

Welcome!

COMS 4995 Topics in Computer Science

C++ for C Programmers

(aka c2cpp, c2cxx, or just c2)

Summer (A) 2023

Teaching staff

- Teaching Assistants (TAs)
 - Ivy Marre Basseches imb2139@columbia.edu
 - Phoebe Lu yl4651@columbia.edu
 - Tal Zussman tz2294@columbia.edu (Honorary TA)
 - Andrew Tsong-Bo Cheng atc2150@columbia.edu (Honorary TA)
- TA access
 - Photos will be posted on CourseWorks
 - Email to all teaching staff: cucs4995-tas@googlegroups.com
 - TA office hour calendar: <http://bit.ly/4995-cal>
- Instructor: Jae Woo Lee
 - Email: jae@cs.columbia.edu / Office: 715 CEPSR
 - Jae's office hour calendar: <http://bit.ly/jae-cal>
 - Home page: <http://www.cs.columbia.edu/~jae/>

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.
 - More info at <http://www.cs.columbia.edu/~jae/>

Lectures, Homework, and Exam

- All lectures will be recorded
 - Watch live, or later on CourseWorks / Video Library
- 4 or 5 homework assignments (60%)
- Final exam (40%)
 - **June 29th, 4:30pm** (Length TBD)
 - **There are no make-up or alternate exams**
 - Please do not take the course if you are not available at that time
- Grading policy may change later

Final Exam Logistics

- Final exam will be **in-person**
 - Traditional pencil & paper exam
 - Closed-everything
- Remote proctoring for CVN students and pre-arranged special cases
 - We send exam PDF a few min before exam
 - You go print exam and come back within a few min
 - You are in a zoom session with video, microphone, and speaker ON
 - Your zoom camera is placed at a distance so we can watch your entire surroundings
 - **You must have access to a printer**

Auditing

- Lectures & listserv are open to auditors
 - Anyone can attend lectures in-person
 - Videos on CourseWorks open to all UNIs
 - Anyone can subscribe to class listserv
- No HW & no TA access
 - Linux server accounts for hw skeleton code & submission restricted to registered students
 - TA access is reserved for registered students

Prerequisites

- COMS 3157 or equivalent is required
 - MUST know C well
 - MUST be comfortable in UNIX command line
 - SHOULD know make & git
 - If not, you need to learn them this week for lab1

Why C++ “for C programmers”

1. New course born out of last 25-30% of COMS 3157 that was cut since Fall 2020
2. Two schools of thought on learning C++:
 - Learn C first
 - Learn C++ as a new independent language
3. This course: survey & analysis of C++ language from the C programmer’s perspective
 - Focus on how C++ features are implemented
 - Not just learn to use C++, but *understand* it

Core topics covered

- C, plus plus
 - Constructor, destructor, copy, move
 - References, operator overloading
 - Odds & ends like namespaces, exceptions
- Object-Oriented Programming in C++
 - Polymorphism
 - Multiple & virtual inheritance
 - I/O stream hierarchy
- Generic Programming in C++
 - Containers, iterators, algorithms
 - Function objects and lambda
- RAII paradigm
 - Smart pointers

Selected additional topics

- Advanced templates
 - Type deduction
 - Variadic templates
 - Metaprogramming
 - Concepts
- Concurrency
- Design patterns in C++

Please don't cheat

- **REQUIRED READING:**

<http://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
 - [cs4995] – all emails from class listserv will have this tag
 - [ANN] – important announcements from me or TAs
 - [LABn] – information relevant on a particular lab
 - Examples:
 - [cs4995][ANN] Sample final
 - [cs4995][ANN][LAB4] Correction on lab4 instruction
 - [cs4995][LAB3] in case you're curious about ...
- Setup Gmail filters
 - I will send an example soon
- Please keep up
 - At a minimum, you must read every single ANN

Textbook & References

- **A Tour of C++, 3rd Ed.**
 - By Bjarne Stroustrup, the creator of C++
- Online references
 - C++ Super-FAQ: <https://isocpp.org/faq>
 - C++ reference: <https://en.cppreference.com/w/>
- “The Definitive C++ Book Guide and List”
 - <https://stackoverflow.com/questions/388242/the-definitive-c-book-guide-and-list>

HW0: 50 points total

- **Part A (20 points): due Tuesday 5/23, 11:59pm (tonight)**
 1. **Subscribe to 4995 ListServ today**
 - <https://lists.cs.columbia.edu/mailman/listinfo/cs4995>
 - In the textbox “Your name (optional)” put **Your Full Name (UNI)**
 - For example: Jae Woo Lee (jwl3)
 - **You must reply to the confirm email (might be in your spam folder)**
 - Then receive “Welcome to the “Cs4995” 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 ATC chapters 1,2,3

HW0 continued

- **Part B (30 points): due Thursday 5/25, 11:59pm**
 1. Read the following two documents:
 - <http://www.cs.columbia.edu/education/honesty>
 - <http://www.cs.columbia.edu/~jae/honesty.html>
 2. Send me an email containing:
 - Subject: “[4995] 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

Request for remote final proctoring

- If you:
 1. Are a CVN student
 2. Cannot attend the final in-person, but would really like to take the course (whether you already spoke to me or not)
- Please send me a request for remote final proctoring with the following info:
 - Reason why you cannot take the exam in-person
 - If you're a CVN student, simply say "Registered in CVN section"
 - Confirmation that you will make sure to have access to a printer for the exam
 - Email subject: [4995] UNI: Request for Remote Final
 - **Deadline for request: Thursday May 25th, 11:59pm**
 - If your request is granted, you will receive an email with a detailed instruction for remote proctoring