CSCI 281: Assembly Language & Computer Architecture

Professor
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Thompson 390E
Office MW 12:05-1:00
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Meetings
We will meet MWF 11:15-12:05, online. The final will be on Wed. Dec. 16th at 12:00.

Course Description
This class is about creating a real, physical machine that runs code. Whenever you write a program, it needs to be translated by the computer into a form that it can run. This “machine code” looks like a stream of raw data, and is not easily readable by people. However, assembly language is an intermediate between high-level languages like C and Java, and the raw machine language. It can be read by humans, but its flow is much more oriented toward the computer’s point of view. Assembly language is specific to the kind of processor a computer uses (e.g. x86, ARM, or MIPS).

Even machine code eventually needs to be translated, down to the physical streams of electrons that make a computer compute. We will learn how chips work, and experiment with some basic circuit designs.

Topics Covered ("Learning Outcomes")
By the end of this class, you will be able to understand and use:

• Basics of the C programming language.
• Digital logic.
• Hardware design.
• MIPS assembly language.
• Memory addressing.
• Pipelining of instructions.
• Caching and virtual memory.
• Pros and cons of different architectures (especially RISC vs. CISC).

Web Page
The class web page is located at http://cs.pugetsound.edu/~aasmith/cs281/. Valuable info and links will be posted there, including the complete homework schedule.

Text
We will be using “Computer Organization and Design”, by Patterson and Hennessy. You may use either the 4th or 5th edition.

Prerequisites
You should have already passed CSCI 261 or its equivalent, with a C- or higher.

Course Policies
There will be twelve assignments over the course of the class—usually one each week. You are free to talk to others in the class about them, but I expect what you finally turn in to be 100% your own work.

Assignments will be penalized by 20% for each working day (or fraction thereof) they are late, down to 40%. However, you will have five “extension days” during the semester to extend a deadline by one working day. These are intended for unforeseen circumstances, and will be used automatically unless you specify otherwise. The hard deadline for all assignments is the beginning of the last class before the relevant exam. (This is so that I may release the answer keys.) After that, I will not take any more assignments, regardless of extension days.

There will also be a course project toward the end of the semester. This is a self-directed project, expanding on one of the areas we have covered. You may work in
pairs, if you wish. One-paragraph proposals will be due in November, and the project itself will be due on the last day of class.

You all should be aware of the Honor Code at the college. Please do not cheat—it will not go well for you. *Any suspected cheating will be immediately reported.*

Exams are closed book, and will be cumulative. You are allowed a calculator (or your phone, so long as it is in “airplane mode”) and one two-sided, letter-sized page of notes. They will be graded on a curve, with the highest score considered to be 100%.

**Grading**

Final grades will be determined as follows:

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<thead>
<tr>
<th>Component</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Homeworks</td>
<td>25%</td>
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<tr>
<td>Project</td>
<td>10%</td>
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<tr>
<td>Midterm 1</td>
<td>20%</td>
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<tr>
<td>Midterm 2</td>
<td>20%</td>
</tr>
<tr>
<td>Final</td>
<td>25%</td>
</tr>
</tbody>
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In particular, notice how heavily weighted assignments are. *Missing assignments is the easiest way to get a lower grade.* Please be sure you do them, and on time. In addition, class participation and effort may help bump you up, if your final grade is borderline.

**Attendance**

I will not be keeping attendance (except on the first day). However, odds are that your attendance will correlate highly with your final grade.

**Miscellany**

If there are any special holy days that you will be taking off, please let me know as soon as you can so that we can work around them.

Consider getting a flu shot. *This is especially true this year. You don’t want to worry that you might have been infected with covid.*

Please remember to be kind to one another. With covid, we are in an entirely unprecedented situation. Also please remember that you are all here to learn. None of you are masters of this material yet, and there’s no need to make things difficult for others.

**Required Boilerplate UPS Info**

*Student Accessibility and Accommodation:* If you have a physical, psychological, medical or learning disability that may impact your coursework, please contact Peggy Perno, Director of Student Accessibility and Accommodation, 105 Howarth, 253.879.3399. She will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential.

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*Bereavement:* Students are normally eligible for, and faculty members are expected to grant, three consecutive weekdays of excused absences, without penalty, for the death of a family member, including parent, grandparent, sibling, or persons living in the same household. Should the student feel that additional days are necessary, the student must request additional bereavement leave from the Dean of Students or the Deans designee. In the event of the death of another family member or friend not explicitly included within this policy, a bereaved student may petition for grief absence through the Dean of Students office for approval. To request bereavement leave, a student must notify the Dean of Students office by email, phone, or in person about the death of the family member. When bereavement leave is approved, the Dean of Students office will notify the student and the Office of Academic Advising. In turn, Academic Advising will notify the students instructors and advisor of the dates of the excused absences for bereavement leave. When the student returns from leave, the student must submit to the Dean of Students office an obituary notice, a funeral or memorial program, or other documentation regarding the death of a family member. While this policy excuses a student from class attendance, the student remains responsible for missed academic work. Therefore, the student is to seek the advice of each instructor to consider the options and to establish a plan to compensate for coursework missed during bereavement leave. For more information, please contact the Dean of Students office.

Finally...if there’s anything else I can do to help you, please let me know. I’m willing to go out of my way to make this a valuable class for you, but I can’t do that unless you talk to me.