

CS 220 / CS319

Introduction

Meena Syamkumar

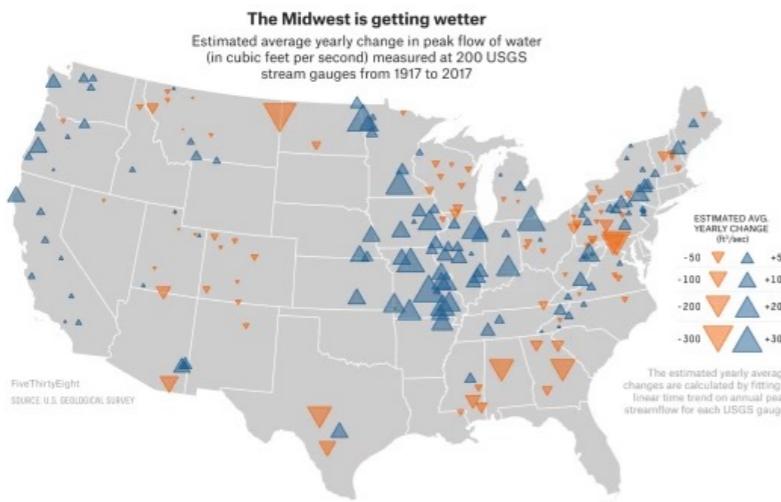
Andy Kuemmel

Cole Nelson

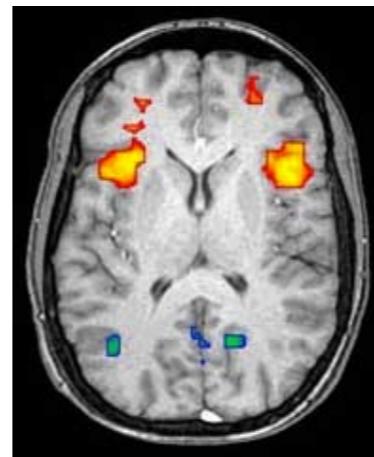
Welcome to Data Science Programming I!

Data is now integrated into many fields

- Journalism
- Biology, physics, chemistry
- Psychology, sociology, economics, business
- Engineering (mechanical, biomedical, industrial, etc.)



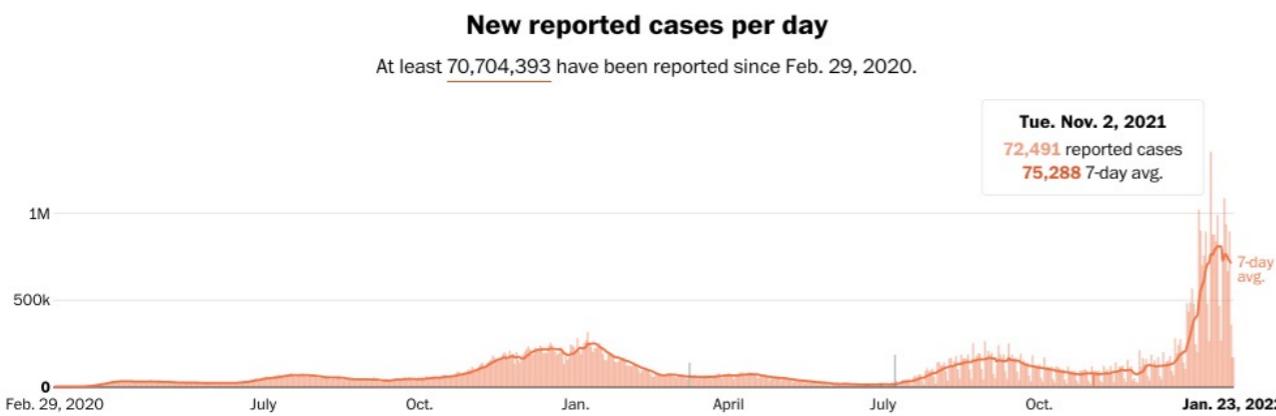
<https://fivethirtyeight.com/features/the-midwest-is-getting-drenched-and-its-causing-big-problems/>



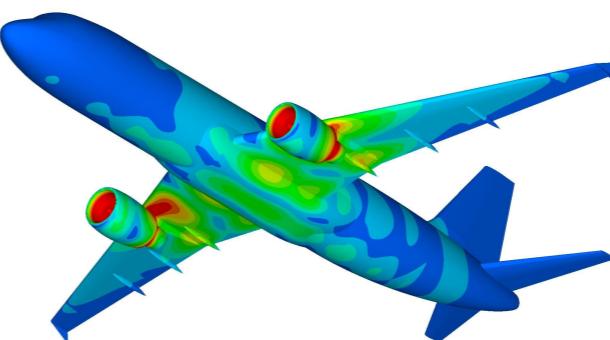
<https://en.wikipedia.org/wiki/Neuroimaging>



<https://science.howstuffworks.com/life/genetic/gattaca-gaptacaz-adding-letters-the-genetic-alphabet.htm>



<https://www.washingtonpost.com/graphics/2020/national/coronavirus-us-cases-deaths/>



<http://www.stressebook.com/finite-element-analysis-in-a-nut-shell/>

Welcome to Data Science Programming I!

Data is exploding in many fields

- Journalism
- Biology, physics, chemistry
- Psychology, sociology, economics, business
- Engineering (mechanical, electrical, industrial, etc)

How can we gain insights from that data?

- With computation

Approach 1: human computation



https://en.wikipedia.org/wiki/Human_computer

Approach 2: machine computation



<http://fortune.com/2015/11/15/intel-super-7/>

Welcome to Data Science Programming I!

CS 220 is about approach 2

- Faster, more reliable, can churn through more data
- Automate to save human effort

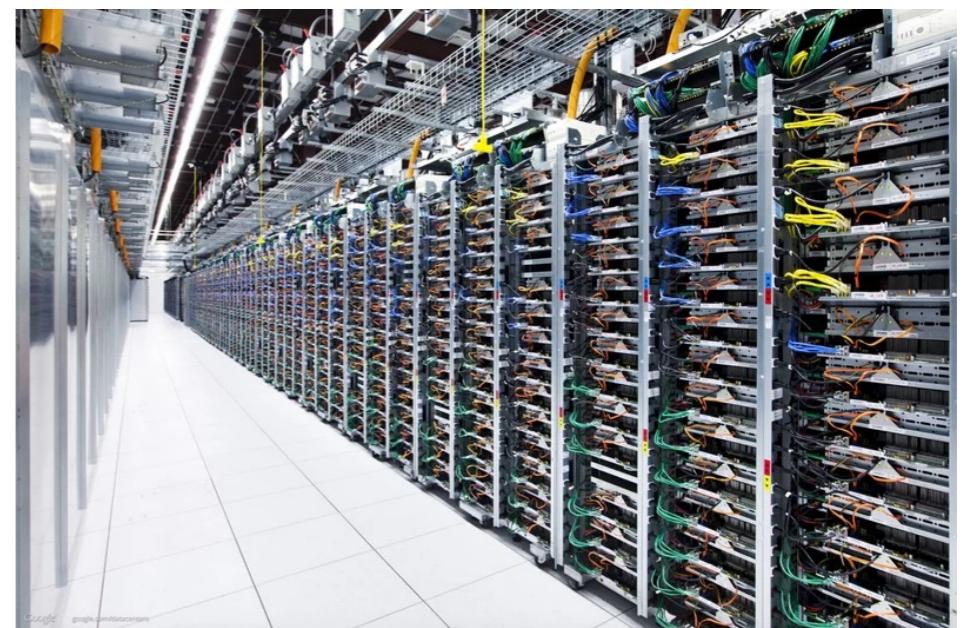
*“Find the leverage in the world, so you can **be more lazy!**”*

~ Larry Page

Approach 1: human computation



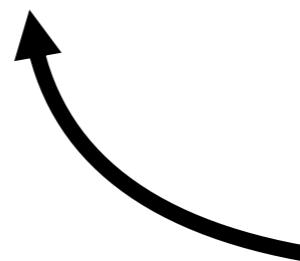
Approach 2: machine computation



Welcome to Data Science Programming I!

CS 220 is about approach 2

- Faster, more reliable, can churn through more data
- Automate to save human effort
- Requires being able to tell computers what to do!



**society needs more domain experts
in specific fields who can write code**

Goal: become "bilingual"

- Speak the language of **X** (biology, mech eng, journalism, etc)
- Speak the language of **computing**

Data Science:

- Combines inquiry, statistics, **programming**, and communication skills to provide actionable insights from data sets

Why CS 220?

Typical intro CS

- Challenging language (e.g., C++ or Java)
- CS students and other majors together
- Heavy on theory, light on data

vs

CS 220 approach

- Python (powerful but easier to learn)
- Bring more coding into other fields
- Light on theory, heavy on data
- Emphasize questions and communication

Why CS 220?

50 Best Jobs in America for 2021

Job Title	Median Base Salary	Job Satisfaction	Job Openings
#1 Java Developer	\$90,830	4.2/5	10,103
#2 Data Scientist	\$113,736	4.1/5	5,971
#3 Product Manager	\$121,107	3.9/5	14,515

https://www.glassdoor.com/List/Best-Jobs-in-America-LST_KQ0,20.htm

Why CS 220?

People use Data to solve the world's problems



We just published our new Global Food Data Explorer

Explore the global food system from field to plate, for all countries in the world.



Measuring progress towards the Sustainable Development Goals

<https://ourworldindata.org/>

<https://sdg-tracker.org/>

Today's Topics

Introductions

- Who am I? Who are you?

Course overview

Website

Who am I?

