CS 241 - System Programming

Instructors:

For the past few semesters, Professor Lawrence Angrave has been teaching the course.

Prerequisites:

Officially CS 225 - Data Structures is a prerequisite. Credit or concurrent enrollment in CS 233 - Computer Architecture is also required.

When to Take It:

Many students take this course with CS 233 or directly after completing CS 233. Basic knowledge of Unix and C-based languages from CS 225 can come in handy for the course. There is little overlap in actual content covered between CS 233 and CS 241, but the course expects students to have good programming intuition.

Class Content:

Students learn the fundamentals of system programming using C. Course content differs from ECE 391 - Computer Systems Engineering in that Unix system calls are abstracted away, and assignments typically implement a portion of the POSIX C library (ie: malloc) or build on top of it.

The course begins with an overview of the quirks of the C language and the underlying system calls. Then forking and process control is covered, including the fork-exec-wait pattern. Memory allocation, heap vs stack memory follows. Then the course spends several weeks on threading and synchronization--there is heavy emphasis on using the pthread library, dealing with critical sections, and avoiding deadlock. After follows pipes and networking. Finally, the course ends with several lessons on the file system.

Professor Angrave has an excellent wikibook that he updates periodically for the course. It acts as the "textbook" for the course, so students interested in course materials should refer it.

Work:

Workload is heavier than CS 225 and CS 233. There is typically one lab assignment and one MP assignment due every week. Furthermore, lab attendance is mandatory for the section that students registered for. There are several bi-weekly multiple-choice quizzes at the Computer-Based Testing Facility, two computer-based midterms where students are expected to write code, and one final.

Life After:

CS 241 prepares students to take further electives covering low-level computing. For example, students may take CS 431 - Embedded Systems to learn more about microprocessors, CS 438 (ECE 438) - Communication Networks for further studies on networking, or branch to related topics such as CS 425 (ECE 428) - Distributed Systems and CS 461 (ECE 422) - Computer Security I.