CMPSC 210: Principles of Computer Organization
Course Syllabus Fall 2014
Allegheny College

Meeting Times: MWF 11:00-11:50 in Alden 101, lab T 2:30-4:20 in Alden 101
Instructor: Mr. John Wenskovitch
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Office: Alden 104
Office Hours: M 1:30-3:30; T 11-12; W 1:30-3:30; TH 11-12, 1:30-3:30; F 2:30-4:30

Course Catalog Description
An introduction to the basic organization and operation of computers, including logical structure, hardware components, machine and assembly language, and computer system performance. Topics include internal representation of information, instruction set architecture, instruction types and addressing techniques, computer arithmetic, memory systems, design and operation of the control unit, input/output devices and interfaces, assembly language and translation techniques, and modern architectural enhancements such as pipelining and multiprocessors. Special emphasis is on systems programming and assignments in a particular assembly language. One laboratory per week.
Prerequisites: Computer Science 112 officially (CMPSC 111 is sufficient).

Required Texts and Materials
- **Free Software:** MARS (http://courses.missouristate.edu/kenvollmar/mars/)
- **Free Software:** Logisim (http://ozark.hendrix.edu/~burch/logisim/)
- **Course Website:** http://www.cs.allegheny.edu/~jwenskovitch/teaching/CMPSC210/

Learning Objectives
In the Patterson and Hennessy textbook, several questions are listed at the top of page 8; by the end of this course, you should know how to answer them, at least in part:
1. “How are programs written in a high-level language, such as C or Java, translated into the language of the hardware, and how does the hardware execute the resulting program?”
2. “What is the interface between the software and the hardware, and how does software instruct the hardware to perform needed functions?”
3. “What determines the performance of a program, and how can a programmer improve the performance?”
4. “What techniques can be used by hardware designers to improve performance?”
5. “What are the reasons for and the consequences of the recent switch from sequential processing to parallel processing?”
You’ll also learn:

1. how to write, compile, and execute programs in the C programming language;
2. how to write, assemble, and execute programs in the MIPS assembly language (and, if time permits, a little bit about ARM and Intel assembly languages);
3. how different types of data (integer, floating-point, character, Boolean, etc) are internally represented and manipulated in a computer’s memory;
4. how to assemble basic logic gates into complex logic circuits (such as a processor datapath).

Teaching and Learning Methods

The main mode of learning in this class is reading the textbook and working assigned homework exercises from the text. Students are responsible for reading assigned portions of the textbook, whether or not the topics are discussed in class. Lectures provide explanation and emphasis for material and examples in the textbook. The instructor will ask questions to stimulate thinking and participation. Students’ comments and questions are highly encouraged. Internet resources will also be used to supplement lectures and discussions.

Grading and Evaluation

Your total grade for the course will be based on the following, weighted appropriately:

- Exams 1-3 (10% each)
- Final Exam (20%)
- Projects and Labs (30%)
- Final Project (10%)
- Attendance & Participation (10%)

Four exams will be given in this class, spaced roughly four weeks apart. The final will be cumulative, as later parts of the course will build on your knowledge from previous weeks. Graded homeworks will be given, collected at the end of every chapter of material. Raw grades for the exams are based on the accuracy and merit of the content. In addition, the grades for the exams will be affected negatively if the quality of language use or the mechanics of the calculations undermine the overall logic and credibility of the content.

There will be three programming projects assigned throughout the course, in addition to weekly labs. While you will have dedicated time to work on the labs during the lab sessions, the projects will be mostly external to the class meeting sessions.

The participation grade will be based on attendance (includes arriving on time, remaining until class is dismissed, and notifying the instructor in advance if you know you will be absent), asking pertinent questions demonstrating evidence of completing reading assignments, and participation in the class discussions and problem-solving sessions.
Late Policy

Every assignment has a due date and time. Failure to hand in the assignment by the deadline will result in a late submission penalty.

Assignments handed in within one week of the deadline will receive automatic grade reductions of 20% (in addition to any points deducted for errors). Assignments will not be accepted more than one week past the deadline, unless you can provide documented extenuating circumstances. Any extenuating circumstances must be documented through the Learning Commons, Counseling Center, Dean of Students office, Health Center, or other authoritative source.

If you are unable to attend class for any reason beyond illness or injury, you must make arrangements with me to turn in assignments before class. Exams must be taken at scheduled times. This includes the final exam. Please check the syllabus and with the instructor before making any travel plans for the end of the semester or around breaks. Missed exams will receive a grade of zero without a documented illness or emergency.