Meena Syamkumar

- Email: ms@cs.wisc.edu
- Please call me “Meena”

Industry and Teaching experience

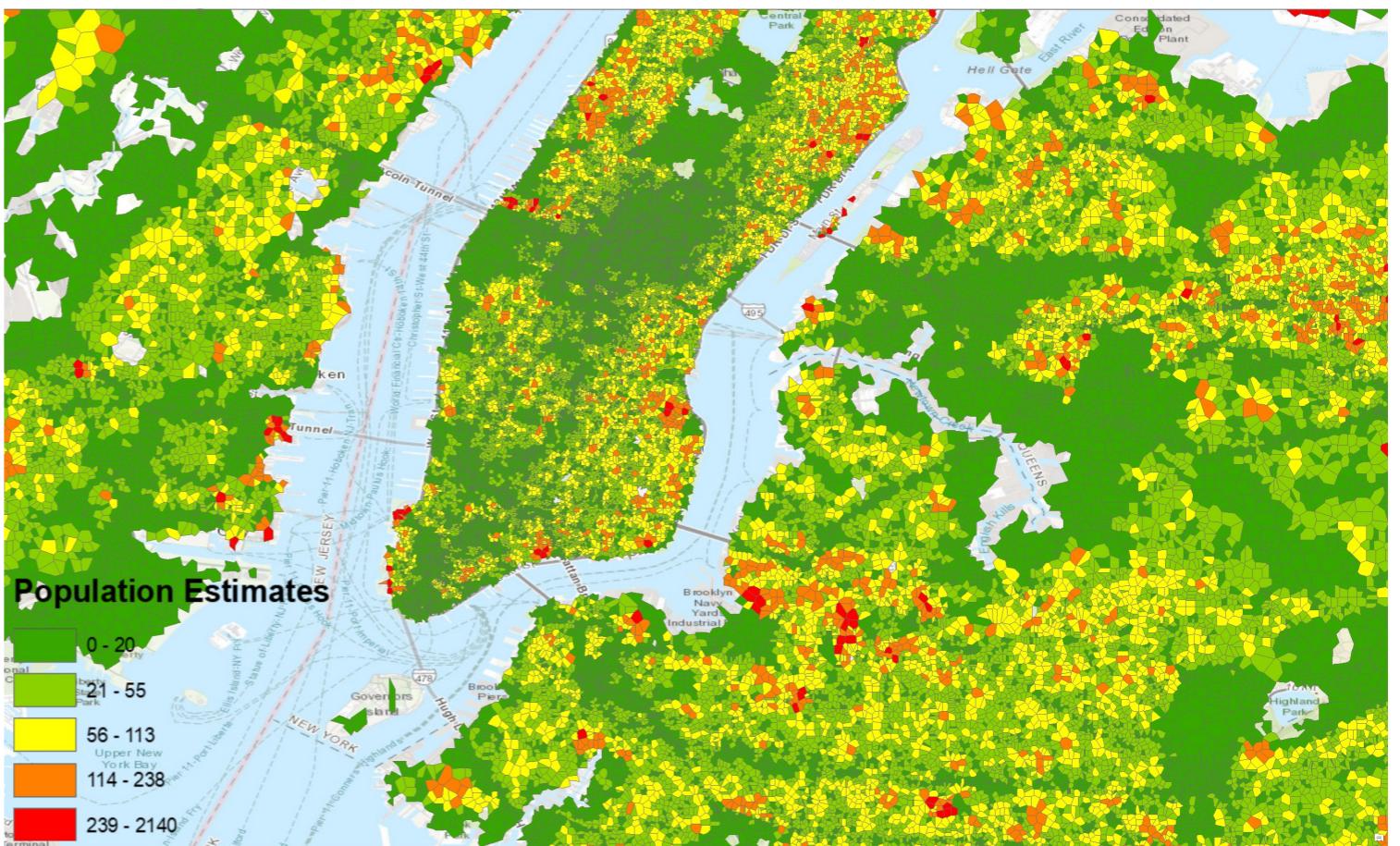
- Citrix, Cisco, and Microsoft
- CS220, CS300, CS367, guest lectures in CS640, CS740



Passion: Running



Research: Internet measurements + CS education



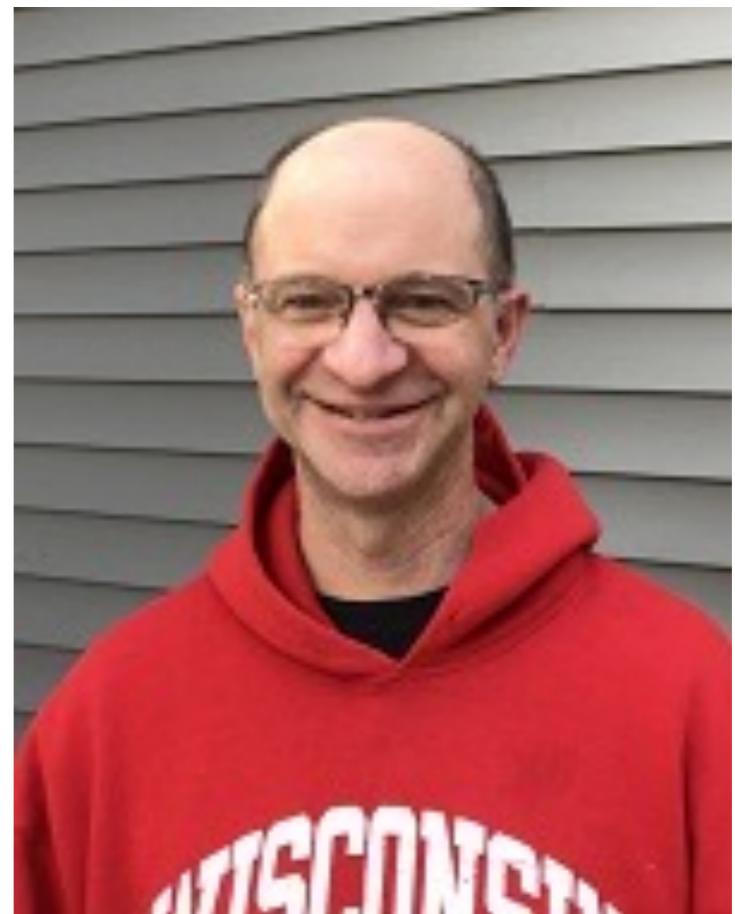
Who am I?

Andy Kuemmel

- Email: kuemmel@wisc.edu
- Please call me “Andy”

Work Experience

- College Board – AP Exam Committee
- AP Computer Science teacher
- Microsoft curriculum writer
- UW Madison Faculty Associate



Interests

Men's Barbershop Chorus



Running

Thanksgiving Day

10k • 5k run/walk

2021
BERBEE DERBY

Powering TECHNOLOGY EDUCATION FOUNDATION

CrazyLegs
CLASSIC

**BRAT
FEST
BUN RUN**



Who am I?

Cole Nelson

- Email: ctnelson2@wisc.edu
- Please call me “Cole”



Industry & Teaching Experience

- Kohl's Software Engineering
- Nelnet Cybersecurity
- CS After-School Programs & Workshops

Interests

Scratch Dataset



Community Involvement



Running



Who am I?

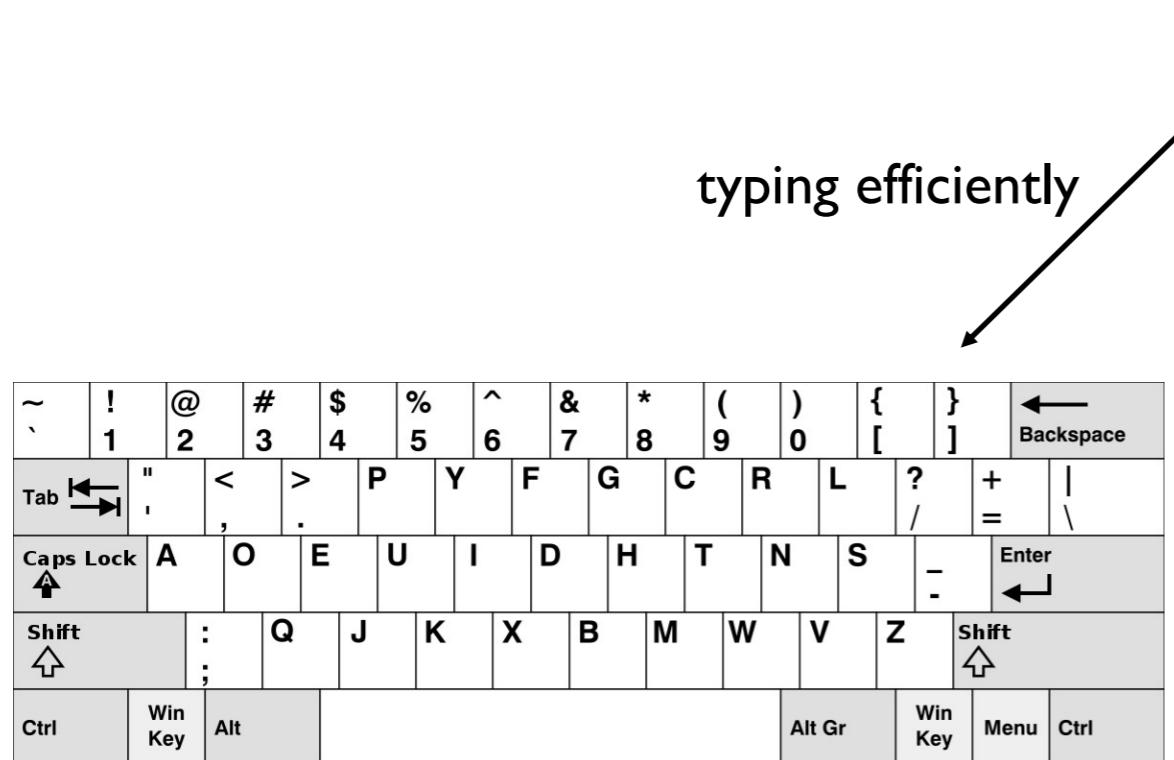
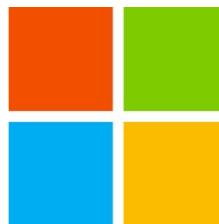
Tyler Caraza-Harter

- Long time Badger
- Email: tylerharter@gmail.com
- Just call me “Tyler”



Industry experience

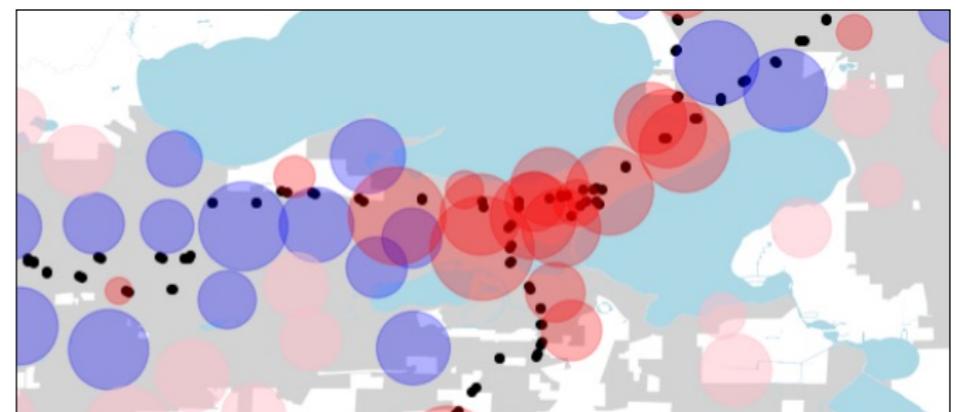
- Worked at Microsoft on SQL Server and Cloud
- Other internships/collaborations:
Qualcomm, Google, Facebook, Tintri



interests

typing efficiently

civic "hacking"



