Welcome to AP!

COMS 3157
Advanced Programming
Spring 2022

http://www.cs.columbia.edu/~jae/3157/?asof=20220117
Teaching staff

• 20+ Teaching Assistants (TAs), all former AP students
  – Full list with photos will be posted on CourseWorks
  – Emails to cucs3157-tas@googlegroups.com go to all teaching staff

• Instructor: Jae Woo Lee
  – Email: jae@cs.columbia.edu
  – Office: 715 CEPSR
    • Mixture of zoom, indoor, outdoor OHs
Who am I?

- Jae Woo Lee
  - Senior Lecturer in Computer Science
    - Teaching first, research second
    - Just call me Jae (pronounced ‘Jay’)
      - Note that this is NOT a general rule – address instructors as Professors unless told otherwise

- My background
  - Undergrad in Columbia College
  - Many years of professional experience
    - Designing and coding large-scale software systems
    - Running a start-up company
  - Came back to Columbia for Ph.D.
This course

• Introduction to systems programming
• Course objective
  – Right now, you are a programming student
  – After this course, you will become a programmer
• How?
  – Go beyond Java & IDE: learn C & command line tools
  – Learn advanced techniques & design principles
• *Follow the River and You Will Find the C*
  – Paper published in SIGCSE 2011 (link on my home page)
  – Great overview of this course: what, how, and why
  – Read it now, and again after the course
But then, it’s just another class

• Focuses on systems programming
  – Precision and attention to detail
  – Systematic approach to problem solving

• And that’s one narrow aspect of CS
  – Not a gauge for general CS potential
  – Not even a gauge for general programming ability

• Please don’t get stressed out about AP
Set your expectations

• AP may not be your cup of tea, and that’s ok
  – Systems programming may not be your thing
  – You may have other priorities
• It also means that you may not do well even if you try
  – This stuff is not easy, even for those who like it
• 12 hours/week is the NOMINAL workload for 4-credit course
  – Could be a bit lighter, or could be a lot heavier
• Think of this course as a 13-week workout regimen
  – Your IMPROVEMENT will be what you put in
What you can expect from me

• Honesty
  – You get straight, no-BS answers to the best of my ability
  – Cons: People say I am very blunt

• Transparency
  – You will know everything – how hw & exams are graded, why I do certain things in class, etc., etc.
  – Please ask anything. I’ll either answer it, or tell you why I cannot.
  – Cons: None I can think of – at least to students

• Fairness
  – Fairness plays a big role in how I run my class
    • Ex) hard grading rubric, no extensions, no tolerance on cheating
  – Cons: Students are often denied exceptions for the sake of fairness to the whole class
What past students wrote

• Past evaluations of all my classes are posted here:

• Reviews on CULPA, etc.

TLDR:
• Some people love the course, others hate it; some people think I am great, others think I am horrible
• Focus on your own learning
Lectures

• In-person lectures
  – May switch to online as needed (like these first two weeks)
  – Auditors are welcome to lectures & listserv, but no Linux account, no lab/exam submissions, no TA access

• Sometimes video lecture/tutorial you need to watch before class

• TA review sessions (in-person or online) will be scheduled as needed
  – Exam preps for example
Exam dates

• Synchronous & in-person exams for all sections
  – Thursday, Feb 24, 4:10pm: Midterm exam #1
  – Thursday, Apr 14, 4:10pm: Midterm exam #2
  – Tuesday, May 10, 4:20pm: Final exam
• May switch to online format if necessary
• All students in all sections MUST take the exams at those times. There are no make-up or alternate exams.
  – If you cannot make any of those exams, please take the course next semester.
• If you receive extended time accommodation, you cannot have a class after this class
Prerequisites

• Absolutely required
  – 2 or 3 semesters of Columbia-level programming courses
    • Ex) 1006-1004-3134

• Pretty much required
  – 3134 Data Structures
    • For general CS & programming maturity
    • Ex) I’ll assume you know all about recursion
    • Taking 3134 and 3157 together is not recommended unless you have a very light load

• No C knowledge assumed

• No Java knowledge assumed
Topics covered

• **C**
  – Mastery of the C language is the most important part
  – Everything else depends on it!

• Intro to UNIX systems programming
  – I/O, Process control, TCP/IP networking
  – Sockets API and HTTP protocol
  – Final assignment: write your own web server from scratch!
Why C?