Honor Code

All students enrolled at Allegheny College are bound by the Honor Code. It is expected that your behavior will reflect that commitment. To this end, we expect that you will adhere to the following Department Policy:

Department of Computer Science Honor Code Policy

It is recognized that an important part of the learning process in any course, and particularly in computer science, derives from thoughtful discussions with teachers, student assistants, and fellow students. Such dialogue is encouraged. However, it is necessary to distinguish carefully between the student who discusses the principles underlying a problem with others, and the student who produces assignments that are identical to, or merely variations on, someone else’s work. It will therefore be understood that all assignments submitted to faculty of the Department of Computer Science are to be the original work of the student submitting the assignment, and should be signed in accordance with the provisions of the Honor Code. Appropriate action will be taken when assignments give evidence that they were derived from the work of others.

You are encouraged to periodically review the specifics of the Honor Code as stated in the College Catalogue, The Compass, and elsewhere.

Disability Statement

Students with disabilities who believe they may need accommodations in this class are encouraged to contact Student Disability Services (SDS) at (814) 332-2898. SDS is part of the Learning Commons and is located in Pelletier Library. Please do this as soon as possible to ensure that such accommodations are implemented in a timely fashion.
Participation Evaluation

While it is difficult to quantify the success of a student’s contributions to class discussion (at our best we all of course contribute differently), here are the general standards I will use to grade participation:

**A range:** Participation at this level is marked by its active nature, its consistency, and its quality. When A participants read an assignment, they prepare to participate in a class discussion; they read the assignments fully, carefully and critically enough to be ready not just to respond to my questions but also to initiate discussion with comments and questions of their own. Such participants will also come to class ready to make and argue assertions about the reading and to think out loud about a text’s relation to its contexts; they will attend to the comments of others in class, agree, elaborate or civilly disagree with them, bring our attention to passages from the reading to make their point and at times connect such thinking with earlier readings or previous class discussions. In short, students who by their engagement in class discussion throughout the semester show themselves to be true students of the course material--persistently conscientious and inquiring--will get an A for their efforts. They will also make the course a lot better. (By the way, substituting quantity of participation for quality will not work.)

**B range:** Students who come to every class, have almost always done all the reading, and consistently respond to the questions of others in a way that demonstrates their command of the reading will earn a B participation grade. What separates this effort from an A one is not so much quantity (teachers are remarkably good at detecting BS) as the level of preparation--one's reading and thinking--that has gone on before one gets to class, especially the kind that enables students to initiate discussion. But you can't get a B participation grade by just showing up, either, or by talking every once and a while.

**C range:** A C participant comes to almost all the classes, usually has done most of the reading most of the time, but not with the energy necessary to demonstrate through participation their ongoing engagement with the material. Such a discussant contributes infrequently, maybe one time every week.

**D range:** Automatic pilot mode. You were physically there most of the time, spoke a few times all semester maybe, but that was it.

**F:** Not coming to class is the traditional route.

**Please Note:** Students who are reluctant to talk in class can partially compensate for their silence by e-mailing me comments and questions about the reading before the class discussion of it. If you define yourself as “shy,” though, please don’t convert this definition into permission not to talk. People get “writer’s block” but still must hand papers in on time; others have “test anxiety” and take tests. In this class, participating in discussions is an obligation as important as test and papers, so keeping mum isn’t really an option for those who expect to succeed.

(Credit for this participation policy goes to Prof. Ben Slote, English Department)
Email
“The use of email is a primary method of communication on campus. ...All students are provided with a campus email account and address while enrolled at Allegheny and **are expected to check the account on a regular basis.**” [The Compass, the Allegheny College student handbook]

I will occasionally need to send out announcements to the class with items such as clarifications, changes in the schedule, or other matters. I will use your Allegheny College email account to do this. It is your responsibility to check your email (I suggest at least once a day) and to make certain that your email is working correctly (able to send and receive messages). Please include “CMPSC210” in the subject line when emailing me questions.

You can count on my reading and responding to emails from roughly 10AM to 6PM, Monday through Friday, although I will certainly check at other times.

Structure of the Semester
This is a rough outline of the topics covered this semester. A detailed version will be updated at: [http://cs.allegeheny.edu/~jwenskovitch/teaching/CMPSC210/schedule.html](http://cs.allegeheny.edu/~jwenskovitch/teaching/CMPSC210/schedule.html)

Some shifting in the schedule of topics is possible, but the exam dates are firm.

Course Structure
Weeks 1-2 – Performance
Weeks 2-5 – MIPS Language
Weeks 6-7 – Internal Representation of Data
Weeks 8-11 – Datapath and Control
Weeks 12-15 – Additional Topics

Exam Dates
Exam 1 – September 19
Exam 2 – October 10
Exam 3 – November 7
Final Exam – December 16, 9:00AM