$\preceq$ COMP 220 Computer Organization & Assembly Language $\succeq$

M-W-F	*Lecture* – 10:30-11:20
W	*Lab* – 3:30-5:20

Who:	Michael Gousie
Where:	Science Center 102
When:	Mon 2:00-3:00; Tue 2:00-4:00; Fri 11:30-12:00 and by appointment
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Content:

We will explore the basic workings of computer hardware, and how different architectures affect performance. An important theme of the course is to understand how data flows through the computer. We will cover low-level assembly language programming (in SPIM) as well, using computers running Linux. Weekly labs put lecture concepts to immediate use in designing parts of the hardware (such as an adder) and writing programs in assembly. By combining architecture and programming, the relationship between the hardware and software will be made more obvious. This, in turn, will give you an understanding of how the way you write programs in high-level languages affects performance.

Connection:

CONX 2022 - Computer Architecture is a two-course connection that combines this course and PHYS 110 - Electronic Circuits.

Required Text:

Patterson and Hennessy. *Computer Organization and Design*, 4^{th} Edition, Morgan Kaufmann, 2009. *Be sure the CD-ROM is included.*

Recommended Text:

Britton. *MIPS Assembly Language Programming*. Pearson Prentice Hall, 2004. Alternatively, there are MIPS tutorials and examples available online.

Requirements:

There will be 2 exams during the semester and a comprehensive final exam. The exams will comprise 50% of your grade. Exams will take place during the afternoon lab time.

We will also cover some assembly language programming, for which you will hand in 3 small projects, the first two worth 6% each, and the third worth 8%. The *MIPS* text is a valuable reference for these programs. Due dates for these projects will be announced in class.

Five or six written homework assignments, roughly one week in length, will comprise 20% of your grade. Due dates for all homeworks will be announced in class.

Some labs may have a graded component that will be added to the homework or project that is next due.

The remaining 10% of your grade will be a 5-7 page paper on a topic involving emerging computer technology. The paper will be in done in a format similar to what is seen in computing journals. You will also give a short presentation of your work during class, as if you were presenting your paper at a conference. The presentation will be a significant portion of the grade. The paper is due near the end of the semester.

Grading:

Grades will be assigned according to the following scale:

A = 93-100, A- = 90-92, B+ = 87-89, B = 83-86, B- = 80-82, etc.

Exam Schedule:

Exam	Weight	Date
Exam 1	15%	February 24
Exam 2	15%	April 7
Final	20%	May 12 @ 9 AM

Course Policies:

- You are responsible for all material covered in class, including the reading (shown below).
- You should bring your heavy book and calculator to class, especially when we cover Chapter 4.
- If you must miss a quiz or exam for any reason, you must inform me BEFORE the test. Except in the case of emergency, illness (almost death), or you've fallen off one of Wheaton's spires, makeup exams will not be given.
- Homework due dates are FIRM. Homework must be handed in at the start of class on the due date. There are **no** provisions for late homework.
- Programming assignment due dates are FIRM as well. All assignments must be submitted electronically by 11:59:59 PM on the due date. Assignments submitted on the following day will receive a 15% penalty. Anything turned in later will receive a 0. Hard copy must be submitted the following day or as indicated in the program specifications.
- You are expected to adhere to the Honor Code.
  - Although *discussion* of projects or homework is encouraged, the final *implementation* of programs should be the result of your own work. Any copying of programs or homework is prohibited.
  - Collaboration on exams is prohibited.
  - You will be required to write and sign the pledge on all work turned in: *I have abided by the Wheaton Honor Code in this work.*
  - Any violation of the above guidelines will result in a 0 for the project/homework and/or a failing grade for the course.
- The use of cell phones, iPods, and other personal electronic devices is prohibited during class and lab.

Course Schedule:

Wk #	Week Begin	Topic	Reading	Lab
	January			
1	24	Introduction	Sections 1.1–1.3, slides (available on Web page)	Optional
2	31	Performance	Sections 1.4–1.10	Linux/performance
	February			
3	7	Low level instructions, SPIM	Chapter 2	SPIM
4	14	SPIM	Appendix B	SPIM
5	21	Numbers, digital logic	Sections 3.1–3.4	Exam 1
6	28	Arithmetic	Appendix C (available on CD in text)	Digital logic
	March			
7	7	Floating point arithmetic	Sections 3.5–3.10	Circuit simulator
8	14	*Spring Break*		Ski bumming
9	21	More SPIM	Appendix B	SPIM
10	28	The CPU	Sections 4.1–4.2	Knob & Switch Computer
	April			
11	4	More CPU	Sections 4.3–4.4	Exam 2
12	11	Pipelining	Sections 4.5–4.13	Circuit simulator
	⇒4/16⇐	**No class!**		
13	18	Memory	Sections 5.1–5.5	Circuit simulator
14	25	Cache memory	Sections 5.6–5.13	Hardware
	May			
15	2	Storage ’n stuff	Selections in Ch. 6	Presentations
16	9	Final Exam, May 12 @ 9 AM	Go home!	