Course Syllabus

Description:

Welcome to CSci 4061! This course is concerned with the principles and concepts of contemporary operating systems with an emphasis on the programmer or user view of the OS. We will discuss concepts relating to processes, threads, synchronization, advanced and asynchronous control, inter process communication, memory management, I/O, file systems, network communication, and system design principles. We will examine the issues that surround these concepts, look very briefly at implementation issues, and focus our attention on the systems programming interface provided to the user for each concept. We will use Unix as our model of a systems programming interface for an OS. We will also look at "systems" in other domains, e.g. network and DB systems. Several programming projects will be used to gain hands-on experience with systems issues. A solid programming background preferably in C/C++. Comfort with Unix/Linux is very helpful.

Several new items for this offering include: a more top-down perspective on systems programming, inclusion of ethics (TBD), and use of edge computing services in the classroom (to be discussed).

We recommend you set Modules as your home page for this canvas site.

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Course Team:

- Professor Jon Weissman: Section 10
- **Contact: weiss039@umn.edu (mailto:jon@cs.umn.edu)**
- Lectures (IN-person as of now)
  - Section 1 (1 - 2:15 pm), KH 3-210
  - Section 10 (4 - 5:15), Bruinicks Hall 220
- **Student Hours**:
  - Weds 8:30-10:00 am
  - **Zoom meeting link (office hours) (https://umn.zoom.us/j/92929564988?pwd=VGRSTVhHTXZsbUZSZzl0SjRiTEtydz09)**
  - Must be signed in to Zoom with UMN email
  - T/Th 2:45-3:45pm, in person KH 4-225F

- Other times upon request

TAs:

Name	Email	Lab Sections	Student Hours	
Mitch Terrell	terre101@umn.edu (mailto:terre101@umn.edu)	13, 14	Tues 5:30 - 7:30 pm	Office Ho q=https://umn.zoom.us/j/95332769310&s
Ebasa Temesgen	temes021@umn.edu (mailto:temes021@umn.edu)	6, 7	Thurs 4:00 - 6:00 pm	Office Hours Link (https://umn.zo
Sai Tharun Tallapragada	talla037@umn.edu (mailto:talla037@umn.edu)	11, 12	Fri 9:00 - 11:00 am	Office Hours
Ammar Ahmed	ahme0599@umn.edu (mailto:ahme0599@umn.edu)	4, 5	Wed 12:00 - 2:00 pm	
Anlan Zhang	zhan6841@umn.edu (mailto:dhruv@umn.edu)	2, 3	Fri 9:30 - 11:30 am	Office Hours Link (https://umn.zo
Samuel Highbargin	highb015@umn.edu (mailto:highb015@umn.edu)	none	Tue, Thu 8:30 - 9:30 am	

Lab Sections:

Section #	Time	Room	TA
002	Mon 8:00 - 8:50 AM	KHKH 1-250	Anlan Zhang
003	Mon 9:05 - 9:55 AM	KHKH 1-250	Anlan Zhang
004	Mon 10:10 - 11:00 AM	KHKH 1-250	Ammar Ahmed
005	Mon 11:15 - 12:05 PM	KHKH 1-250	Ammar Ahmed

006	Mon 12:20 - 1:10 PM	KHKH 1-250	Ebasa Temesgen
007	Mon 1:25 - 2:15 PM	KHKH 1-250	Ebasa Temesgen
011	Mon 2:30 - 3:20 PM	KHKH 1-250	Sai Tharun Tallapragada
012	Mon 3:35 - 4:25 PM	KHKH 1-250	Sai Tharun Tallapragada
013	Mon 4:40 - 5:30 PM	KHKH 1-250	Mitch Terrell
014	Mon 5:45 - 6:35 PM	KHKH 1-250	Mitch Terrell

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Textbook:

Unix Systems Programming: Communication, Concurrency, and Threads, Robbins and Robbins (***R&R***), Prentice-Hall, 2003.

Optional Reading:

- Linux Systems Programming, Love, 2nd edition, O'Reilly Books, 2013 (***LSP***).
- Advanced Programming in the Unix Environment, 3rd edition, Stevens and Rago (***S&R***)
- Principles of Computer System Design, Saltzer and Kaashoek, Morgan Kaufmann, 2009 (***S&K***).
- Unix System Programming, Haviland, Gray, and Salima.
- Modern Operating Systems (Tanenbaum), 3rd Edition, Prentice-Hall, 2008 (***MOS***).
- Operating System Concepts, 8th Edition, (Silberschatz, Galvin, Gagne), 2009 (***S&G***).

