CS205: Computer Systems Programming and Architecture
Spring 2026 Instructor: Professor Karavanic

Course Description

This course is an in-person Course. We will have regular meetings on campus on Tuesday/Thursday at 1:30 pm. These sessions may include lectures, Q&A, hands on exercises in the lab, and individual and group exercises in the classroom.

Introduction to computer systems from a software perspective. Topics include: Basic machine organization, Programming using C and assembly language, Introduction to C 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 the machine level, Linking and loading, Exceptions and interrupts, Process control and signals, System calls, Timing, concurrency and improving program performance, and an Introduction to the memory hierarchy.

Our learning platform will be linux on x86.

This course covers all of the required material in the State of Oregon MTM agreement for CS 205.

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

- Describe basic computer system organization including the operating system 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 and assembly 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.
- Understand the performance implications of multicore processors.
- Go on to learn about Compilers and Operating Systems (CS and CS 333).

Accounts:
You will need a "CS account" to log in to the Linux systems (linuxlab.cs.pdx.edu) provided by the college. This is not the same as your PSU/OIT account.

If you don't already have a CS account, go to
https://cat.pdx.edu/users/getting-help/intro-to-mcecs-computing/
for instructions. The Linux labs are located in FAB 88-09 and FAB 88-10.

Mailing List:
There is a class google group for sending announcements and also for you to ask and answer questions with your classmates. Your .pdx.edu address is added automatically to this mailing list. You are granted conditional privilege to post to this list. If you post anything inappropriate (this means, in violation of your PSU usage agreement or PSU standards of behavior) you will be removed from this list and face disciplinary action.

Required Textbook

Brian W. Kernighan and Dennis M. Ritchie, "The C Programming Language" second edition.
Other readings will be assigned from freely available online sources.

Workload:
Reading assignments, practice exercises, homeworks (including written questions and programming).

Assessment:

7 Homeworks (42%; 6% each homework)
Midterm Exam (25%)
Final Exam (33%)

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 as soon as possible and preferably *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 assigned 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.

Kindness and Respect:

Kindness and respect are essential in a learning environment where by definition, we will all (except your class staff) start out ignorant of much or all of the material, and we will all (including your class staff) undoubtedly make mistakes along the way.

If you feel like your performance in the class is being impacted by your experiences outside of class, or by something in class making you uncomfortable, please don't hesitate to come and talk with me. Be aware I cannot keep some things confidential: Oregon law requires me to report abuse that anyone tells me about, and threatens me with jail if I don't comply. So if you are dealing with abuse, please talk with the folks in SHAC for confidential help:

https://www.pdx.edu/health-counseling/health

We may use technology for virtual meetings and recordings in this course. Our use of such technology is governed by FERPA, the Acceptable Use Policy and PSU's Student Code of Conduct. Your instructor will not share recordings of your class activities outside of course participants, which include your fellow students, TAs/GAs/Mentors, and any guest faculty or community based learning partners that we may engage with. You may not share recordings outside of this course. Doing so may result in disciplinary action.

OUR HEALTH

Any of us may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce your ability to participate in daily activities. Portland State University is committed to advancing the mental health and well-being of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of support, services are available. You can learn more about the broad range of confidential mental health services available on campus via https://www.pdx.edu/health-counseling/

SHAC also has resources for physical health, including a nurse hotline and flu shots.

If you are not feeling well, please consider the potential impact to others in the classroom and wear a mask or skip class as appropriate to your situation. Your instructor may wear a mask.

Access and Inclusion for Students with Disabilities

The Disability Resource Center (DRC) provides reasonable accommodations for students who encounter barriers in the learning environment.

If you have, or think you may have, a disability that may affect your work in this class and feel you need accommodations, contact the Disability Resource Center to schedule an appointment and initiate a conversation about reasonable accommodations. The DRC is at drc@pdx.edu, https://www.pdx.edu/drc.

- If you already have accommodations noted by DRC to remove barriers to your learning, please contact the instructor so we can discuss the details.
- Note: if you have accommodations to remove barriers during testing, please contact the instructor so we can plan a time and setting that works.