Plot by [Jin Woo Lee](#) (previous CS 301 student)

More: <https://wisc-ds-projects.github.io/f19/>

Student Information Survey (graded)

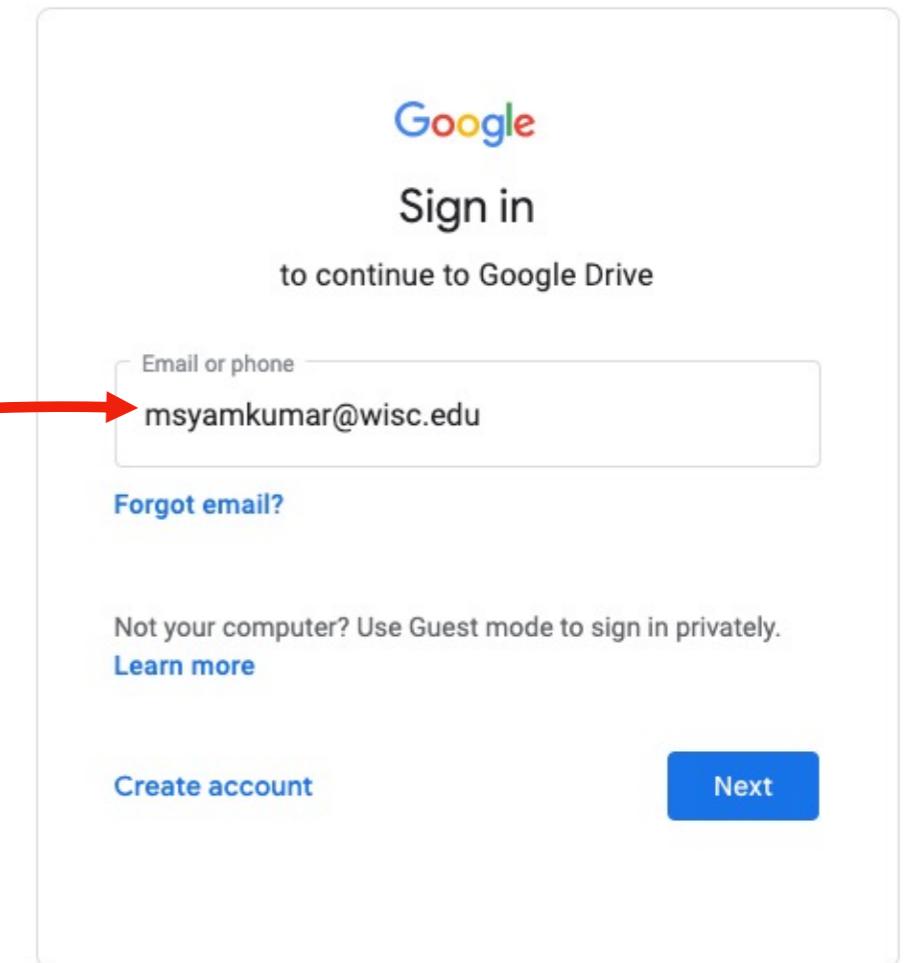
Please help us get to know you (not anonymous):

<https://forms.gle/yDd7hXN8uVDesYtTA>

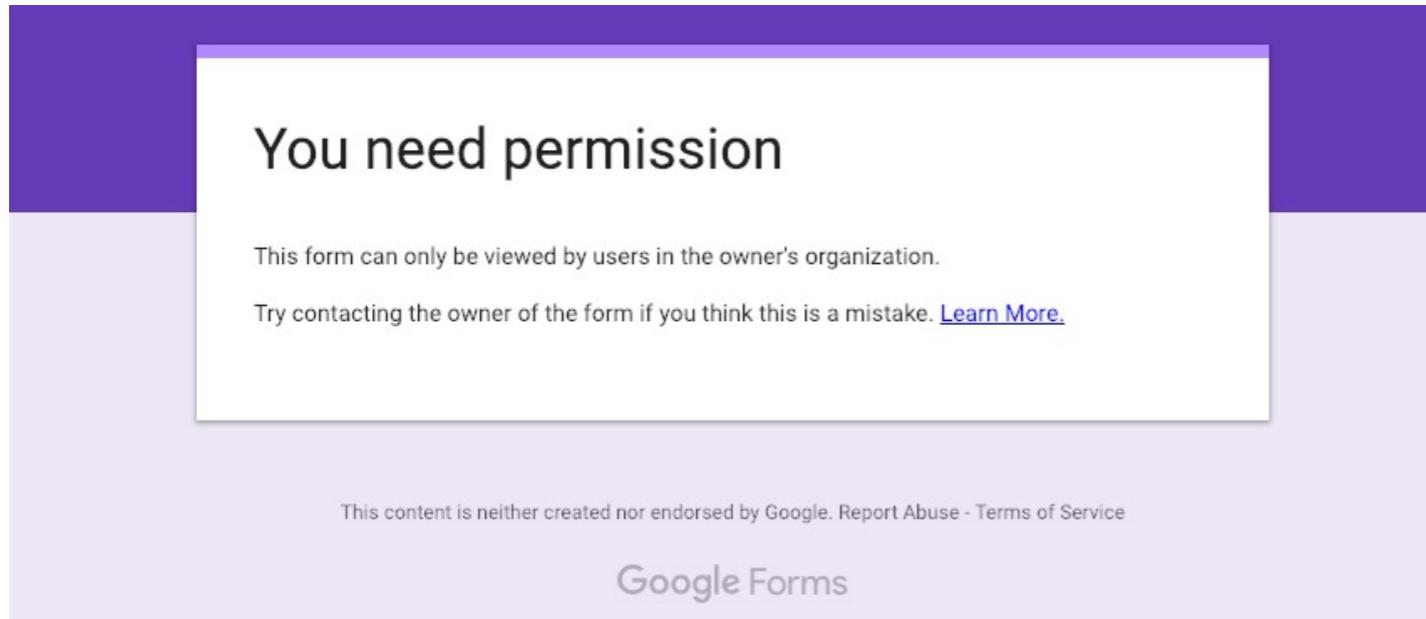
Purposes:

- gauge class interest for office hours
- collecting data to demonstrate Data Science

be sure to use your
campus email!

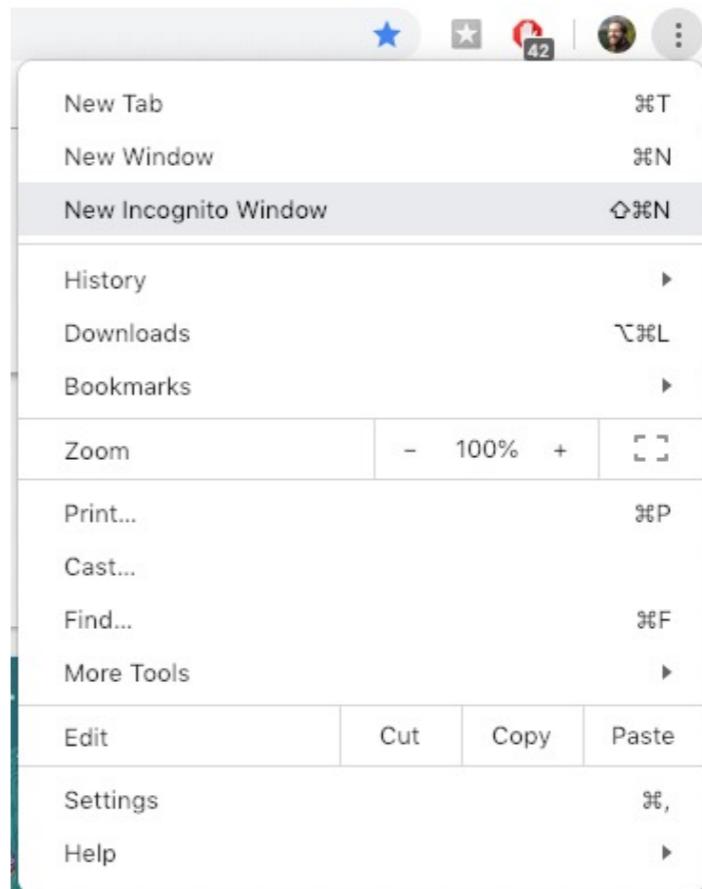


Survey: Common Technical Issues



if you were automatically signed into gmail without being asked, consider clearing cookies or using an Incognito Window (in Chrome)

if you see this, it means you're signed in via Gmail instead of your campus email



Today's Topics

Introductions

Course overview

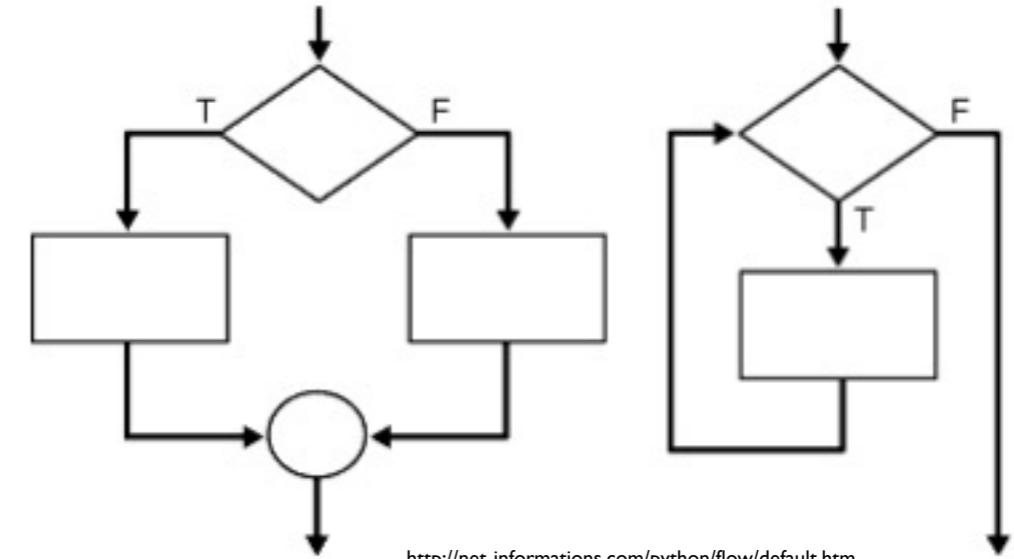
- Topics
- Lecture
- Lab
- Readings
- Class communication
- Grades
- Projects
- Exams & quizzes