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Weekly schedule of topics:

Week 1: Course admin, OS Overview

Week 2: Programs and Processes

Week 3-4: I/O and Devices

Week 5: File systems

Week 6-7: Communication

Week 8: Exceptions

Week 9-10: Threads

Week 11-12: Synchronization

Week 13: Network Programming

Week 14: Memory Management

Week 15: System Design

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Communication:

Course communication channels are the following. In the **module** for the week, you will have explicit instructions (1) *this_week* on what you need to do for that week to prepare for the week's class. (2) this term we will be using *Piazza* for class discussion and any Q&A. The system is highly catered to getting you help fast and efficiently from classmates, the TA, and myself. Rather than emailing questions to the teaching staff, I encourage you to post your questions on Piazza. You can post just to me, any TA, any of the TAs, or the entire class.

Sign up for Piazza **here (https://piazza.com/studentsignup)**

Find our Piazza page **here (http://piazza.com/umn/fall2022/csci4061010/home)**

For personalized help, you may go to any TA or instructor (3) *student hours* which will be held either live or in zoom (see TA info above). If want to speak to someone specific outside of their office hours, you will need to (4) contact them via Piazza to set up a meeting. For substantial project questions, I would like you to utilize the TAs in their student hours as the first point of contact as they will have the ability to spend more time with you. If that does not succeed, you can attend my student hours. TAs may use a mixture of in-person and on-line (zoom) student hours, but zoom is the default. I will use a mix of zoom and in-person for student hours.

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Course Structure:

As of now, the lecture will be in-person with masking optional and social distancing where possible. If you require or need a virtual version of the course, you may sign up for the UNITE section. Both lecture versions of the course will be identical. The main lectures or lab sessions will not be taped by me. However, UNITE recordings will be available to all students on a 10-day delay. If need an on-line version of the course, sign up for UNITE (Section 883). **Students are expected to obtain notes from a classmate if they miss class.**

Labs will also be in person and identical. It will consist of some review material, occasionally project discussion, occasionally new material, occasionally exam review/exam solutions, examples, and an

exercise (most weeks). The exercise can be group work if you choose or individual. You can form a small group in person with the TA's help. You will submit your work individually.

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Course Work and Grading:

Programming projects (4): 50% (top 3)
Exams (2): 25%
Engagement: 25%

The programming projects will be done in a group of 3 that is up to you. All team members are expected to share the load and everyone gets the same grade UNLESS I become aware of severe inequities in the shared work. I will handle these situations in a case-by-case basis. Feel free to change your project team overtime but you MUST communicate this to **all your teammates** and us. TAs will help form groups for students that do not have groups, most likely through their lab section. You may choose any student in any lab section to work with. We will run your programs on CSE-IT lab machines so you must ensure your programs run on those machines. We will supply instructions on this later, as well as the set of collaboration tools we recommend for project teams. **We will drop your lowest programming project score.** There is **no late work for projects**. Projects will generally be substantial systems projects with 2 weeks to do them, and a preliminary submission to incentivize you to start work immediately.

There will be two exams, week 7 and week 14, and no final. We will be using Gradescope for exams. Details to follow.

All regrading requests for projects or exams must be made within **one week** of receiving the grade.

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Approximate Grade Scale (slight adjustment is possible):

>=93 A

>=90 A-

>= 87 B+

>=84 B

>= 80 B-

>=75 C+

>= 70 C

>= 65 C-

>= 50 D

< 50 F

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Engagement:

Staying engaged on a weekly basis is crucial to your success in the class given the spacing of projects and exams. For this component, there will be weekly short on-line quiz that will be given out Saturday and due Sunday evening. It will be based on the prior week's material. Next, for the lab exercise you will begin this work in lab (and can work with students and ask the TA questions), but it will be due as a on-line submission in Canvas by Monday midnight. You will submit your exercise solution individually whether you work in a group or not. Projects will generally be due on a Wednesday. Grading for quizzes and exercises is to be decided but will likely be informal (e.g. below-par, par, above-par) and you may drop two of each.

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Collaboration:
For questions concerning the projects, you can talk to the TAs or
myself. Limit discussion with your classmates or access to the Piazza discussion forum to clarification questions, NOT elements of a solution. For the group projects, collaboration within your team is of course expected.

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Illness Accommodation and Expectations:

Expectations:

You obey the University's COVID guidelines. Right now, masking is optional and social distancing is encouraged. Here is a recent statement on COVID by the University Health Officer: **COVID_ stmt. (https://clinicalaffairs.umn.edu/covid-19-updates/news/updated-information-covid-19-and-monkeypox)**

More on COVID:

You should stay at home if you experience any signs of illness or have a positive **COVID-19 test (https://safe-campus.umn.edu/return-campus/mtest)** result. If this occurs, please consult with your healthcare provider about an appropriate course of action. I will follow these same protocols and will let you know if the delivery of this course has to be temporarily changed as the result of my own circumstances. Absences related to illness, including COVID-19 symptoms, for yourself or your

dependents, are **legitimate "excused" absences (https://policy.umn.edu/education/makeupwork)**

Vaccines: COVID-19 Vaccinations (or approved exemptions) are **required for all students and employees (https://safe-campus.umn.edu/return-campus/get-the-vax)** . Learn about vaccine and booster appointments on campus by visiting the FAQ on **Get the Vax (https://safe-campus.umn.edu/return-campus/get-the-vax)** page.

