# COLLEGE OF ENGINEERING, UIC

## CS 361 Systems Programming (4 Credit Hours)

Spring 2026

## Instructor & Course Details

**Days/Times & Location:** TR 3:30-4:45 in CDRLC 1426
**Instructor:** Jakob Eriksson
**Email:** jakob@uic.edu
**Drop-In Office Hours:** Wednesdays 1-3 pm
**Drop-In Hours Location:** CDRLC 4452
**Course site:** Piazza

Students are expected to log into the course site regularly to learn about any developments related to the course, and communicate with instructors and classmates.

## Course Information

### Catalog Course Description and Prerequisite/Corequisite Statement

This course is a study of computer systems emphasizing their impact on application level programming. By the end of the class, you will have a good low-level understanding of how applications are built from source code, how processes are created from executables, and the environment that processes run in, all primarily from a Unix perspective. In addition, you will have a good familiarity with the most important tools that a systems programmer uses, including build tools, debuggers, profilers and tracers.

**Prerequisite:** CS261

### ABET Course Goals and Learning Outcomes

- Analyze a complex computing problem and apply principles of computing and other relevant disciplines to identify solutions.
- Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.

**Course requirement status:** Required for Computer Science majors.

### Required Textbook & Technology

**Textbook:** Computer Systems a Programmer's Perspective, by Bryant and O'Hallaron.
**Technology:** This course requires the use of a standard portable computer running Linux, Mac OS or Windows. You must have an ssh client software, and be familiar with its use. I recommend using Visual Studio Code with the Remote SSH plug-in for editing files on department servers.

## Course Policies & Classroom Expectations

### Grading Policy and Point Breakdown

Your final letter grade is determined based on your course percentage, which has the following components:

- 10 Lab completion credits (weight 1 each)
- 10 Post-assignment paper quizzes (weight 4 each)
- Midterm paper exam (weight 20)
- Final paper exam (weight 30)
- Sum of weights: 100

The course percentage is the weighted average percentage of the final and the other 21 components above, with **one major modification**: with the exception of the final exam, if ignoring a component would improve your course percentage, then it is not counted.

The purpose of the quiz vs. assignment-based grading policy is to emphasize individual learning, rather than skill in completing assignments or AI prompting. The purpose of the course percentage computation is to provide maximum flexibility.

For example, if you score 100% on the final, then no other components are counted, and your course percentage is 100%. If you miss the final, and the midterm, but score 100% on all the labs and quizzes, then your course percentage is $50/(50+30)$, as the midterm is ignored, but the final is not.

### Policy for Missed or Late Work

There is no explicit accomodation for late work in this course, see grading policy.

### Attendance and Participation Policy

Attendance is not taken nor required in this course.

### Academic Integrity

You may use any tools or methods you see fit to learn the materials of this course and to complete assignments. This includes enlisting the help of classmates, instructors and all AI chatbots.

However, you will be evaluated on your own knowledge, through paper-based quizzes and exams.

Please review the UIC Student Disciplinary Policy for additional information.

## Course Schedule

| Week of | Topic(s) / In-Class Activities | Assignment due Tuesday 3:30pm | Reading |
|---|---|---|---|
| 01/12 | Executables and Libraries | | CSaPP Ch 7 |
| 01/19 | Processes and System Calls | hw1: linking and shared libraries | CSaPP Ch 8 |
| 01/26 | File Descriptors and File I/O | hw2: syscalls and signals | CSaPP Ch 10 |
| 02/02 | Sockets and Network I/O | hw3: runCommand and runInteractive | CSaPP 11-11.4 |
| 02/09 | Adv. I/O | hw4: socket server with epoll | CSaPP 12.2 |
| 02/16 | Memory Layout - Process and Data Structure | *no hw due* | CSaPP 9.1-9.2 |
| 02/23 | Memory Management - Malloc and Mmap | hw5: learning about memory layout with gdb | CSaPP 9.8-9.9 |
| 03/02 | Adv. Memory Management and Common Problems | hw6: IPC over shared memory | CSaPP 9.11 |
| 03/09 | MIDTERM EXAM on Tuesday, no lab | *no hw due* | |
| 03/16 | Programming with Threads | *no hw due* | 12.1,12.3 |
| 03/23 | *SPRING BREAK* | | |
| 03/30 | Race Conditions, Synchronization and Deadlock | hw7: multi-threaded socket server | CSaPP 12.4,12.6-12.7 |
| 04/06 | Adv. Concurrency - atomics, lock-free operation | hw8: concurrency bug hunt | |
| 04/13 | PTrace - the API for debugging | *no hw due* | |
| 04/20 | Performance Monitoring with perf and strace | hw9: basic debugger with ptrace | |
| 04/27 | Bonus Topic and Final Review | hw10: hands-on performance diagnostics | |
| 05/04 | *FINAL EXAM WEEK* | Final Exam is on Friday May 7 at 1-3 PM | |

**Disclaimer**

This syllabus is intended to give the student guidance on what may be covered during the semester and will be followed as closely as possible. However, as the instructor, I reserve the right to modify, supplement, and make changes as course needs arise. I will communicate such changes in advance through in-class announcements on Piazza.

## Accommodations

### Disability Accommodation Procedures

UIC is committed to full inclusion and participation of people with disabilities in all aspects of university life. If you face or anticipate disability-related barriers while at UIC, please connect with the Disability Resource Center (DRC) at https://drc.uic.edu, via email at drc@uic.edu, or call (312) 413-2183 to create a plan for reasonable accommodations. To receive accommodations, you will need to disclose the disability to the DRC, complete an interactive registration process with the DRC, and provide me with a Letter of Accommodation (LOA). Upon receipt of an LOA, I will gladly work with you and the DRC to implement approved accommodations.