Website

220 Topics

Part I: Control Flow

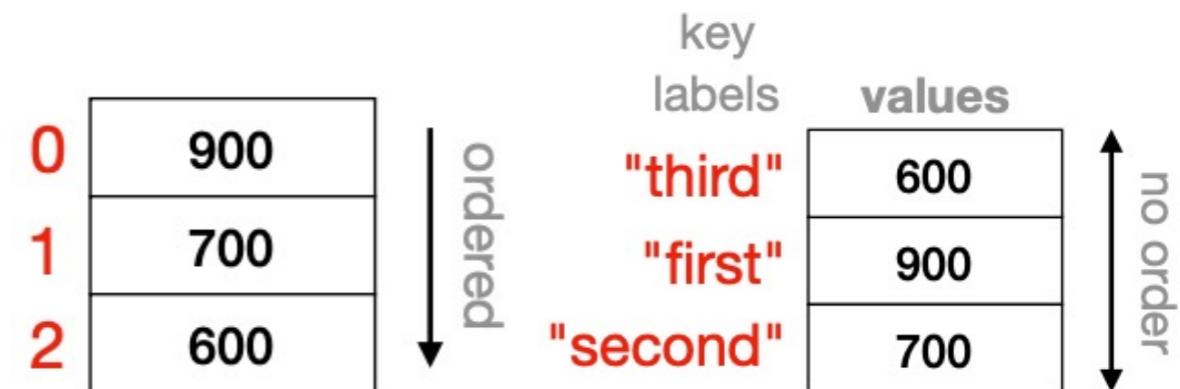
- What step is currently executing?
- How to write functions?
- How to conditionally do something?
- How to repeat steps?



<http://net-informations.com/python/flow/default.htm>

Part 2: State

- How to structure lots of data?
- How to save data in files?



Part 3: Data Science

- Tabular data
- Internet
- Databases
- Plotting



Today's Topics

Introductions

Course overview

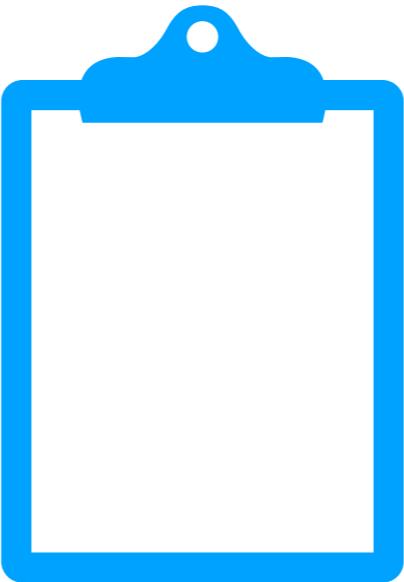
- Topics
- Lecture
- Lab
- Readings
- Class communication
- Grades
- Projects
- Exams & quizzes

Website

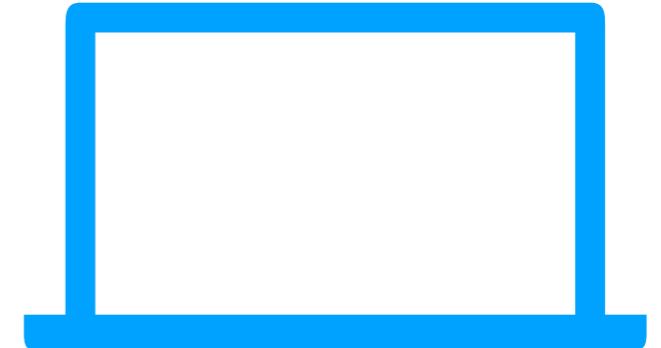
Lecture Style



general concepts



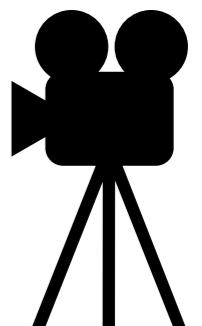
worksheet practice



live coding

Your role

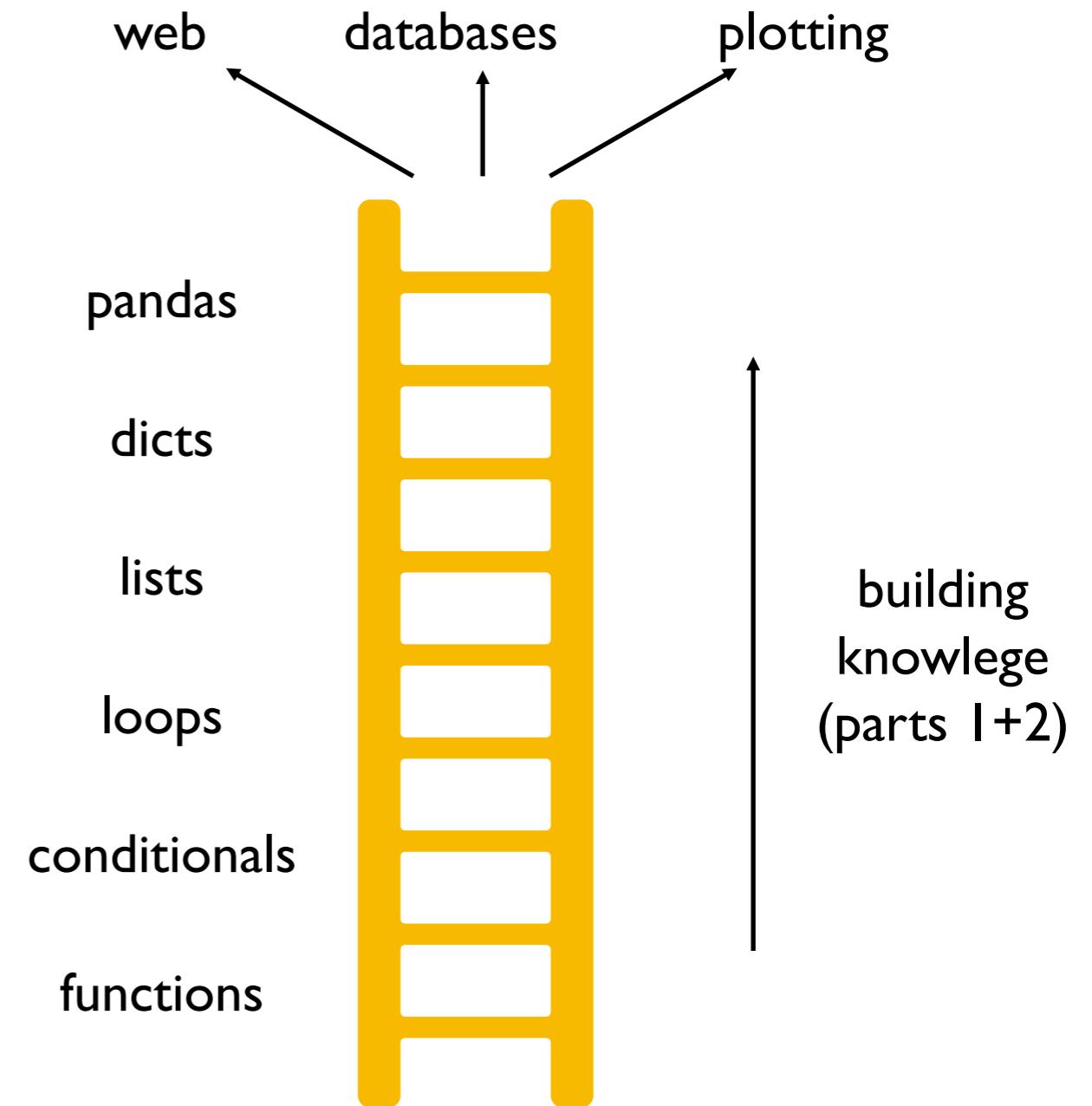
- do **readings** before or after
- Download the **template file** and code along in lecture
- Ask **questions** during the lectures + office hours



In computer science, knowledge builds. All content is cumulative.



To avoid holes in
Your knowledge....



Because all the material builds on previous learning

Today's Topics

Introductions

Course overview

- Topics
- Lecture
- Lab
- Readings
- Class communication
- Grades
- Projects
- Exams & quizzes

Website

Labs – CS220

Format

- Attendance is mandatory – 3 out of 13 labs will be dropped for grading
- 75 minutes on Wed, Thu or Fri
- led by Teaching Assistant (TA) and a Peer Mentor (PM)
- lab document will be posted each week on Wednesday
- Meant to help you succeed on your project

Partnership

- We strongly encourage you to find a project partner
- CS220 students can partner with CS220 students
- If you chose to do lab with a partner, make sure they are your project partner

we will have labs this first week

(also, get any help needed installing Python during this one)

Lab switch requests form (course website)

Labs – CS319

Format

- Self-guided
- Utilize Office Hours to get questions answered

Partnership

- CS319 students can partner with CS319 students
- If you chose to do lab with a partner, make sure they are your project partner

Today's Topics

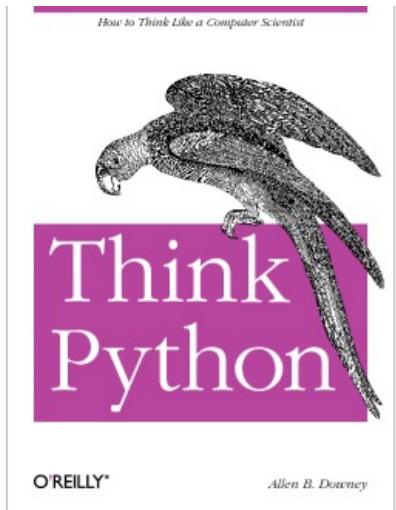
Introductions

Course overview

- Topics
- Lecture
- Lab
- **Readings**
- Class communication
- Grades
- Projects
- Exams & quizzes

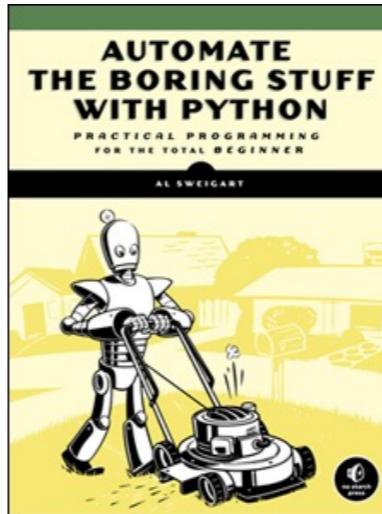
Website

Readings (all free!)