Face coverings: Up-to-date policy information is available on the **Safe Campus (https://safe-campus.umn.edu/return-campus/covid-19-prevention-and-wellbeing)** page. The University expects all community members to respect those who choose to wear a mask, as well as those who choose not to wear one.

I don't intend to wear a mask in class myself, and I fully support your individual choices around masking. IF I contact COVID-19, I will switch the class to zoom/on-line rapidly until it is safe for me to return to class. The same is true for any TA w/r to lab and/or their office hours.

Indoor masking continues to be an important tool in high risk situations. High-quality masks (N-95 or certified KN-95) will be available to students Fall 2022. Check the **Safe Campus (https://safe-campus.umn.edu/return-campus/university-planning-response)** website for information on the location(s) for each campus.

Testing: Information on *When*, *Where*, and *What if* for testing is available on **MTest (https://safe-campus.umn.edu/return-campus/mtest)** webpage.

The above policies and guidelines are subject to change. The University regularly updates **pandemic guidelines (https://safe-campus.umn.edu/return-campus/covid-19-updates)** in response to guidance from health professionals and in relation to the prevalence of the virus and its variants in our community.

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Accommodations:

If you are too sick to take an exam, you must notify me ahead of the exam for an accommodation.

If you are sick and cannot complete a quiz or exercise, you should use one of your free drops (2 per quiz, 2 per exercise).

If you are sick and cannot adequately participate in your project group, you must notify me immediately. Note: if you get sick near the end of the project, I will expect to see evidence of real work in order to make an accommodation. If you wait until the last minute to do work, then get sick, you are likely to be out of luck. You have one project to drop. I reserve the right to treat group members

differently based on effort.

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Academic Integrity:

My plan is not burden you with proving the integrity of your work but to set my expectations up front. In short I need to trust you, but I expect that trust to be honored. The first rule is that you are not allowed to disseminate any published course materials including anything on this Canvas site including projects, slides, notes, projects, exams, etc. to anyone outside of this class. The second rule is that I expect you will take all quizzes and exams without giving or receiving aid from anyone. If I stipulate closed notes and/or Internet, I expect this to be honored. The third rule is that I expect project work will be done **solely** by your group without hunting down any on-line solutions (or fragments thereof, unless I expressly allow it), or any written materials provided to you by others (e.g. prior exams or code). We will be running comparison checking software on submitted projects. Violation of these rules will be dealt with swiftly and severely in accordance with **University policies (https://sites.google.com/umn.edu/cis-policies/academic-misconduct?authuser=0)**. The updated Board of Regents scholastic conduct is **here (https://click.ecommunications2.umn.edu/?qs=2c50fa21e9772988b0c5552b8cb48993d60afb92d3eab7358edf131226877a677d0cf73623ea6ae3c8c499c4**
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Mental Health:

The Computer Science department takes the physical and mental health of its students seriously. We have created resources **here (https://cse.umn.edu/cs/student-mental-health-resources)**; also accessible through this QR code.

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Exceptions:

If something UNEXPECTED happens and you require an exception, you can contact myself or the TAs. Note: exception requests received ahead of due dates, exams, are far more likely to receive favorable treatment provided it can be justified. We are already planning some flexibility (see Grading above) so anything additional would require special circumstances. A project extension due to a

single team member issue is not guaranteed and you are expected to pick up the slack as teammates. A University guideline for acceptable exceptions is **here. (https://policy.umn.edu/education/makeupwork)**

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Campus Safety:

For info: **Public Safety Messages.pdf (https://canvas.umn.edu/courses/333077/files/30119336?wrap=1)** **(https://canvas.umn.edu/courses/333077/files/30119336/download?download_frd=1)**

Safe Campus info (http://safe-campus.umn.edu/crime-prevention)

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Disability Statement:
Students with a documented disability (e.g., physical, learning, psychiatric, vision, hearing, etc.) that need to arrange for reasonable accommodations must contact the instructor and Disability Services at the beginning of the semester. All discussions will remain confidential. For further information contact the University of Minnesota Disability Services website **here (http://disability.umn.edu)** or call 612-626-1333.

IGNORE column labelled Due below

Course Summary:

Date	Details	Due
Tue Sep 6, 2022	**First day of 4061: welcome! (https://canvas.umn.edu/calendar?event_id=1031509&include_contexts=course_333077)**	12am
Thu Sep 8, 2022	**Office Hours - CSCI 4061 - Ebasa Temesgen (https://canvas.umn.edu/calendar?event_id=1038603&include_contexts=course_333077)**	4pm to 5pm
Sun Sep 11, 2022	**Quiz Week #1 (https://canvas.umn.edu/courses/333077/assignments/2758108)**	due by 11:59pm