

Welcome to...

W4118: Operating Systems I

Spring 2023

cs4118.github.io/www/2023-1/

Teaching Staff

Two co-instructors:

Jae Woo Lee

Hans J. Montero

10 TAs, all former OS students:

Tal Zussman (Head TA)

Joy He

Maylis Whetsel

Cynthia Zhang

Claire Liu

Phoebe Lu

Jeremy Carin

Andy Cheng

Burcu Cetin

Helen Chu

...names and photos will also be posted on Courseworks.

Teaching Staff

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

Background

- Undergrad in Columbia College
- Many years of professional experience
 - Designing and coding large-scale software systems
 - Running a startup company
- Came back to Columbia for Ph.D.
- More info at <http://www.cs.columbia.edu/~jae/>

Teaching Staff

Hans J. Montero (just call me 'Hans')

Adjunct Instructor

Software Engineer @ Google – distributed file system

Columbia SEAS: BS'21, MS'22

- Took OS Fall 2019 with Prof. Jason Nieh
- 4x OS TA over 2020-2022 with Jae

...more info at <http://cs.columbia.edu/~hans/>

Course Homepage

cs4118.github.io/www/2023-1/

Please see the homepage for:

- Lecture schedule and notes
- Office hours calendar
- Exam dates and assignment deadlines
- Other course material

Course Prerequisites

1. Solid C programming experience
 - **DON'T TAKE THIS CLASS IF YOU DON'T KNOW C COLD!**
2. UNIX environment
 - Must be **comfortable** with command line interface
3. Computer Architecture
 - **Basic knowledge** of computer hardware: register, cache, bus, etc.
 - Should be able to **read simple assembly code**: load, store, add, jmp, etc.
4. Data Structures
 - Nothing fancy, but must be **solid on the basics**: list, tree, stack & queue

Columbia courses:

For #1 and #2:

W3157 Advanced Programming

For #3:

W3827 Fundamentals of Computer Systems

For #4:

W3134, W3136, W3137
Data Structures

Hardware Requirements

You need a computer that has the following specs:

- 64-bit CPU with multiple cores – all computers manufactured within the last five years should have this
- At least 8GB RAM

You must run one of the following platforms:

- Windows on x86 CPU (i.e. Intel or AMD)
- MacOS on x86 CPU
- MacOS on Apple M1/M2 chip
- Linux on x86 CPU

You will receive VMware for your platform – VMware for Apple M1/M2 is in beta

Mailing Lists

[Cs4118] (whole class) cs4118@lists.cs.columbia.edu
[W4118-TA] (teaching staff) cucs4118-tas@googlegroups.com

Look for subject tags in brackets, e.g.:

- [Cs4118] **[ANN]** Memory Leak Testing in the Linux Kernel
- [Cs4118] [ANN] **[EXAM1]** Exam 1 Grades Published
- [Cs4118] **[HW3]** [part1] waitpid clarification

(Listservs prepend list tag to your subject, don't add it yourself)

Class ListServ Etiquette

[Cs4118] (whole class) cs4118@lists.cs.columbia.edu

Do: Don't:

- Ask & answer questions. 1st place to go for non-personal questions
- Provide helpful tips & links for classmates
- Be considerate & friendly
- Ask questions without first trying to solve it yourself
- Post code/critical info that leads directly to solution
- Be impatient & rude
- Send improperly formatted emails

Learn to manage high volume of emails – **set up Gmail filters**

At the very least, ensure you won't miss any **[ANN]**s

Teaching Staff Mailing List Etiquette

[W4118-TA] (teaching staff) cucs4118-tas@googlegroups.com

TA mailing list is intended for questions specific to you or your team

- We may redirect general questions to class mailing list with your ID redacted (unless you tell us not to)

Prefer emailing the TA mailing list over emailing any teaching staff individually

Anonymous feedback form available – see course homepage

Textbooks

1. **Advanced Programming in the UNIX Environment** (APUE)
 - **3rd Edition, 2013**, Addison-Wesley – by W. Richard Stevens, Stephen A. Rago
2. **Operating Systems: Three Easy Pieces** (OSTEP)
 - **Version 1.00, 2018** – by Remzi H. Arpaci-Dusseau, Andrea C. Arpaci-Dusseau
 - Free in PDF form: <http://pages.cs.wisc.edu/~remzi/OSTEP/>
3. **Linux Kernel Development** (LKD)
 - **3rd Edition, 2010**, Addison-Wesley – by Robert Love
4. ...plus a few other free online materials that will be assigned

Lectures and Recitations

In-person lectures: **Tue/Thu 5:40pm - 6:55pm, 501 Schermerhorn Hall**

- May switch to online format if needed
- Auditors are welcome to lectures & listserv, but no GitHub repos, no HW/exam submissions, no TA access

Optional recitations may be held by TAs over the semester – details TBA

Lectures will be recorded and be made available shortly afterwards

Exams

Three **synchronous** and **in-person** exams for all sections:

- Exam 1: Thursday February 16, 5:40pm
- Exam 2: Tuesday April 18, 5:40pm
- Exam 3: Tuesday May 9, 7:30pm

(May switch to online format if necessary)

No make-up and no alternative exams

Please take OS next semester if you can't make these times

If you receive extended time accommodation, you can't have a class after this class

Homework

7 assignments (not including hw0)

Some are individual, some are group assignments

Some are short & light, some are long & heavy

Assignments carry different weights

Some assignments may not be graded (but you won't know until after the deadline)

Late policy: 20% penalty after deadline up to 24 hours; zero afterwards

HWs picked for grading will be 40% of your grade

Grading Policy

Homework (40%) + Exam 1 (20%) + Exam 2 (20%) + Exam 3 (20%)

Letter grades are curved – no predetermined letter grade cutoffs

(Grading policy may be subject to change)

Zero Tolerance on Cheating

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 that your friend has from previous semester
- Upload any class materials (including your own code) to public repository (e.g. GitHub) during or after this semester

We can detect cheating cases:

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

Advanced UNIX Programming

First four weeks of the semester: UNIX from the outside

- Advanced systems programming material that comes between cs3157 and OS

Processes, threads, concurrency, signals, networking, non-blocking & async I/O

hw3-multi-server:

- add complex functionality to a provided basic web server

Operating Systems Internals

OS theory reinforced by Linux kernel hacking

- Work with real-world C code implementing OS theory from lecture
- Experiences Teaching Operating Systems Using Virtual Platforms and Linux, Jason Nieh, SIGCSE 2005 ([paper](#))

System calls, synchronization, scheduling, memory management, file systems

Linux kernel hacking assignments (hw4–hw8)

Let's get to work! (1/2)

1. Subscribe to the Cs4118 ListServ TODAY:

<https://lists.cs.columbia.edu/mailman/listinfo/cs4118>

- In the textbox "Your name (optional)" put **Your Full Name (UNI)**
 - For example: Hans Montero (hjm2133)
- You must reply to the confirm email (which might be in your spam folder)
- Then receive "Welcome to the "Cs4118" mailing list"
 - This email contains your password for accessing archives of past postings
- If you register late, you might miss ANNs and other emails – check the archives

Let's get to work! (2/2)

2. Read the following two documents:
 - <http://www.cs.columbia.edu/education/honesty>
 - <http://www.cs.columbia.edu/~jae/honesty.html>

3. See course home page for **HW0, HW1, and reading assignments**:
cs4118.github.io/www/2023-1/

4. Start forming groups of 3 – feel free to advertise on listserv with [LFG]

Welcome to...

W4118: Operating Systems I

Spring 2023

cs4118.github.io/www/2023-1/