but do more!
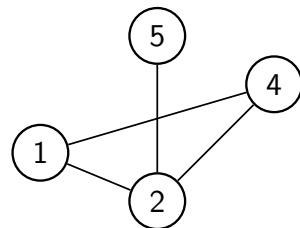
What is Discrete Math?

Dominic Walliman https://www.flickr.com/photos/95869671@N08/32264483720

Continuous Mathematics

$$\int \frac{1}{4}x^3 + 5x^2 - 2 \ dx$$

Discrete Mathematics

$$V = \{1, 2, 4, 5\}$$
$$E = \{\{1, 4\}, \{2, 5\}, \{1, 2\}, \{2, 4\}\}$$

Discrete Math and Computer Science

- Cryptography
- Program Analysis and Computation Theory
- Randomized Algorithms
- Machine Learning/Artificial Intelligence
- Network and Queuing Theory

- Data Structures
- Databases
- Encoding
- Architecture
- Programming Languages
- Concurrency
- Cyber Physical Systems

To study computer science is also to study an application of discrete mathematics

Course Topics

Sets

$$A \subset C, B \not\subset D$$

$$\{x \mid x \in \mathbb{Z}^+\}, \left\{y = \frac{a}{b} \mid y \in \mathbb{Q}\right\}$$

Recurrences

$$f(x) = f(x-1) + 5$$

$$a_n = \frac{(-1)^n}{n+1}$$

Logic

$$\neg p_1 \wedge p_2 \vee \Rightarrow p_3$$

$$\forall x \in \mathbb{Z}, \exists y, y > z$$

Functions

$$F : X \to Y, G : X \to Y$$

$$F = G \iff \forall x \in X, F(x) = G(x)$$

Proofs & Induction

The $\sqrt{2}$ is irrational.

$$\sum^{n} i = n(n-1)/2$$

Relations

$$L : \mathbb{R} \times \mathbb{R} \mid x \, L \, y \iff x < y$$

Course Topics

Modular Arithmetic

$$x \equiv_n y \pmod{n}$$

Counting and Probability

What is the probability that two players on a soccer pitch share the same birthday?
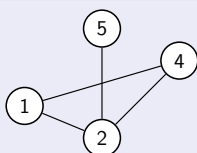
Graphs and Trees

Boolean Algebra and Russell's Paradox
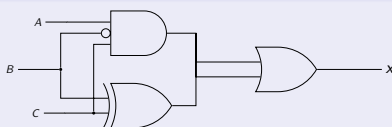
Set of all sets that are not elements of themselves

$$S = \{A \mid A \text{ is a set and } A \notin A\}$$

Is $S \in S$?

Logic and Circuits

Let's get started!