Think Python, 2nd Edition

- Allen B. Downey
- Assumes no programming background
- It's very concise
- Get the 2nd edition, which is for **Python 3!**

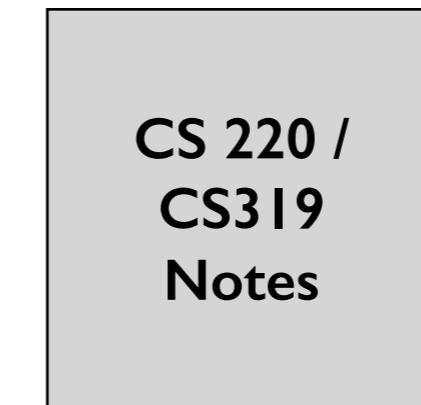
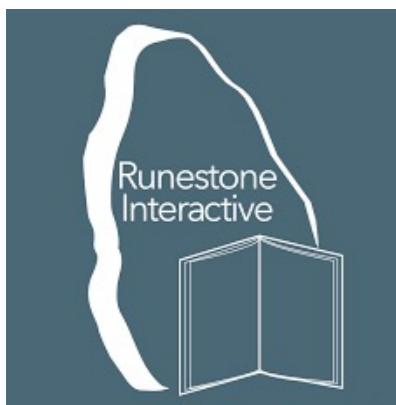


Automate the Boring Stuff

- Al Sweigart
- Useful for some more advanced topics related to using data

Python for Everyone – Interactive

- Barb Ericson
- Allows you to practice coding as you learn



Course Notes

- 220 / 319 instructors
- Mostly for data science part of class

Today's Topics

Introductions

Course overview

- Topics
- Lecture
- Lab
- Readings
- **Class communication**
- Grades
- Projects
- Exams & quizzes

Website

Communication in CS 220

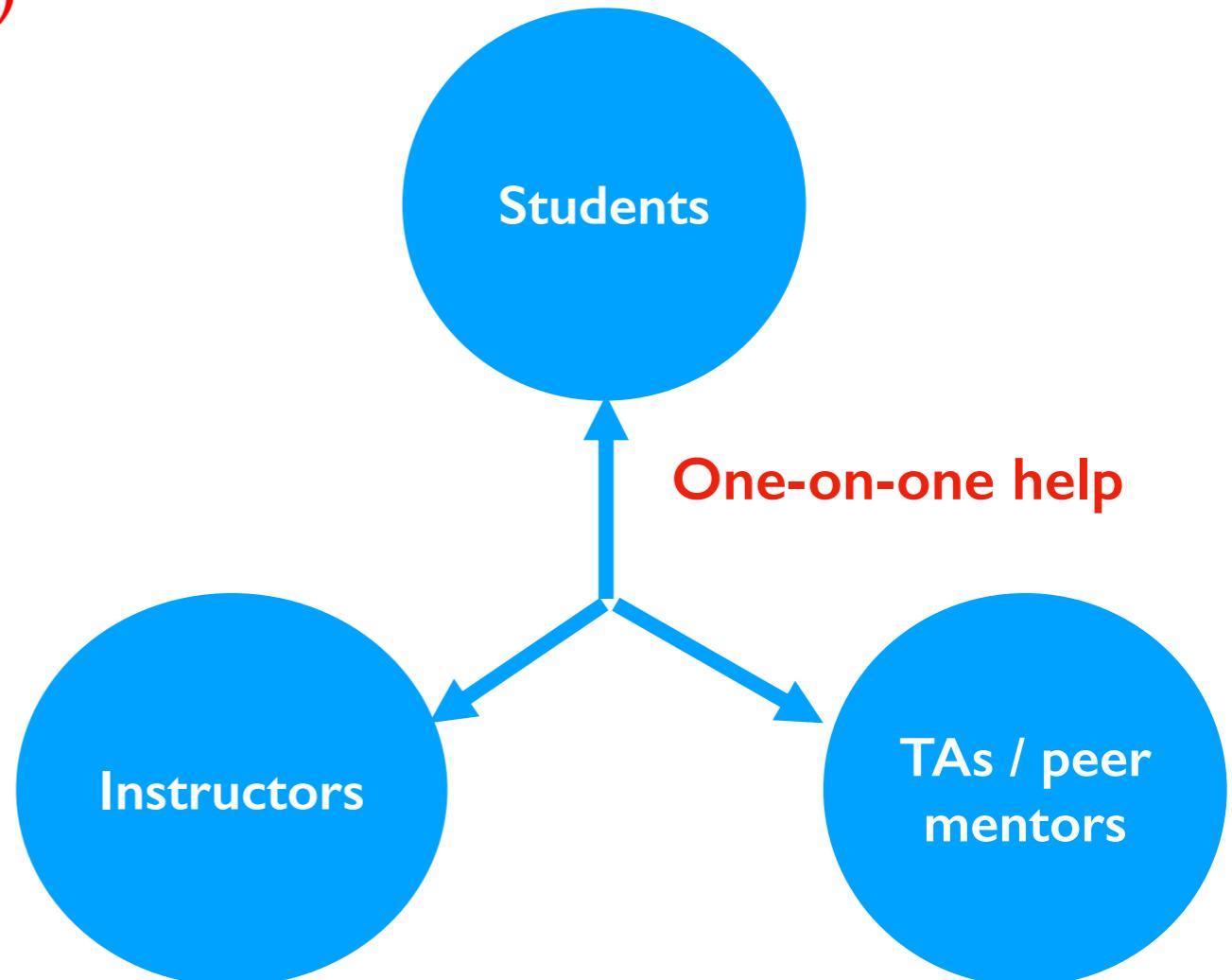
Good communication is critical for a class of this size

- Who needs to communicate? students, TAs + mentors, instructors

Communication tools

- Office hours (best way to get help)
- Piazza
- Email (least-preferred)
- Class Forms
- Project Submission
- Canvas

See: [TA / PM Office Hours Piazza post](#) and
[Instructor Office Hours Piazza post](#)



Communication in CS 220

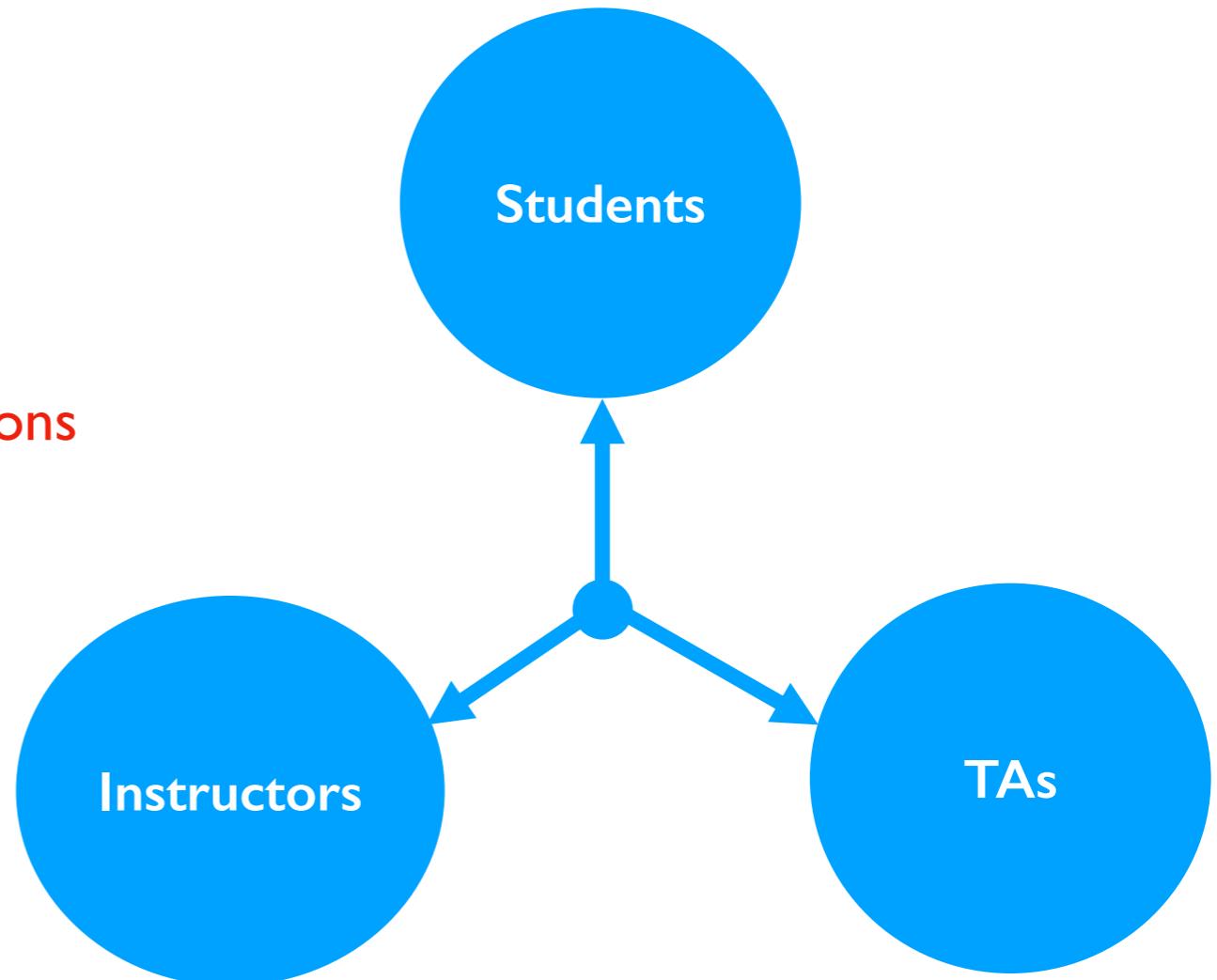
Communication tools

- Office hours (best way to get help)
- **Piazza**
- Email (least-preferred)
- Class Forms
- Project Submission
- Canvas

