Overview: This course provides a programmer's view of how computer systems execute programs, store information, and communicate. It enables students to become more effective programmers, especially in dealing with issues of performance, portability, and robustness. It also serves as a foundation for courses on compilers, networks, operating systems, and computer architecture, where a deeper understanding of systems-level issues is required. Topics covered include: machine-level code and its generation by optimizing compilers, performance evaluation and optimization, computer arithmetic, memory organization and management, processes and concurrent computation, and networking technology and protocols.

List of topics, not necessarily in chronological order:

- Course overview: A tour of computer systems; Chapter 1
- Representing and manipulating information; Chapter 2
- Machine-Level representation of programs; Chapter 3
- Optimizing program performance; Chapter 5
- Memory hierarchy and caching; Chapter 6
- Processes and exceptions; Chapter 8
- Virtual memory and memory management; Chapter 9
- System level I/O; Chapter 10
- Concurrent programming; Chapter 12

Prerequisite: CS 52 and 62, or CS 60 and 70, or permission of instructor.


Web Pages: http://www.cs.pomona.edu/classes/cs105. Pay particular attention to the course Calendar—it will direct you to laboratory exercises, due dates, lecture slides, and other material.

We will be using Piazza for questions and discussion; follow the link on the course page and sign up there. The course assistants’ names and mentoring hours will be announced (soon!) on Piazza as well.

We will use Sakai only for recording laboratory grades. You may track your progress there.
**Laboratory:** The laboratory sessions are an essential part of the course. The exercises are fun and challenging; they really are the core of the class. Lab time will be used to get you started on the various experiments.

We do not intend that you complete the labs during the lab time, but rather that you get started and that you understand the details of each lab. The various web pages will be updated as the semester progresses. The labs are done in a pair programming paradigm. Adequate performance on all the labs is required to get a passing grade in the course.

You will choose a partner in the first laboratory session. We will assign partners for some of the later labs. Keep in mind that your best friend may not be your ideal partner. A few students come to CS 105 with no experience with the Unix command line and will face a bit of a learning curve early in the course. If you fall into that category, seek a lab partner who is comfortable with using the command line and pay close attention to the first two labs. (Good books for learning Unix are *Unix in Nutsell* and *Learning the UNIX Operating System*. Some good books on the C programming language are listed above under “Textbooks.”)

All laboratory exercises will be done—and graded—on project5.cs.pomona.edu, a computer that is configured for this class. Everyone registered should have an account when classes begin.

**Lectures:** This course investigates computer systems from the viewpoint of the programmer at the interface between the hardware and software. The lectures will assume that you have read related material from the text and thus that you come to class with questions and some knowledge.

For now, you may use your laptop or other device during lecture to take notes. This policy may change if computer use becomes distracting. Resist the temptation to use your cell phone or device for other purposes—like email, web browsing, games, texting, and so on. Electronic devices are not permitted during examinations.

**Instructor and Mentors:** Professor Bull, Everett.Bull@pomona.edu, Edmunds 127, extension 18709.

Office hours: Monday 1:15–2:30, Wednesday 4:00–5:00, and by appointment. Mentors and the mentoring schedule will be announced on the course web page and on Piazza.

**Requirements and Grades:** Finishing all the laboratory exercises successfully is required to pass the class. After that, grades are computed on a point basis, as follows:

- Participation, 5%.
- Laboratories, 40%.
- Two midterm examinations, 15% each
- Final examination, 25%.

The exams are the major component of your grade. Normally, most students get close to full credit on the labs, so grades are determined by the exams. You will learn some
of what you need to know in the labs, but you will also have to read the textbook and work the problems there.

There will be two midterm examinations October 4 and November 8. The final examination is scheduled for 2:00–5:00 pm on Friday, December 21. Note the late date of the final exam, and make your end-of-semester travel plans accordingly.

The majority of labs will be started in the laboratory sessions. It is your responsibility to complete the assignments and turn them in on time. If you are late, then we want the lab to include a statement as to the reason. We will evaluate your reasons and, when appropriate, deduct up to half the points.

**Disability Accommodations:** Pomona College is committed to providing equal opportunity for participation in all programs, services and activities. Requests for accommodations may be made by contacting the Disability Coordinator on your home campus. At Pomona College, that person is Associate Dean of Students Jan Collins-Eaglin. Pomona College’s policy on disability accommodations can be found at the Dean of Student’s website.

Accommodation forms must be submitted and accommodations agreed upon by the last day to add classes, or within five days of the date on which the form was signed by an appropriate dean, whichever comes later. Many accommodations will be handled through the Student Disability Resource Center in the Tranquada Student Services Center.

**Collaboration Policy:** Please read the department’s statement on academic honesty at www.pomona.edu/academics/departments/computer-science/courses-requirements/academic-honesty.

In general, collaboration is encouraged in this course. This means that you may discuss approaches to solving problems with anyone in this class, including faculty and lab assistants. As specified in the department policy, you may help, or receive help, in using systems and tools, in debugging code, and in working with high-level design issues. However, using material from any external source—web page or person or book—is forbidden. The actual solutions to the laboratory exercises and the code you submit must be your own and your partner’s. Except for material from the textbook or lecture, you may not copy, retype, view, or share a copy of any file. If you have any questions about what is appropriate or inappropriate collaboration, please speak with the instructor. When in doubt, credit your sources.

There will be stringent penalties for violations of academic honesty, up to failure in the course.

Course materials provided to you, including graded papers and exam summaries, are for your use in the course. You are encouraged to use them to the fullest extent, but you are not to publish them or distribute them to other people or organizations.