Syllabus for CS 341L - Introduction to Computer Architecture and Organization, Fall 2007

Class meeting times:

9:30am-10:45am in Dane Smith Hall #132
You should be registered in and plan to attend regularly one of these three labs (unless you are a remote student, in which case arrangement will be made) in Engineering/Science Computer Pod 109:

12:00-12:50pm Wednesday
2:00-3:15pm Thursday
10:00-10:50am Friday

Instructor:
Jedidiah Crandall, crandall@cs.unm.edu
Office #FEC 345B
Office hours 1-4pm Tuesday and Thursday

Prerequisites:
241L and ECE 238L. You should be comfortable with C and with using a UNIX environment.

Required Text Book:
Patterson & Hennessy: Computer Organization and Design The Hardware/software Interface, 3rd ed.
Mailing List:

cs341l@cs.unm.edu

You need to join this mailing list or have me add you, the instructor or TA/Grader will only answer questions posted to the list, unless the question is personal in nature in which case it is okay to e-mail the instructor directly. Please do not post code or homework answers to the list, even if only partially complete. If we need to look at your code, we can take it off-line. Just remember that all of your classmates will see mail posted to this list.

Web Page:

http://www.cs.unm.edu/~crandall/341l/

TA and Grader:

TA: Hsien-Chieh Cheng (Bryan), Office hours 2-4pm Monday and Tuesday, FEC 345F

Bryan will be handling the Thursday and Friday labs

Grader: Sheng Feng (Sheng), no office hours

Sheng will be handling the Wednesday labs and will help with grading.

E-mail all questions that your classmates can see (e.g. I don't understand this assignment...) to the mailing list at cs341l@cs.unm.edu, e-mail all personal questions (e.g. I have to miss class next week...) to the instructor at crandall@cs.unm.edu.

Course Goals:

At the end of the semester you should understand the basics of computer architecture and be comfortable programming in assembly language, and most importantly you should have some knowledge about how architectural issues can effect the performance, security, and reliability of the software you write.

From the catalog: “Survey of various levels of computer architecture and design: microprogramming and processor architecture, advanced assembly language programming, operating system concepts and input/output via the operating system.”
Grading:

4 tests, each 12.5% of your grade, labs and homework- 25%, and the final is 25%.

Grades for individual tests will be on a curve so don’t panic until you see what the curve is (i.e. if you get back a score of 41/100 it might still be an A, or maybe not).

Late Policy, Attendance:

Late homeworks and lab assignments will not be accepted without prior arrangements. Do not miss class without making prior arrangements. If you must miss class (car trouble, etc.), e-mail me at crandall@cs.unm.edu just in case I assigned some homework during class. Please do not eat, talk on the phone, surf the web, chat, etc. in the classroom. If something urgent comes up (need to use the restroom, make a phone call, etc.) just go ahead and get up and leave the room for a few minutes, no need to get my permission.

You are expected to attend every lab session. Remote students will need to make some arrangements with myself and the TA/Grader on how we're going to administer the labs remotely.

Cheating and Collaboration:

All lab and homework assignments are individual efforts. Do not look at the code/solutions of others or share your code/solutions with them. You can discuss assignments at a high level only.

Tests are closed-book, closed-notes, and closed-neighbor. I’ll make sure that any equations or reference material you need is included on the test. Remote students and students with planned absences that give me a one-week notice will have special arrangements, everybody else needs to take the test in the classroom and turn it in before the period is up.

All UNM academic policies regarding these matters will be enforced.
Computer Access, Turning in the Lab Assignments:

You need to be able to log into and use the department Linux machines.

There will be a “turnin” script for turning in your lab assignments, details on how to use it will be available hopefully before the first lab.

Homework

Homework may be relatively light, or maybe not, depending on how the class goes and in particular how attendance goes. I will assign homework, if any, at the end of the lecture, and give instructions and the deadline for turning it in at the time I assign it (most will be either e-mailed to me or turned in as a hard copy at the beginning of the next class).
Tentative Schedule

August 21 – Administrativia, Intro to assembly and MIPS
August 23 – Registers, memory, basic operations (floating point arithmetic, etc.)
Lab - “Hello World” in MIPS assembly
August 28 - More MIPS assembly
August 30 – More MIPS assembly, microprogramming
Lab – Capitalizing strings in MIPS
September 4 – Performance measurement
September 6 – Test #1
Lab – Subroutines and calling conventions
September 11 - Datapath
September 13 – Control flow, branch prediction
Lab – Implementing AES in MIPS part 1
September 18 - Caching
September 20 - Caching
Lab - Implementing AES in MIPS part 2
September 25 – Test #2
September 27 – Pipelining
Lab - Implementing AES in MIPS part 3
October 2 – Pipelining hazards
October 4 – Superscalar
Lab – Compiling code into assembly and then modifying it
October 9 - More control flow; branch prediction, interrupts
Lab – no lab
October 16 - More on interrupts, kernel traps, exceptions
October 18 – Test #3
Lab – x86 instruction set and Linux system calls
October 23 – Virtual memory
October 25 – Virtual memory
Lab – Malware analysis
October 30 – Storage and networks
November 1 – Storage and networks
Lab – Hand optimizing compiled assembly code
November 6 – Memory bus, multicore
November 8 – Multithreading
Lab – Race conditions
November 13 – Caching revisited
November 15 – Caching revisited
Lab – Cache performance
November 20 – Virtual memory revisited
Lab – no lab
November 27 – Test #4
November 29 - DMA
Lab – DMA part 1
December 4 – Virtualization hardware
December 6 – Review
Lab – DMA part 2

Final is Tuesday, 11 December, 7:30 – 9:30 am