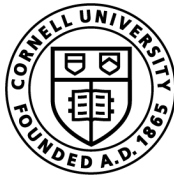


# Administrivia

CS 6410: Operating Systems

Fall 2022

Robbert van Renesse



**Cornell Bowers C-IS**

College of Computing  
and Information Science

# Inclusion

- We strive to make CS6410 a welcoming, safe, equitable, and respectful environment, consistent with [Cornell's commitments](#)
- We recognize that the society we live in is none of those things, that we have implicit biases, and that we have to work hard every day to counter those biases to create an inclusive environment
- If you witness a bias incident or have been the victim of one, please file a [confidential report](#) with Cornell
- If you have any suggestions such as improvements to the web site, syllabi, slides, homework and exam questions, and so on, you can email [cs6410-prof@cornell.edu](mailto:cs6410-prof@cornell.edu)

# Emotional Help

Engineering Advising	<a href="http://www.engineering.cornell.edu/resources/advising">www.engineering.cornell.edu/resources/advising</a>	Academic advising for engineering students
Arts College Student	<a href="http://www.arts.cornell.edu/stu-adv/">www.arts.cornell.edu/stu-adv/</a>	Listing of general support services for a variety of concerns
Gannett	<a href="http://www.gannett.cornell.edu">www.gannett.cornell.edu</a>	Cornell University Health Service
CAPS	<a href="http://www.gannett.cornell.edu/services/counseling/caps">www.gannett.cornell.edu/services/counseling/caps</a>	If you experience emotional distress, please contact Counseling and Psychological Services
Student Disability Services	<a href="http://sds.cornell.edu">sds.cornell.edu</a>	Ensures that all aspects of student life are accessible, equitable, and inclusive of those with disabilities. Send accommodation letters to Veronica VanCleave-Seeley (vv48, Gates 401) by Sep 15.

Get help. Get documentation. The earlier the better.  
Also, please look out for each other

# How this class is organized

- **Who's Who**
- Before you take this class...
- Course Content
- Communication
- Grading
- Academic Integrity

# About RVR

- Ph.D. C.S., Vrije Universiteit Amsterdam
  - Amoeba Distributed Operating System
- Industry: Research Scientist @ AT&T Bell Labs
  - Unix, Plan 9
- Serial entrepreneur
  - Reliable Network Solutions (IP → Amazon)
  - D.A.G. Labs (acquired by FAST, then by Microsoft)
  - Exotanium (ongoing)

**Interests:** scalable and fault tolerant distributed systems

**Non-geek:** musician (trad. jazz), swing dance, unicycling

# About Shubham

- 3<sup>rd</sup> year PhD Student advised by RVR

**Interests:** high-speed systems

**Non-geek:** ?

# About Yu-Ju

- 4<sup>th</sup> year PhD student advised by RVR
- National Chiao Tung University

**Interests:** scalable distributed system

**Non-geek:** Kendo, Motorcycle, Snowboarding , and learning to Skateboard

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# Prerequisites

- CS 3410 or CS 3420 (ECE 3140) or equivalent
- CS 4410 or equivalent
- Familiarity with proof techniques

***Otherwise: you must contact RVR, explain your situation and request permission***

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# Objectives

- learn about current research perspectives on computer systems, including advanced systems abstractions, principles, and artifacts that have had lasting value
- understand attributes of systems research that is likely to have impact
- become comfortable navigating the literature in this field
- gain experience in thinking critically and analytically about systems research
- acquire the background needed to work on research problems currently under study at Cornell and elsewhere

# CS PhD program requirements

As a Cornell CS PhD student, you are required to demonstrate basic competency in systems at the CS 4410 level, take a systems breadth course, and take at least one 6xxx course in the "systems style". **CS6410 can satisfy all of these requirements** (assuming you get a B+ or better).

- you won't need to take CS4410

# Draft Topics

- Specification of Concurrent Systems
- Concurrent Systems
- Networked Systems
- Distributed Systems
- Storage Systems
- Cloud Systems
- IoT Systems
- ...

# Lectures

- Mixture of lectures from me and lectures from PhD/MS students in the class
- I will present introductory materials on some topics
  - Specifying concurrent systems (with TLA<sup>+</sup>)
  - Concurrent and Distributed Programming with Harmony
  - Distributed Consensus
  - Dealing with Byzantine Failures
  - ...
- Attendance taken
- Participate!!

# Reading

- Mixture of seminal papers and contemporary papers on systems research
- Approx. one mandatory and one or two recommended papers per class meeting
  - i.e., 2 per week, or about 25-50 pages per week
  - First read “How to read a paper” by S. Keshav
    - <http://ccr.sigcomm.org/online/files/p83-keshavA.pdf>
- Not all class meetings will have a new paper though

# Paper reports

- Submit for each required paper (plus possible bonus points for related papers)
  1. a summary in a few lines (3-5 lines)
  2. one to three major strengths of the paper: what is really cool about this?
  3. most major weakness of the paper, including whether it is fixable or not
  4. discuss future work opportunities
- Report (half to one page) must be submitted before the class in which the paper is presented
  - free passes for 3 papers!



