

CS201: Computer Systems Programming
Spring 2019 Instructor: Professor Karavanic

Course Description

Introduction to computer systems from a software perspective. Topics include: Basic machine organization, System programming using C and assembly language, Introduction to system programming tools (gcc, makefile, gdb), Data representation (bits & bytes, characters, integers, floating point numbers), Implementation of control flow, procedure calls, and complex data types at machine level, Linking and loading, Exceptions and interrupts, Process control and signals, System calls, File I/O, Timing and improving program performance, Introduction to memory hierarchy, dynamic memory allocation techniques.

Our learning platform will be linux on x86.

This course covers all of the material in the "standard" CS 201 courses, and will prepare students for any PSU course with CS 201 as a prerequisite.

Course Goals

By the end of the course the student will be able to:

- Describe basic computer system organization including the operating system (processes, files, virtual memory) and the underlying hardware (CPU, registers, memory hierarchy).
- Understand in detail the path from source code to machine instructions: preprocessing, assembling, compiling, linking, data representation, object/executable files, shared libraries, and instruction set architecture.
- Write short C programs to illustrate basic systems concepts.
- Explain how exceptions, traps, and context switches occur, how they are handled at the machine level, and how this impacts running applications.
- Use software tools to: compile, link, load, run, debug, disassemble, and analyze code; and change code as it runs.
- Go on to learn about Compilers and Operating Systems (CS 333).

Accounts:

You will need an account to log in to the Linux systems (linuxlab.cs.pdx.edu) provided by the college. If you don't already have an account, go to <http://www.cat.pdx.edu/students.html> for instructions. The Linux lab is located in FAB 88-10.

Mailing List:

All students are required to join the class mail list. A great deal of information is communicated on this mailing list, including general questions, information, updates, hints on the homeworks, schedule changes. Your .pdx.edu address is added automatically to this mailing list. You will be granted permission to post to this list.

Required Textbook

Computer Systems: A Programmer's Perspective, 3rd ed., Bryant and O'Hallaron, Prentice Hall, 2015.
The C Programming Language, 3rd ed., Kernighan and Ritchie, Prentice Hall, 1998. ISBN 0-13-110362-8.

Other readings will be assigned from freely available online sources.

Workload:

Reading assignments, practice exercises, homeworks (including programming).

Assessment:

Best 7 of 8 Homeworks (49%; 7% each homework)

Midterm Exam (25%)

Final Exam (25%)

Oops !! (1%)

Policies

- This class is designed for in-person attendance. Students are responsible for anything that transpires during a class. There will be several sessions conducted in the Linux Lab for hands-on instruction.
- If an extraordinary situation (for example severe illness) prevents you from working for a period of time, contact the instructor as soon as possible to discuss your situation and arrange a special schedule or incomplete.
- Requests for regrading must be submitted to the instructor in writing within one week of the time the graded assignment was made available for pickup. You must be specific in saying why you feel the grading is incorrect. A request for regrade will result in a re-evaluation of the entire assignment and your total grade may increase or decrease as a result.
- Makeup exams will not be given except in cases of severe medical or family emergencies. Please note that travel (even work-related travel) is not considered an emergency. If an emergency arises and you miss an exam, contact the instructor *before the exam date and time* to arrange for a special circumstance.
- In order to pass this course, a score of 35% or higher must be earned on EVERY assignment. If this condition is not met, you will be given a grade of F for the course.

Academic Honesty

Students are prohibited from handing in work as their own which they did not create. This includes handing in assignments in which a substantial amount of the material was done by someone else. Students need to be especially careful that in the process of discussing problems with other students they do not inadvertently end up using someone else's work. Similarly, failing to cite a source that contributed substantially to the solution of a problem is also considered to be cheating. It is not necessary to cite the textbook for the course, other than for direct quotes. All other sources should be referenced precisely.

In the event a case of cheating is discovered, the student will automatically receive a score of zero (0) for that assignment or exam. Stricter penalties apply for repeat offenders.