

# Welcome!

COMS W3136

Essential Data Structures in C/C++

Fall 2023

# Teaching staff

- 2 Teaching Assistants (TAs)
  - Jacklyn Tsai
    - [ct3064@columbia.edu](mailto:ct3064@columbia.edu)
  - TBD

# Teaching staff

- TA email & office hours
  - Email to [cucs3136-tas@googlegroups.com](mailto:cucs3136-tas@googlegroups.com) goes to all teaching staff
  - TA room – 1st floor, Mudd building
  - TA calendar: <http://bit.ly/3136-cal> (will be filled by this weekend)
- Instructor email & office hours
  - Tim Paine [paine@cs.columbia.edu](mailto:paine@cs.columbia.edu)
  - Office Hours - TBD

# Prerequisites and course objective

- Prerequisites
  - One semester of introductory programming course
    - Ex) 1006 (Python), 1004 (Java), or equivalent
    - High school CS class you took 3 years ago does NOT count
  - No prior knowledge of C/C++ or UNIX is assumed
- Course objective
  - Meet the increasing demand for solid programming skills in many non-CS disciplines including EE & IEOR
  - Provide the minimum prerequisite for non-majors who are interested in taking upper-level CS courses

# Course summary

- Follow-on course for ENGI E1006
  - Intended for non-CS majors
  - Bridges E1006 and many upper-level CS courses
  - Interleaves C/C++ language and data structure topics
  - Introduces professional UNIX programming tools
- Fusion of 3157 and 3134
  - 3157-lite: C & C++, but no heavy systems stuff
  - 3134-extract: only the most important data structures
  - Kill two birds with one 4-credit stone!
  - Perfect for EE & IEOR folks who came to 3157 to learn C/C++ but found it a bit too much

# Review session

- Logistics
  - One topic / week, multiple sessions by different TAs
  - When:
    - Evenings – hours TBA
  - Where:
    - CLIC lab: <http://www.cs.columbia.edu/clic/directions.html>
  - Attendance optional, but recommended
- Topics
  - UNIX basics, editors, Git, etc. (in the beginning)
  - Lecture reviews
  - Lab assignment clarifications & reviews
  - Lab solutions walk-through
  - Exam preps

# Participate in class, please!

- Classes are no fun (for me, at least) if we don't interact
  - Answer questions I pose
  - Ask questions anytime
  - Embarrass me when I'm wrong
- People are afraid to ask when they think:
  - “I'm the only one who doesn't know this.”
  - “I can't frame this question clearly and eloquently.”
  - “Maybe he just said it when I dozed off just now...”
- Big class, so I may not entertain all questions, but:

NEVER BE AFRAID TO ASK ANYTHING, IN THIS CLASS AND IN LIFE!

# Course structure and focus

- Start with C and move toward C++, interleaving data structures throughout
- Focus on programming with data structures, not mathematical analysis
- “Job postings just say C++. Why waste time with C?”



# Grading

- Grading logistics may change later
- You get overall score out of 100, comprised of:
  - HW assignments – 33%
  - Midterm exam – 33%
  - Final exam – 33%
- I look at everyone's HW & exam scores in a big spreadsheet sorted by the overall score
- I decide cutoffs for letter grades A+, ..., D, F
  - No predetermined formula for cutoffs
- Booster: I reserve the right to raise one's overall score by a small amount (typically less than 0.5%)

# Booster

- Grade boost based on subjective evaluation
  - Most people will not get it
  - Have been used to boost some borderline cases
  - Can be up to 5% in theory, but never been  $> 1\%$
- Based on:
  - Class participation
  - Mailing list participation
  - Beautiful code
  - Awesome documentation
  - Optional work (if any)

# HW (aka lab)

- Probably 6 HW assignments
  - Mostly programming assignments
  - Some of them may have written parts
- Deadline
  - Soft deadline, and then hard deadline 2 days later
    - You use 1 late day if you submit within 24 hours after the soft deadline
    - You use 2 late days if you submit between 24 and 48 hours after the soft deadline
    - After 48 hours past the soft deadline, no submission will be accepted
  - You have 5 late days total; up to 2 can be used for a single hw
    - Check your late days by running: `/home/w3136/submit/check-late-days`
  - Absolutely no exception under any circumstances
  - After you receive grade, you have 2 weeks to send re-grade request

# Lab grading

- Grading model
  - You are a software company
  - I hire you to develop a product according to spec
  - You ship the finished & polished product on time
  - TAs are the end users who will pay you with grade
- What this means:
  - Your software doesn't work, they don't pay
  - Your software didn't follow spec, they don't pay
  - Your software didn't ship on time, they don't pay
  - But you worked so hard... they sympathize, but they don't pay
- For example:
  - Your software doesn't compile – you get ZERO
  - Deductions for not following spec EXACTLY
    - Ex) Spec asked for README.txt file, not README, not README.md, not Readme.txt