# Paper presentation and discussion

- Paper and related materials presented by PhD/MS student
  - who will receive the paper reports ahead of time
- Student also leads a discussion
  - participation in the discussion counts towards your grade!
- May also want to present the same paper afterward in systems lunch seminar!

# Presentation Schedule

- By September 4<sup>th</sup>, PhD and MS students must send me a paper they want to present in class
- I will assign time slot in the semester for your presentation
- 2 weeks before presentation: slide set and list of related readings
- 1 week before presentation: dry run

# Paper choice

Either

- seminal system paper (I have a list)
- paper in a recent major systems conference

# Programming Assignments

- A small network programming assignment in programming language of choice
- Must be done individually

# Project

- Do a research project
- Encouraged to be done with a partner, preferably selected from your own "class"
  - PhD/MS
  - MEng
  - Senior undergrad
- Phases:
  - develop and present an idea
  - do literature survey
  - work out idea to some degree
  - evaluate the idea to some degree
  - write a 6-10 page paper
- Could be something you're working on already, but should be in state of infancy

# Project Group Code of Conduct

- Each student should feel safe, welcome, respected
- *Participate, but don't dominate*
- Be patient
- Respect diverse talents and ways of learning
- Fight your implicit biases

A well-run study group benefits **all** participants

# Peer reviews

- Papers written in class will be peer reviewed by the students
  - 3 peer reviews per student
  - If there are  $N$  projects and  $M$  students, then each project will get  $3M/N$  reviews. I hope  $M/N$  will be about 2, so approx. 5-6 reviews per project
  - Uses state-of-the-art conference submission system (HotCRP)
- Paper must be revised based on peer reviews

# Project Schedule

- Sept. 18<sup>th</sup>: project proposal due (1 page)
  - what is interesting about the problem?
  - what is interesting about the solution?
  - why are you the right person(s) to do it?
- Oct. 2<sup>nd</sup>: survey due (2-3 pages)
  - what is the related work in the area?
  - what is different about what you're proposing?
- Nov. 7<sup>th</sup>: draft report due (4-6 pages)
  - implementation, evaluation



# Project Schedule, cont'd

- Nov. 15th (peer reviews due)
  - reviews are similar to paper reports
  - can contain detailed comments for improvements
- Nov. 22<sup>nd</sup>: revised draft paper due
  - distributed to all students
- Presentation, demo, and discussion in the following class meetings
- Final paper due on December 5<sup>th</sup>

# Success stories

- Lorenzo Alvisi and Jon Kleinberg took CS6410 (well, CS614 to be precise) and published their projects

# Collaboration

- You may discuss the questions for each discussion paper with other students, but you may not look at other student's answers. You must write your answer yourself.
- You may use any idea from any other person or group in the class or out, provided you *clearly state what you have borrowed and from whom*
- If you do not provide a citation---that is, you turn other people's work in as your own---that is cheating
  - We will be grading you on the ideas you have added, but you should always borrow as much as you can as a starting point as there is no point in reinventing the wheel

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# Course Web Page

`http://www.cs.cornell.edu/courses/cs6410/`

- Schedule
- Homework release and due dates
- Slides posted before each lecture

*Let's have a look around at the [web site](http://www.cs.cornell.edu/courses/cs6410/)*

# CMSX

<https://cmsx.cs.cornell.edu>

- Assignments
- Grades & Regrades

# Lectures

- First few lectures recorded
  - *but live participation strongly encouraged*
  - *recordings only kept for a few days*

# Ed Discussion

- Yet to be set up...



# Office Hours

- RVR:
  - MR 3:30-4:30pm at Gates 443
- Shubham
  - TBD
- Yu-Ju
  - TBD

# Email

[cs6410-staff@cornell.edu](mailto:cs6410-staff@cornell.edu): **time sensitive** matters

- Goes to professor & TAs

[cs6410-prof@cornell.edu](mailto:cs6410-prof@cornell.edu): *sensitive* matters

- Goes to RVR only

**Please no emails to personal email accounts**

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# Academic Integrity & Honor Code

All submitted work must be your own

- OK to discuss concepts with any other student
- Study group can submit the same code
- Different study groups are not allowed to share code

**Violations will be prosecuted**

# Academic Integrity

## Why not cheat?

- It hurts you in various ways:
  - It reduces the value of your Cornell degree
  - It stresses you out because you might get caught
  - You won't feel good about yourself afterward
  - The energy that goes into cheating is better used for learning
- It hurts other students:
  - It stresses them out
  - By far most students are honest

*If you need help, get it early*

# Semester Grades

- CS6410 is not a competition
- Your grade reflects your learning objectives, not how well you did compared to others
- Goal is to give everyone an A
  - I will come after you if you're not on track...
- Grade based on (7 P's):
  1. Paper reports (approx. 10%)
  2. Programming problem (approx. 10%)
  3. Project (approx. 20%)
  4. Project paper (approx. 25%)
  5. Peer reviews (approx. 5%)
  6. Participation in discussions (approx. 10%)
  7. Presentations (approx. 20%)