

CSE 30321: Computer Architecture I

Logistics:

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Course Time: Tuesday, Thursday 11:00 a.m. – 12:15 p.m.

Course Location: Hayes Healy Center 127

Website: <http://www.cse.nd.edu/courses/cse30321/www/>

Texts: (1) David A. Patterson and John L. Hennessy, Computer Organization and Design: The Hardware/Software Interface, 4th Ed., Morgan Kaufmann Publishers, ISBN 978-0-12-374493-7;

Course Goals:

By the end of this course you should be able to:

1. Describe the fundamental components required in a single core of a modern microprocessor as well as how they interact with each other, with main memory, and with external storage media.
2. Suggest, compare, and contrast potential architectural enhancements by applying appropriate performance metrics.
3. Apply fundamental knowledge about a processor's datapath, different memory hierarchies, performance metrics, etc. to design a microprocessor such that it (a) meets a target set of performance goals and (b) is realistically implementable.
4. Explain how code written in (different) high-level languages (like C, Java, C++, Fortran, etc.) can be executed on different microprocessors (i.e. Intel, AMD, etc.) to produce the result intended by the programmer.
5. Use knowledge about a microprocessor's underlying hardware (or "architecture") to write more efficient software.
6. Explain and articulate why modern microprocessors now have more than one core and how software must adapt to accommodate the now prevalent multi-core approach to computing.

Grading Policy:

Homework	20%	~8 in all – so each is about ~2.5% of your overall grade
Labs	25%	~5 in all – so each is about ~5% of your overall grade
Final Project	10%	
Midterm	20%	Tentatively the week before fall break
Final Exam	25%	

Between the midterm and the final exam, I will post estimated course letter grades ~4-5 times. You should not consider the grade you receive during these postings as “your final grade”. Rather, they are just meant to give you a good estimate as to where you stand in the class.

Late Policy:

Each student receives 3 days that can be used if extra time is desired to complete a homework assignment or lab. Whenever using one or more of these days on an assignment, you must communicate this to me **prior to the assignment deadline**. Each extra day extends the deadline by 24 hours. The assignment can then be submitted by e-mail. (Note that a hard copy of the assignment is OK too – and quite honestly preferred – but I must have it in hand before the extended due date/time.) No late homework beyond the 3 extra days is accepted. Exam dates, final project deadlines, and any lab demonstration deadlines are firm and *cannot* be extended with late days.

More specifically, **hard copies** of homework assignments and labs will be due at the end of a given class period. If you wish to use a late day, you’ll need to email me before 12:15 pm. (*Note the emphasis on hard copies.* If you are not using a late day, **do not e-mail me your assignment**. Ultimately, we need a hard copy for a TA to grade and for assessment purposes. Emailing the assignment to us only creates more work and sometimes results in missing assignment grades.)

Other common questions and answers about late days:

- Q:** Do I need to explain why I am using a late day?
A: No. Just email me and tell me “I want to use a late day” ... but do it before 12:15 pm on the day the assignment is due.
- Q:** If I email you at 12:17 is that close enough to the 12:15 due date / time?
A: No. I am actually quite strict about this point as I find it’s the only way to be fair to everyone in the class. For example, what happens if the next person emails me at 12:20 or at 12:25? It’s only a few more minutes right? This is a slippery slope that I will avoid. If you don’t turn in the assignment by the due date, and you don’t request a late day, you will not receive any credit for the assignment.
- Q:** What if I have a university excused absence? Do I have to use a late day?
A: No. If you have approved university travel, an approved university medical excuse for missing class and/or an assignment, etc. you don’t need to use your late days.
- Q:** Will you acknowledge me email requesting a late day?
A: 95% of the time I will. However, there are times when I am just inundated with emails and forget to send you the requisite “got it” email. Rest assured, it will get recorded though. There has never been a case where someone claimed they requested a late day and I didn’t record it.
- Q:** Can I use multiple late days for the same assignment? (e.g. to extend a deadline by 48 hours)
A: Yes. Just let me know that you are using a second late day *before* the first 24-hour extension expires.

Homework Collaboration Policy:

- Generally, there will be an assignment due every 1-2 weeks. I was once an undergraduate too so I do try very hard to take university holidays, etc. into account.
- Homework assignments may be done in **groups of 4 or less** unless otherwise instructed.
- Whether the write up can be done as a group or individually will be noted in the assignment.

Lab:

- Will begin the week of September 7th. TAs will be available in a location to be announced in class.
- Will be conducted in **groups of 2** unless otherwise noted.
- Will require some kind of write up (a list of questions to answer, a more formal report, etc.) and perhaps a demonstration.
- Reports and demos will usually be due as noted in each lab handout.
- More often than not, it will not be necessary to do work associated with a given lab during your lab time. However, in the past, most students have found it useful to attend lab as a TA is present and questions can be answered immediately as you and your partner get started.
- Labs will be due on Thursdays, in class, by 12:15 pm.

Final Project:

- For your final project, you will be allowed to work in **groups of up to 4**; note that I'll expect "more" from a group of 4 than from a group of 2. (So don't think you can try to divide a smaller amount of work up over more people. Again, I was an undergraduate once too and I know your tricks.)
- I'm well aware that some students in the class are more interested in hardware and others are more interested in software. The final project has been designed so that it can be tailored to one interest or the other (depending on your group's interests) but still be very computer architecture centric. I encourage you to craft a project based on your longer-term career interests.

Re-grade policy:

- Requests for re-grades will be considered up to 2 weeks from the day an assignment has been returned and solutions have been posted. After this, no re-grades will be considered.
 - o (So, later in the semester, if you think you are close to a grade boundary, don't try to bring a stack of assignments back to be regarded in an attempt to "fish" for extra points.)

Where can I get help if I need it?

- I'll have office hours twice each week.
 - o On one day (Monday, 2:00 – 3:30 pm) office hours will be somewhat "traditional" – i.e. I'll be in my office for 1.5 hours and you can stop by and ask questions.
 - o On another day (Thursday, 5:00 – 6:30 pm) office hours will be somewhat less traditional – i.e. I will be at Reckers for ~1.5-2 hours in the evening. On these days, I encourage you to come by and just work on a given assignment or lab. If you have questions, you can stop by and ask while you're working.
- If (in a given week) office hour times are not convenient, we can always set up a specific appointment time.
- You are quite welcome to stop by my office at your convenience too. However, be forewarned that I have other meetings and appointments too and may not always be free. If this is the case, 99% of the time we can just quickly agree on another time. 1% of the time I may be on a call or in a meeting that cannot be interrupted so I may ignore the knock on the door. Don't take it

personally – if this happens, just send me an email telling me what happened and we'll find a time to meet.

- All TAs (graduate and undergraduate) will also have office hours. Specific times will be posted on the course website.

Special Notice:

Do be aware that at the very beginning of this semester (i.e. the first 2-3 weeks or so), I will not be found in office as frequently as I will be for the rest of the semester – as my wife and I are expecting a baby girl on August 29th. However, I do intend to keep office hours as discussed above a week or so after she arrives. I can always communicate via email too at any time – but it may take me a few days to respond around August 29th ☺.

Honor Code

- Students are expected to understand and abide by the principles and procedures set forth in the University of Notre Dame Academic Code of Honor (<http://www.nd.edu/~hnr/code/>) and uphold the pledge that “As a member of the Notre Dame community, I will not participate in or tolerate academic dishonesty.”
- I am a stickler about the ND Honor code. When in doubt about whether or not something is allowed or not, don't assume that you are right – ***ask me first.***