

CS 361: Systems Programming

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Course Description

This course covers various low-level aspects of computer systems. The course is organized around the following broad themes:

- Linking
- Exceptional control flow
- Input/Output (I/O)
- Virtual memory
- Network programming
- Concurrent programming

This is a hands-on, programming-heavy course. The course is structured with labs, a series of homework (programming assignments), a mid-term exam, and a final exam.

Textbook

Computer Systems, A programmer's perspective by Randal E. Bryant and David R. O'Hallaron, 3rd edition [\[link\]](#)

Topics covered (tentative)

- Linking
 - Symbol resolution
 - Relocation
 - Dynamic linking and shared libraries
 - Position-independent code

- Exceptional control flow
 - Control flow
 - Processes
 - System calls
 - Signals
- Input/Output (I/O)
 - File I/O
 - Redirection
 - Standard I/O
- Virtual memory
 - Physical and virtual addressing
 - Dynamic memory allocation
 - Garbage collection
- Network programming
 - Client-server programming model
 - Socket interface
 - Web servers
- Concurrent programming
 - Process-level concurrency
 - I/O multiplexing
 - Threads
 - Semaphores
 - Thread safety

Prerequisites

The main conceptual prerequisites for this class are CS 211 (the C part), CS 261 (machine organization), and CS 251 (data structures). A solid understanding of the theory of how things are stored in the computer, as well as the theory of how a processor executes instructions, as well as a basic understanding of programming (and specifically programming in C) are the tools you'll need to succeed in this class.

Grading

The course uses *relative* grading. The (tentative) weights of the different components are as follows:

- Clicker Quizzes (lowest two dropped): 5%
- Labs (lowest one dropped) : 25%
- Homework assignments: 40%
- Mid-term exam: 15%
- Final exam: 15%

Lateness policy

Every assignment in this course is due at exactly the time stated on Gradescope, and while we will grade late assignments, they earn zero credit. Gradescope deadlines are precise—an assignment is late if it was turned in one millisecond or one month late. Gradescope deadlines are universal—you must turn in your code, and it doesn't matter whether you didn't turn it in because it wasn't compiling, or couldn't upload it to git, or couldn't upload it to Gradescope. You can turn in homework assignments an unlimited number of times, so **we recommend that you turn them in early and often.**

Exams

There will be two exams: a midterm exam and finals. The exams will have a mix of short and long questions.

Clicker Quizzes

In the beginning of each class, there will be a short quiz. Student should use the **iClicker app** for participating in these quizzes. The quiz will cover the topic from the previous lecture. We will drop the two lowest scores, so if you can afford to miss a couple lectures.

Academic Integrity

While active discussion with peers is encouraged, there is a **red** line: copying code, in any form, is plagiarism. If you don't know how your own code works, then there is a problem. Cite your sources in all your turn-ins to be safe. When in doubt, please consult with the instructor or the TA.