Rule 1: don't post more than 5 lines of code

Rule 2: check other posts and project corrections
to avoid repeat questions

Note: we'll keep a pinned post of current
office hours here



Communication in CS 220

Communication tools

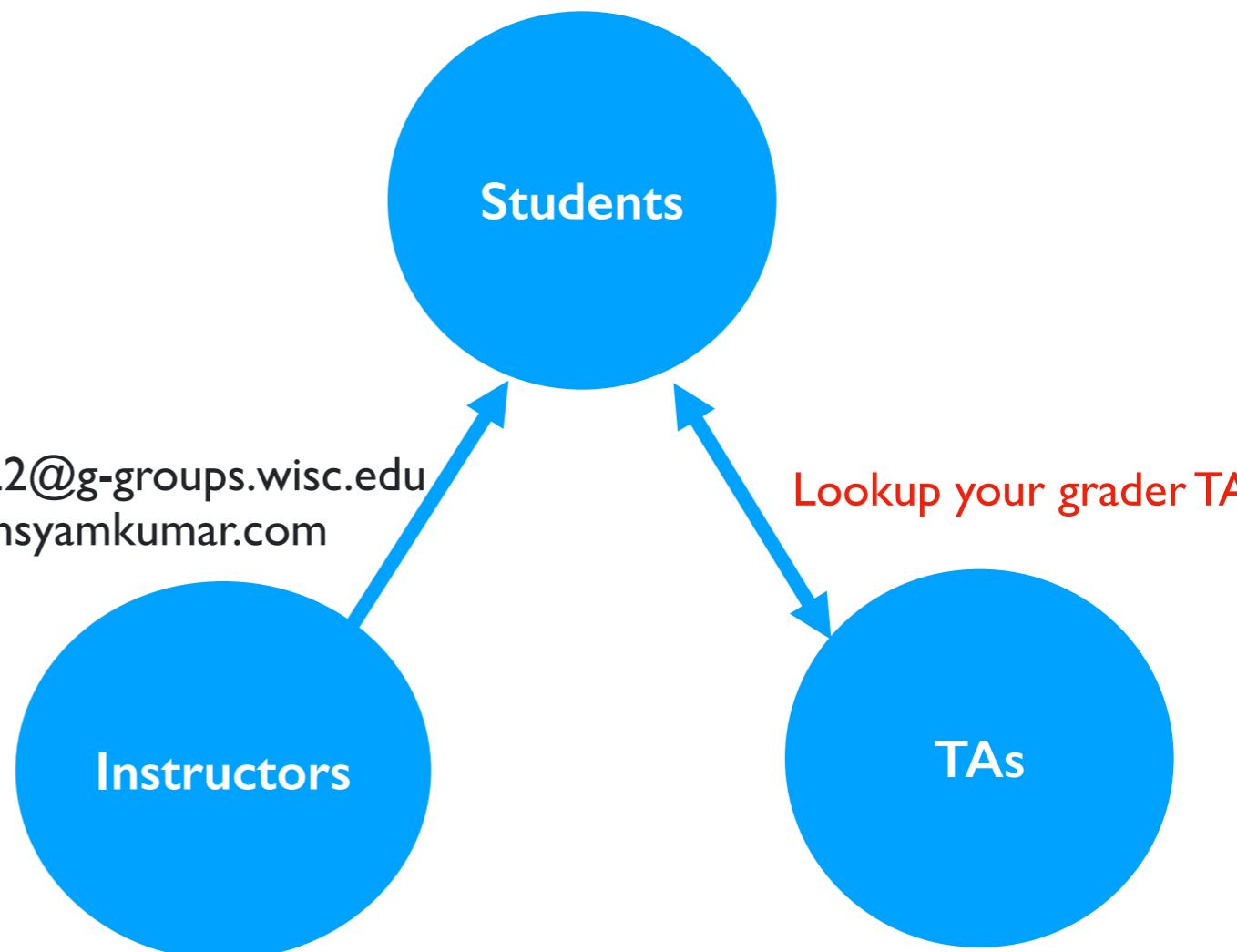
- Office hours (best way to get help)
- Piazza
- Email (least-preferred)
- Class Forms
- Project Submission
- Canvas

You might be redirected to Office Hours for certain email requests

compsci220-<SEC>-s22@g-groups.wisc.edu
no-reply@msyamkumar.com

For grading questions: please email your grader TA

must copy instructor after you don't get a response within 48 hours.

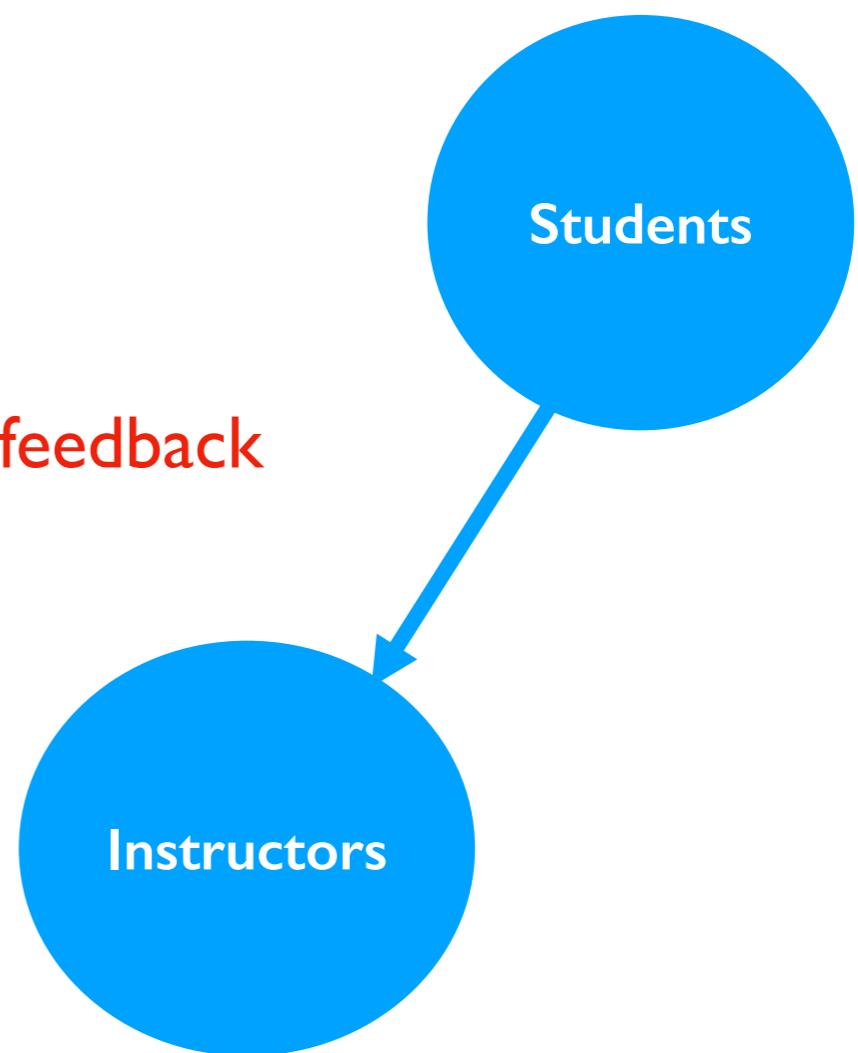


Communication in CS 220

Communication tools

- Office hours (best way to get help)
- Piazza
- Email (least-preferred)
- **Class Forms**
- Project Submission
- Canvas

- Feedback form: anonymous or non-anonymous feedback
- Thank you form
- Exam conflict form
- Grading issues form
- Lab switch request form

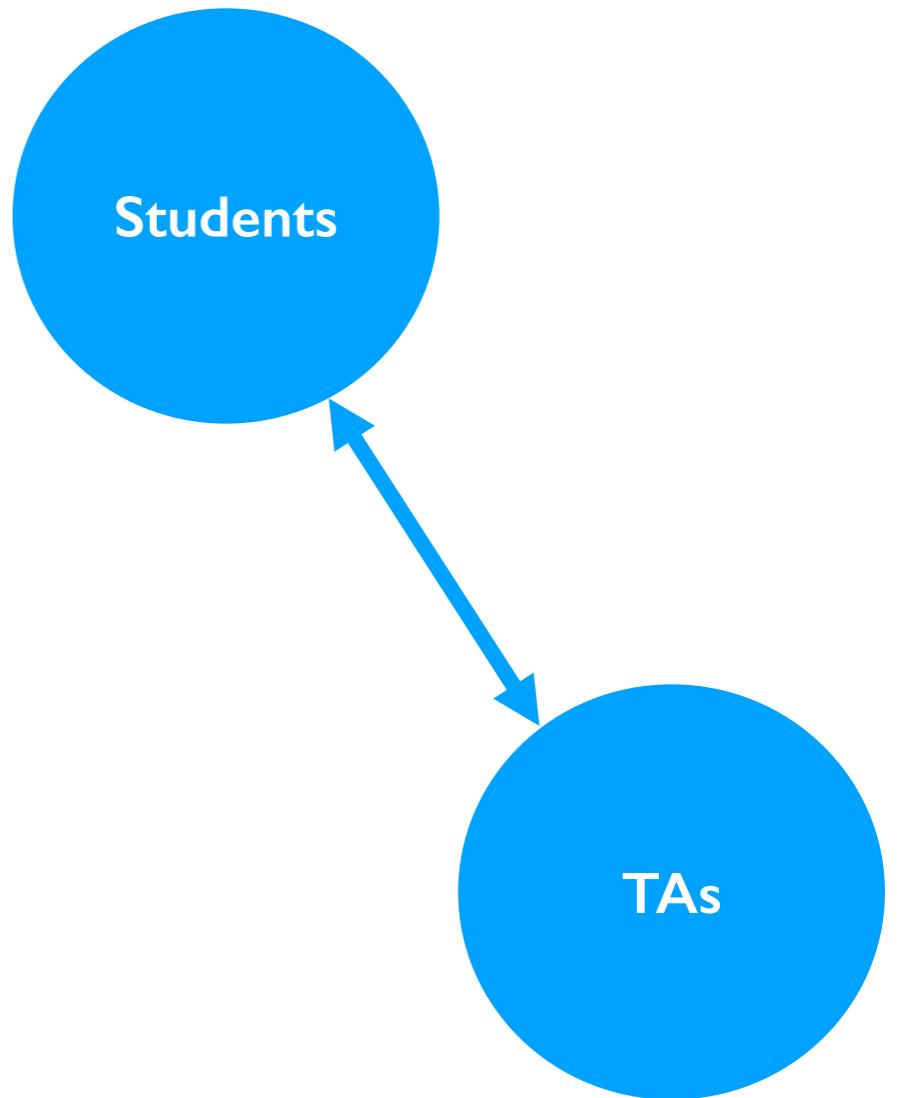


Communication in CS 220

Communication tools

- Office hours (best way to get help)
- Piazza
- Email (least-preferred)
- Class Forms
- **Project Submission**
- Canvas

The screenshot shows a user interface for project submission. At the top, there is a navigation bar with links for "Syllabus", "Projects" (which is highlighted with a red oval), and "Class Forms". Below the navigation bar, there is a "Comment" section containing the text "Good work". Underneath the comment section are three buttons: "OK", a thumbs-down icon, and a thumbs-up icon. At the bottom of the interface, there is a file upload field labeled "Choose File" with the placeholder text "No file chosen". Below the file upload field, a question is displayed: "is any specific kind of feedback you're interested in?".