# Cheating. Please don't.

- **REQUIRED READING:**

- <http://www.cs.columbia.edu/~paine/3136/honesty.html>

- You are cheating if you:

- Take code from friends, or search for code on the Internet
  - Look at solutions that your friend has from previous semester
  - Upload any class materials (including your own code) to public repository (ex. GitHub) during or after this semester

- We can tell

- We compare you submissions to **CURRENT AND PREVIOUS** submissions
  - You submit work history – **minimum 5 commits required**

- Result of cheating

- Case 1: You get caught
    - Academic penalty – 1 letter grade down for mild cases; F for severe ones
    - Referral to the Office of Judicial Affairs
    - **I will make sure you are expelled. Your cheating devalues MY degrees.**
    - Spring 2016: 50+ cases of suspected cheating (still pending); 36 convicted cases
  - Case 2: You get away with it
    - You will keep cheating for the rest of your life – have a nice life.

# Class ListServ

- Communication between all of us
  - Official announcements, lecture notes, lab assignments
  - Should be the 1st place to go for non-personal questions
- Do:
  - Ask & answer questions
  - Provide helpful tips and fun links for your classmates
  - Be considerate & friendly
- Don't:
  - Ask questions without first trying to solve it on your own
  - Post code or critical info that leads directly to solution
  - Be impatient & rude
- TAs and I respond to emails in this order:
  1. All pending questions on the listserv first
  2. All pending questions sent to [cucs3136-tas@googlegroups.com](mailto:cucs3136-tas@googlegroups.com)
  3. Then individual emails
  4. NEVER send a same question separately to multiple people
    - You will get banned from ever sending an email if you get caught doing this.

# Manage ListServ emails

- Learn to manage high volume – filter by tags in subject
  - [Cs3136] – all emails from the class listserv will have this tag
  - [ANN] – important announcements from me or TAs
  - [HW $n$ ] – information relevant on a particular hw
  - Examples:
    - [Cs3136][ANN] Sample midterm exam
    - [Cs3136][ANN][HW3] Correction on lab3 instruction
    - [Cs3136][HW4] in case you're curious about the optional part
- Setup Gmail filters
- Keep up diligently
- Yes, I know about Piazza. Thanks for your suggestion.

# “Required” textbooks

- *Foundations of Computer Science: C Edition*
  - By Alfred V. Aho and Jeffrey D. Ullman
  - Out of print, but available for free
  - <http://infolab.stanford.edu/~ullman/focs.html>
- 1. *The C Programming Language* (2<sup>nd</sup> ed.) – aka K&R C
  - By Kernighan and Ritchie
  - Simply the best
- 2. *A Tour of C++*
  - By Bjarne Stroustrup

Last semester, only 4% bought them at the local bookstore  
So get them wherever you usually get your textbooks



# Recommended references

- Other data structures textbooks
  - *Data Structures and Algorithm Analysis in C++*
    - Mark A. Weiss
    - 4<sup>th</sup> ed. Is the latest, but any edition will do
    - Older editions based on C might be even better if you can find it
  - *Algorithms (4th Edition)*
    - Robert Sedgwick and Kevin Wayne
    - Best introductory DS & Algorithms book I have seen, but in Java

# HW0 (may or may not be graded)

- **Part A (50 points): due noon Thursday**

1. Subscribe to 3136 ListServ today

- <https://lists.cs.columbia.edu/mailman/listinfo/cs3136>
- In the textbox “Your name (optional)” put **Your Full Name (UNI)**
  - For example: Tim Paine (tkp2108)
- **You must reply to the confirm email (which might be in your spam folder)**
- Then receive “Welcome to the “Cs3136” mailing list”
  - This email contains your password for accessing archives of past postings

2. Get the textbooks

- Start reading K&R chapters 1,2,3,4

# HW0 continued

- **Part B (50 points): due Friday 11:59pm**
  1. Read the following two documents:
    - <http://www.cs.columbia.edu/education/honesty>
    - <http://www.cs.columbia.edu/~paine/3136/honesty.html>
  2. Send me an email containing:
    - Subject: “[3136] hw0-UNI”
      - Without the quotes, sole space before hw0, UNI replaced with your actual UNI in lowercase
    - Your name, major & school program, year
      - Ex) Tim Paine, Computer Science, Columbia College, class of 2014
    - Your pledge
      - see honesty.html above
    - CS classes taken and/or other programming background
    - Optionally anything else you want to let me know