Welcome to Comp 411!

I thought this course was called “Computer Organization”

1) Course Mechanics
2) Course Objectives
Whos and Whats...

Lectures: Leonard McMillan (SN-311)
Office Hours Tu 2-3

TA: TBA

Book: Patterson & Hennessy
Computer Organization & Design
(However, you won’t need it until next week)
Course Mechanics

Grading:

Best 5 of 6 problem sets 25%
Best 9 of 10 Labs 25%
2 Quizzes 30%
Final Exam 20%

You will have at least two weeks to complete each problem set. Late problem sets will not be accepted, but the lowest problem-set score will be dropped.

Friday Labs are mandatory, and will meet on most Fridays, grade is based on completing a “lab check list.”

Quizzes are multiple choice.

I will attempt to make Lecture Notes, Problem Sets, and other course materials available on the web before class on the day they are given.
Announcements

- The first lecture will be held on January 9, 2013.

Course Description

Comp 411, Computer Organization, explores the topic of how computers work, in terms of both software and hardware. It covers a wide range of topics including what a bit is, and why bits are the atoms in the universe of computation. We also discuss how information is represented and processed in hardware, and arrive to the conclusion that, to a computer, everything is data, including the instructions that underly software.

http://www.cs.unc.edu/~mcmillan/Comp411S13
Goal 1: Demystify Computers

Strangely, most people (even some computer scientists I know) are afraid of computers.

We are only afraid of things we do not understand!

I do not fear computers. I fear the lack of them.
- Isaac Asimov (1920 – 1992)

Fear is the main source of superstition, and one of the main sources of cruelty. To conquer fear is the beginning of wisdom.
- Bertrand Russell (1872 – 1970)
Goal 2: Power of Abstraction

Define a function, develop a robust implementation, and then put a box around it.

Abstraction enables us to create unfathomable systems (including computer hardware and software).

Why do we need ABSTRACTION…

Imagine a billion --- 1,000,000,000
Understanding systems with >1G components

Personal Computer: Hardware & Software

Circuit Board: ~8 / system
1-2G devices

Integrated Circuit: ~8-16 / PCB
.25M-16M devices

Module: ~8-16 / IC
100K devices

MOSFET

Scheme for representing information

Gate: ~2-16 / Cell
8 devices

Cell: ~1K-10K / Module
16-64 devices
By now, you all know how to program

```c
int f(x) {
    int r;
    int odd = 1;
    for (r = 0; x >= odd; r++) {
        x -= odd;
        odd += 2;
    }
    return r;
}
```

What does this function do?
What does the computer do?

int f(x) {
    int r;
    int odd = 1;
    for (r = 0; x >= odd; r++) {
        x -= odd;
        odd += 2;
    }
    return r;
}

what does a computer do with a program?
Where we are going...

How is data represented, stored, and manipulated in a computer?

What basic operations does a computer use?

What does mean to “compute”?

Are there limits to what can be computed?

Why are computers so fast?

What am I asking a computer to do when I give it a program to execute?

How are programs translated into computer instructions?

Why are some programs faster than others that perform the same function?
Summary

411 answers the following questions:

How is information represented, stored, and manipulated by a computer?

What does a computer really doing with my program?

How to design, build, and manage large systems?

411 logistics:

M-W: lectures and discussions

F: ~2-hour Lab (starting next week 1/18)

Next time: What’s a bit?