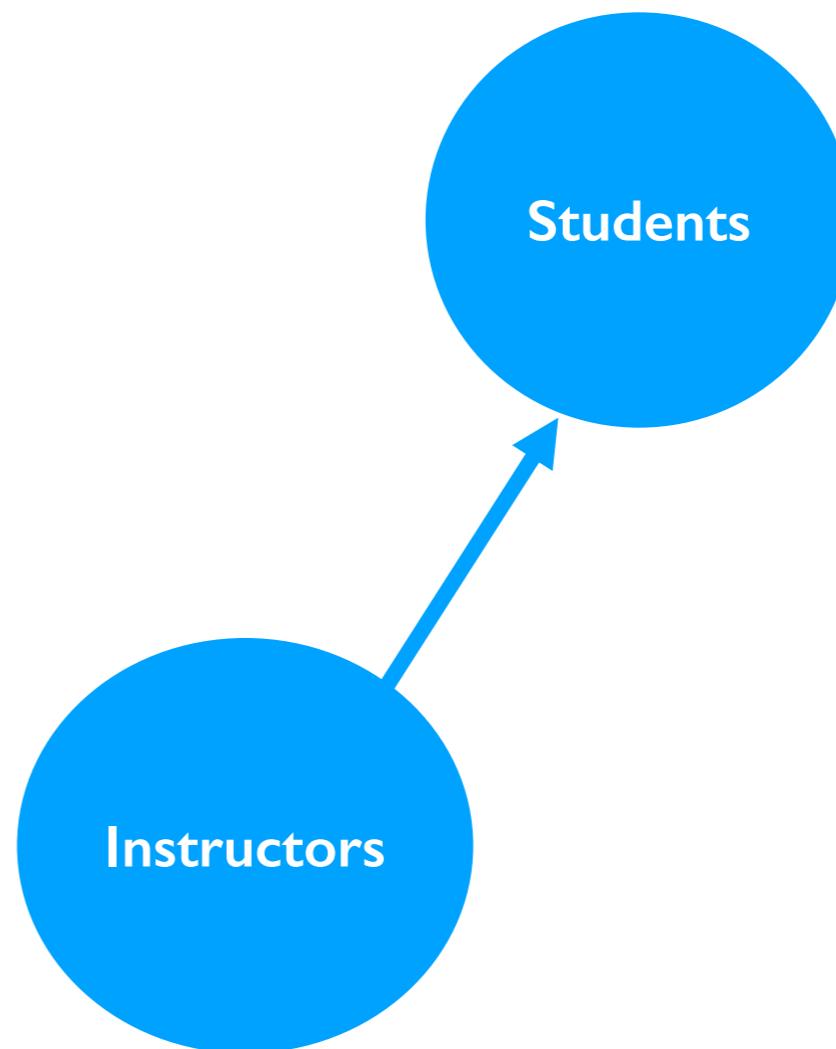


Communication in CS 220

Communication tools

- Office hours ()
- Piazza
- Email (least-preferred)
- Class Forms
- Project Submission
- **Canvas**

Quizzes, grades



Today's Topics

Introductions

Course overview

- Topics
- Lecture
- Lab
- Readings
- Class communication
- **Grades**
- Projects
- Exams & quizzes

Website

Grades - CS220

49% - programming projects

- **13 projects**, evenly weighted except for p1
- learning to program is the most import part of the course

16% - quizzes

- 10 quizzes (drop 2 lowest scores)

4% - labs

- 13 labs (drop 3 lowest scores)

30% - exams

- 10% midterm 1
- 10% midterm 2
- 10% final

1% - communication

- filling surveys, Piazza sign up, other

Grades – CS319

33% - programming projects

- **9 CS220 projects**, evenly weighted except for p1
- learning to program is the most import part of the course

16% - quizzes

- 10 quizzes (drop 2 lowest scores)

20% - graduate-level project

- Self-guided

30% - exams

- 10% midterm 1
- 10% midterm 2
- 10% final

1% - communication

- filling surveys, Piazza sign up, other

Letter Grades

- Your final grade is based on sum of all points earned.
- Your grade does not depend on other students' grade.
- We will NOT be rounding off scores at the end of the semester
- No extra credit

Grade cut-offs

- 93% - 100%: **A**
- 88% - 92.99%: **AB**
- 80% - 87.99%: **B**
- 75% - 79.99%: **BC**
- 70% - 79.99%: **C**
- 60% - 69.99% **D**

Today's Topics

Introductions

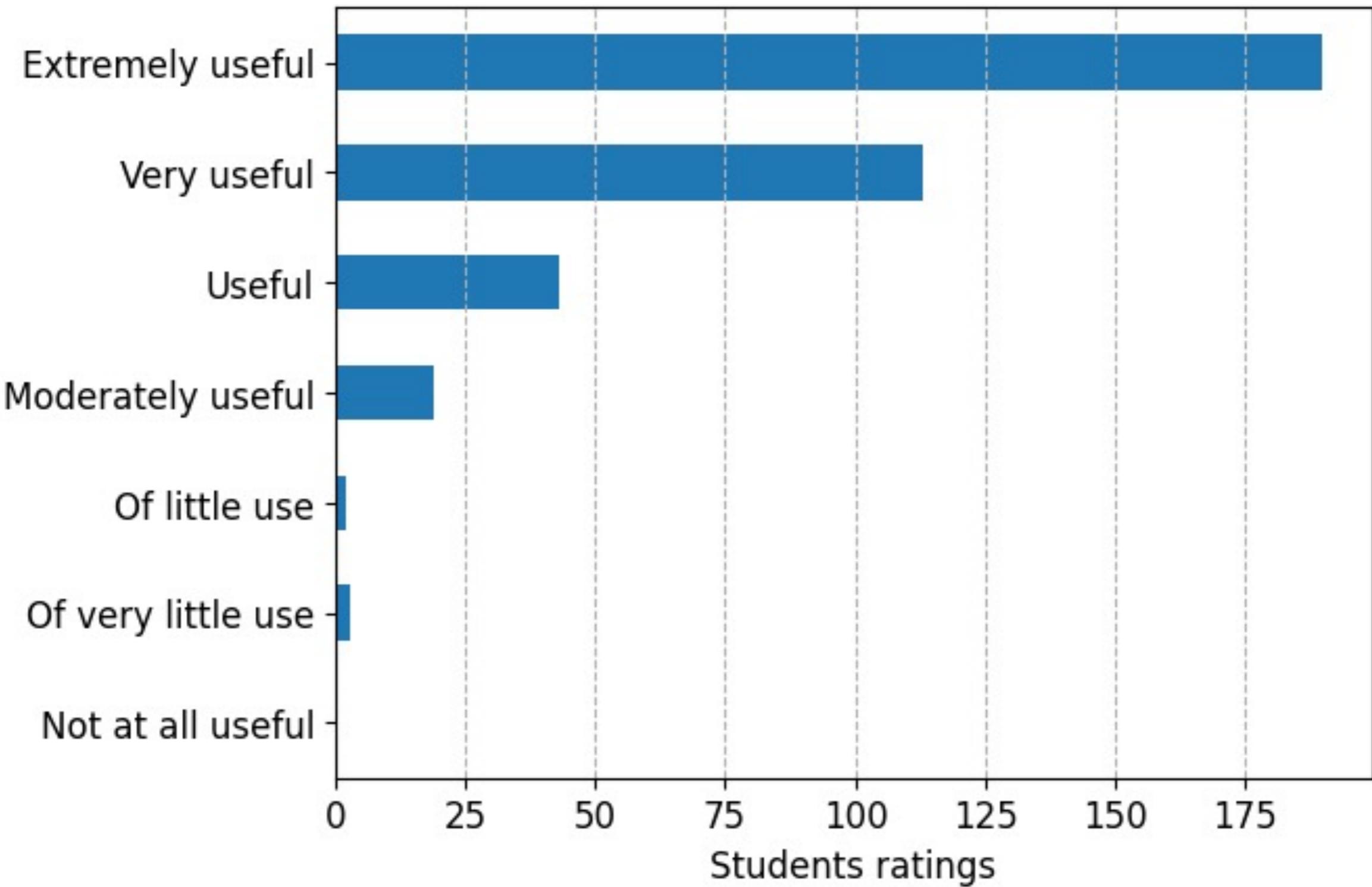
Course overview

- Topics
- Lecture
- Lab
- Readings
- Class communication
- Grades
- Projects
- Exams & quizzes

Website

Prior student reaction to projects

Projects: How useful were projects to your learning?



