Welcome!

COMS W3157
Advanced Programming
Spring 2015
Teaching staff

• Instructor
  – Jae Woo Lee (jae@cs.columbia.edu) – 715 CEPSR
  – Office hours
    • Jae’s calendar: http://bit.ly/jae-cal (will be filled by Friday)
    • First week only: this Friday, 3-4pm, or grab me after class

• Teaching Assistants
  – 10 TAs, all former 3157 students
    • Chris Mulligan clm2186@columbia.edu - Head TA
    • Kaitlin Huben kjh2141@columbia.edu - Head TA
    • Samir Mathrani sm3619@columbia.edu
    • Brian Trippe blt2114@columbia.edu
    • Alexandra Medway afm2134@columbia.edu
    • Emilia Pakulski enp2111@columbia.edu
    • Adrien Brochard ab3593@columbia.edu
    • Edo Nisim Roth enr2116@columbia.edu
    • Akira K Baruah akb2158@columbia.edu
    • Michael Ben-Ami mzb2106@columbia.edu
  – Office hours TBA
    • TA room – see http://ta.cs.columbia.edu for map
Who am I?

• Jae Woo Lee
  – Lecturer in Computer Science
    • Teaching first, research second
  – Just call me Jae (pronounced ‘Jay’)

• 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

According to BWOG:

One of “The Best Classes Ever”
One of “Classes To Take Before You Die I Mean Graduate”

• Introduction to systems programming
  – Arguably the most important course in the CS curriculum
    • It’ll get you ...
• Follow the River and You Will Find the C
  – Paper published in SIGCSE 2011
  – Describes this course: what, how, and why
  – Great overview of what you are in for

(See http://www.cs.columbia.edu/~jae/ for links)
Recitation

• Logistics
  – 1 topic / week
  – Multiple sessions repeated by different TAs
  – Evening hours
  – Attendance officially required, but really up to you

• 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 is 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!
Prerequisites

• Required:
  – 2 or 3 semesters of programming
    • Ex) 1006-1004-3134; 1007-3137; etc.

• Recommended:
  – Familiarity with UNIX environment
    • If not, you need to learn it ASAP
  – Knowledge of Java
    • Only to draw comparisons with C/C++
  – Data structures course (3134 or 3137)
    • No dependency with 3157
    • But recommend taking it before 3157 for programming maturity
    • Taking it together with 3157 is not ideal – too much programming

• No C/C++ knowledge assumed
Course objective

• Simply put:
  – Right now, you are a programming student
  – After this course, you will become a *programmer*

• How?
  – Move beyond Java
    • Learn C/C++
    • Become proficient in UNIX programming tools
  – Move beyond toy programming
    • Learn advanced techniques used in real-world software
    • Learn design principles used in large-scale software
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 computers work

• It’s useful
  – Get ready for OS class
  – Build foundation to learn C++ and Objective-C
Topics covered

Course is divided into 3 parts:

1) C
   - Mastery of C language is the most important part
   - Everything else depends on it!

2) UNIX systems programming
   - Process control, signal, I/O, TCP/IP networking
   - Sockets API and HTTP protocol
     • Write your own web server from scratch!

3) C++
   - C++ language: we will not cover everything
   - Generic programming: templates and STL
COMS 3136 for non-CS majors

• COMS W3136 Essential Data Structures in C/C++
  – Please consider 3136 if you’re not a CS major
  – Offered in Fall semesters

• A 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!
  – Bridges E1006 and many 4000-level CS courses
  – Perfect for EE & IEOR folks who came to 3157 to learn C/C++ but found it a bit too much
Grading

• You get overall score out of 100, comprised of:
  – Lab assignments – 30%
  – Midterm exam #1 – 20%
  – Midterm exam #2 – 20%
  – Final exam – 30%

• I look at everyone’s every score in a big spreadsheet sorted by the overall score

• I decide cutoffs for letter grades A+, ..., D, F
  – No predetermined formula except:
    – Cutoff for A- will be on or below max(mean,median)

• 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
10 assignments (aka labs)

• Some labs may not be graded
  – A random subset of at least 7 out of 10 will be graded
    • Assume that a lab is graded unless I say otherwise after the deadline
  – Lowest score will be dropped (i.e. converted to zero)
    • In other words, everyone is forced to get zero on one lab
    • Note that labs have different weights (between 100 and 150), so you’d be
      at a disadvantage if you end up dropping a bigger one

• 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 7 late days total; up to 2 can be used for a single lab
    • Check your late days by running: /home/w3157/submit/check-late-days
  – Absolutely no exception under any circumstances
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
Exams

“This class is amazing. Jae is amazing. The TAs are amazing. There's not much bad to say about it other than... Oh. Right. The tests.”

- Anonymous, CULPA
How to do well on exams

Exams are closed-book, written, and based on labs and lectures.
So I suggest you should:

1. Do the labs. I mean, really do the labs.
   – Don’t let TAs fix your problems – you need that pain
   – Don’t just “get it working” – understand every detail
   – Don’t code by trial & error – understand your errors

2. Learn to read code on paper
   – Read & understand every line of solution code
   – Read & understand every line of sample exams
   – Read & understand code from the textbook
   – Then try coding them yourself without looking

3. Attend lectures and pay attention
No cheating!

• Don’t:
  – Take code from friends
  – Search for code on the Internet
  – Look at solutions that your friend has from previous semester

• We can tell
  – We know about the Internet too
  – We look at not only your end result, but also your work history
    • Your submitted patch MUST contain at least 5 commits with meaningful logs

• Columbia guidelines to academic honesty

• Result of cheating
  – Referral to academic committee & Dean’s office
  – You will probably not do well on exams
  – You are a loser

No cheating!
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
Learn to manage high volume – filter by tags in subject
- [cs3157] – all emails from the 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 fdopen()

Setup Gmail filters
Keep up diligently

Yes, I know about Piazza. Thanks for your suggestion.
Textbooks

• Required
     • By Kernighan and Ritchie
     • Simply the best
  2. *A Tour of C++*
     • By Bjarne Stroustrup
     – Available now at Book Culture – 112 st, between Broadway & Amsterdam:
       [http://www.bookculture.com](http://www.bookculture.com)

• Highly recommended reference for UNIX programming
  – *Advanced Programming in the UNIX Environment* (3rd ed.)
    • By Stevens & Rago

• Columbia has a free subscription to Safari Books
Homework 0 – due 11:59pm tonight

(1) Subscribe to 3157 ListServ today
   – In the textbox labeled “Your name (optional)”, put Your Full Name (UNI)
     • For example, Jae Woo Lee (jwl3)
   – You must reply to 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

(2) Send me an email to introduce yourself
   – 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, CS classes taken and/or other programming background
   – Optionally anything else you want to let me know

(3) Get a CS account (required for the course)
   – $50 per semester

(4) Get the textbooks
   – Start reading K&R Chapter 1,2,3,4