• It’s cool
  – There are two kinds of programmers: those who know C and those who don’t
    • Corollary: There are two kinds of Java programmers: those who know C and those who don’t
  – Your kung fu will be better than theirs

• It’s fundamental
  – Understand how other languages work
  – Understand how computers work

• It’s useful
  – C is still useful for some things
  – Knowing C, you can learn C++ the right way
Grading

• GRADING POLICY MAY CHANGE LATER
• You get an overall score out of 100, comprised of:
  – Lab assignments (35%)
  – Midterm exam 1 & 2 (20% each)
  – Final exam (25%)
• I look at everyone’s lab & exam scores in a big spreadsheet sorted by the overall score
• I decide cutoffs for letter grades A+, ..., D, F
  – No predetermined formula
  – Usually mean/median are around B/B+
  – No one will get F as long as they keep trying until the end
• I reserve the right to raise one’s overall score by a small amount, based on things like:
  – Class & mailing list participation
  – Beautiful code & documentation
7 assignments (aka labs)

• Lab grading
  – Your lowest lab score will be converted to zero
    • Lab score = (SUM(your lab 1-7 & HW0) - MIN(your lab 1-7)) / 820 * 100
    • 100 for lab 1-5, 120 for lab 6, 150 for lab 7 (and 50 for HW0)
    • Maximum possible lab score is 720/820*100 = 87.8, not 100
    • May skip grading some labs, in which case formula will change

• 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 48 hours past the soft deadline, no submission will be accepted
  – You have 7 late days total; up to 2 can be used for a single lab
    • Check late days: /home/w3157/submit/check-late-days
    • Late days are for unforeseen circumstances such as sickness
    • Please do not ask for additional extensions
  – Absolutely no exception under any circumstances
How to do well in AP

1. First and foremost, WORK
   – 4 credit course → 12 hour/week NOMINAL workload
   – That is 2 hours of AP, 6 days a week, starting NOW
   – Your mileage may vary, but consider that a bare minimum

2. Do the labs. I mean, really do the labs.
   – Don’t just “get it working” – understand every detail
   – Don’t code by trial & error – understand your errors
   – Don’t let TAs fix your problems – it’s all about the process
   – Private tutors are not recommended

3. Learn to read code on paper
   – Read & understand every line of solution & exam code
   – Then try coding them yourself without looking

4. Attend lectures and pay attention
Please don’t cheat

• **REQUIRED READING:**
  https://www.cs.columbia.edu/~jae/honesty.html

• You are cheating if you:
  – Take code from friends, or search for code on the Internet
  – Look at solutions 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 your submissions to CURRENT AND PREVIOUS submissions
  – You submit work history – **minimum 5 commits required**
  – As a beginner, once you peek at cheat code, you won’t be able to come up with any other way to do the same thing
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

• Please use class listserv rather than the TA mailing list
  – The class is huge; please help us not duplicate work
  – General questions to the TAs may be redirected to class listserv with your ID removed
  – Never send a same question individually to multiple TAs

• There will be an ongoing anonymous feedback form
Manage ListServ emails

• Manage high volume – filter by tags in subject
  – [cs3157] – all emails from class listserv will have this tag
  – [ANN] – important announcements from me or TAs
  – [LABn] – information relevant on a particular lab
  – Examples:
    • [cs3157][ANN] Sample midterm
    • [cs3157][ANN][LAB7] Correction on lab7 instruction
    • [cs3157][LAB6] in case you’re curious about fopen()

• Setup Gmail filters
  – I will send an example soon

• Please keep up
  – At a minimum, you must read every single ANN
Textbooks

• Required
  *The C Programming Language* (2\textsuperscript{nd} ed.) – aka K&R C
  • By Kernighan and Ritchie
  • Simply the best
    – Survey in Spring 2016: only 4% bought them at the local bookstore
    – So get them wherever you usually get your textbooks

• Recommended for self-studying beyond this class
  – *Advanced Programming in the UNIX Environment* (3\textsuperscript{nd} ed.)
    • By Stevens & Rago
HW0: 50 points total

• Part A (20 points): due Tuesday 1/18, 11:59pm (tonight)
  1. Subscribe to 3157 ListServ today
     • In the textbox “Your name (optional)” put Your Full Name (UNI)
       – For example: Jae Woo Lee (jwl3)
     • You must reply to the confirm email (which might be in your spam folder)
     • Then receive “Welcome to the "Cs3157" mailing list”
       – This email contains your password for accessing archives of past postings
     • All emails to listserv, TAs, or me MUST include your UNI
       – Sign it with UNI if you don’t use UNI@columbia.edu
       – Or just use UNI@Columbia.edu instead of first.last or whatever... (please)
  2. Get the textbooks
     • Start reading K&R chapters 1,2,3,4
HW0 continued

- **Part B (30 points): due Thursday 1/20, 11:59pm**
  1. Read the following two documents:
  2. Send me an email containing:
     - Subject: “[3157] hw0-UNI”
       - Without the quotes, sole space before hw0, UNI replaced with your actual UNI in lowercase
     - Your name, major & school program, year
       - Ex) Jae Woo Lee, Physics, Columbia College, class of 1994
     - Your pledge
       - see honesty.html above
     - CS classes taken and/or other programming background
     - Optionally anything else you want to let me know
     - Optionally attach a picture of you, but please reduce image file size to about 100KB