Project Overview

Nearly all projects will relate to some dataset

Timeline

- Projects will be due on **Wednesdays at 11:59pm**
- You get a bank of 12 late days, but can use only 3 on one project
- After late days, 5% deduction per day late

Getting help

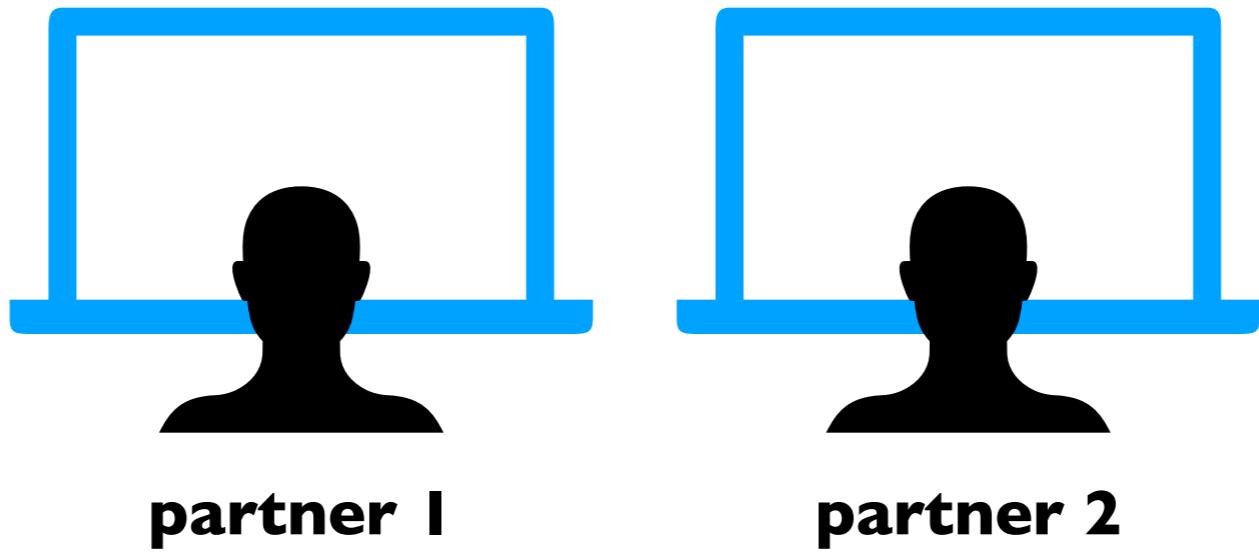
- TA office hours
- Piazza
- Lab sessions
- Instructor office hours

Pair Programming

You can optionally work in pairs of two

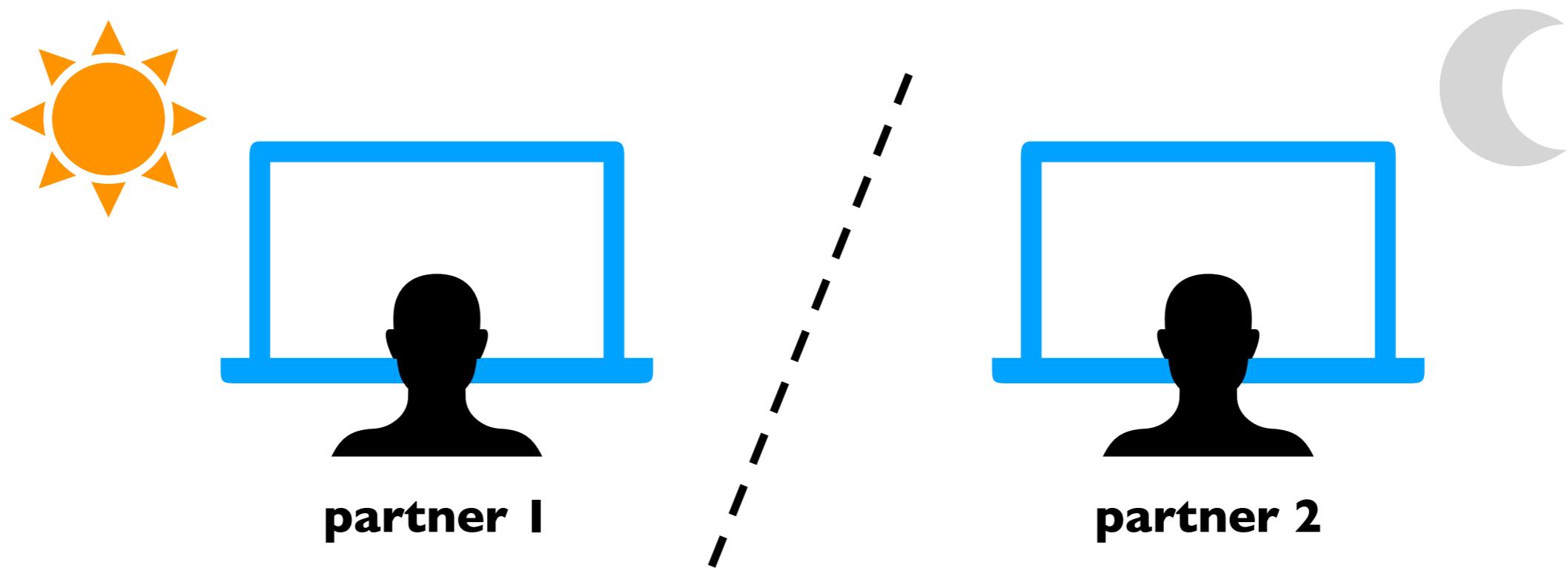
- CS220 students can partner with any CS220 students, in any section
- CS319 students can partner with any CS319 students
- You can choose to keep the same partner, for multiple projects or choose to switch partners

Pair Programming



Best practice: working alongside each other

Pair Programming

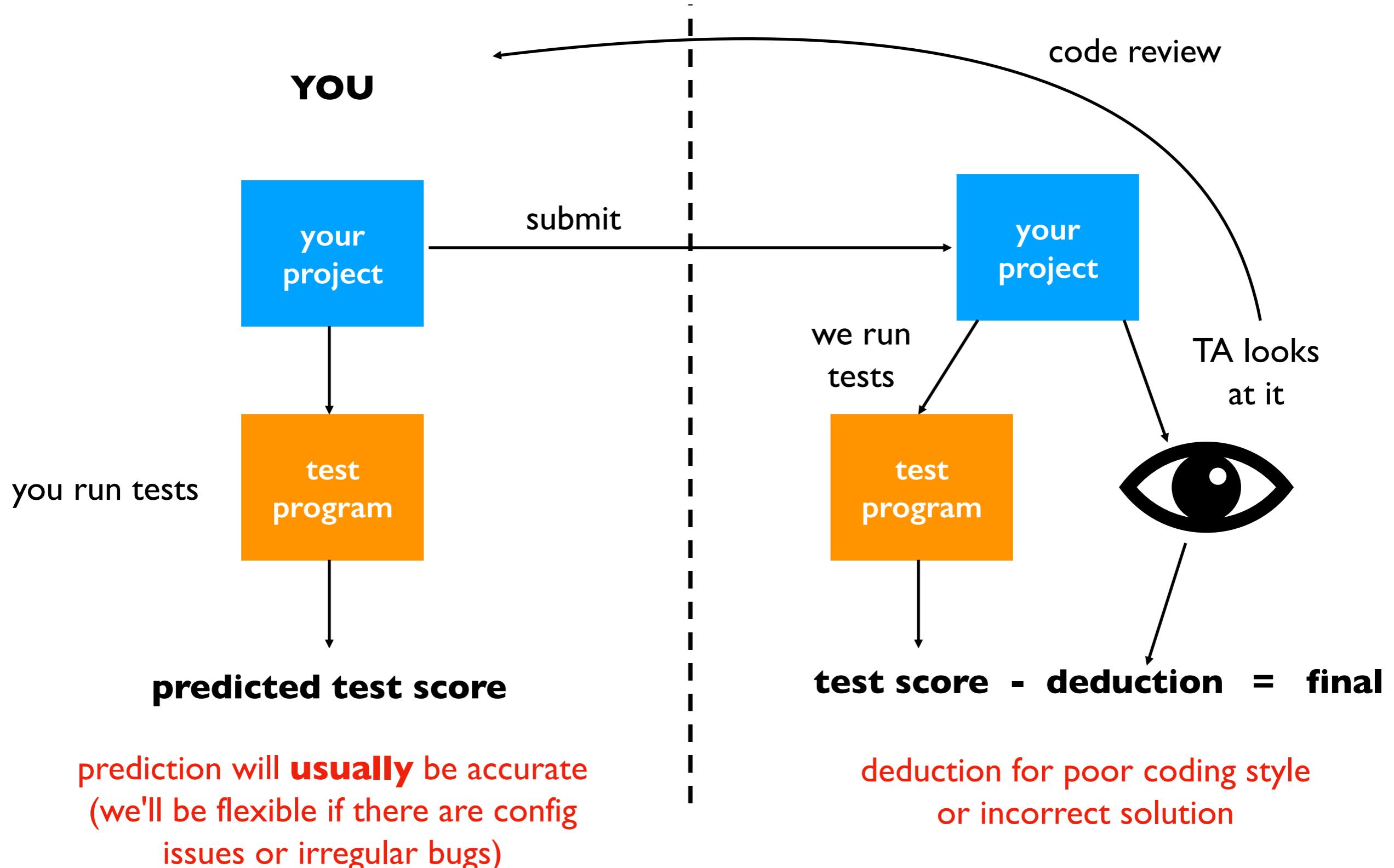


Breaks syllabus rules: working on different parts at different times

Breaks syllabus rules: working on alternate projects individually

Project Grading

feedback is mostly about how to do things better or more simply (valuable even if you score 100%)



Today's Topics

Introductions

Course overview

- Topics
- Lecture
- Lab
- Readings
- Class communication
- Grades
- Projects
- Exams & quizzes

Website

Quizzes and Exams

Quizzes

- Will be due most weeks, on **Fri, at 11:59pm**
- Focus on recent lectures so you stay current and check your knowledge

Exams: two midterms and one final

- Multiple choice
- 2 hours
- Given in a large lecture hall

projects → writing and testing code with a computer

quizzes → reading and interpreting code with a computer

exams → reading and interpreting code **without** a computer

Today's Topics

Introductions

Course overview

Website

Course Website

<https://www.msyamkumar.com/cs220/s22/schedule.html>

Walk through...

Next steps...

- take the "Student Information Survey" survey:
<https://www.msyamkumar.com/cs220/s22/surveys.html>
- read syllabus carefully:
<https://www.msyamkumar.com/cs220/s22/syllabus.html>
- setup Python on your computer and do Lab-PI:
<https://github.com/msyamkumar/cs220-s22-projects/tree/main/lab-pi>
- start PI (Project I), due next Wed:
<https://github.com/msyamkumar/cs220-s22-projects/tree/main/pi>