

CSCI 2321 (Computer Design), Spring 2021

Syllabus

1 Course description

This course is about computer organization and design, emphasizing logical design and including the role of performance, the structure of instructions, computer arithmetic, processor control, and methods of performance enhancement. Some attention will also be given to assembly-language programming.

Course goals

- A better understanding of how computers work internally — how they are structured and how the various components work, at the level of logic gates (which implement a form of Boolean algebra).
- An understanding of the relationship between hardware and software.
- An understanding of assembly-language programming and how it relates to programming in high-level languages.
- An understanding of what factors influence performance.

Course topics

- Overall organization of computer hardware.
- Basics of processor performance.
- Basics of the MIPS instruction set and assembly-language programming using it.
- Basics of processor design, via a discussion of how the MIPS instruction set could be implemented.
- Additional topics as time permits (e.g., more performance enhancements, the memory hierarchy, hardware support for parallelism, etc.).

2 Basic information

Class meeting times and location

- MW 2:30pm – 3:45pm, via Zoom (section 1)
- MW 3:55pm – 5:10pm, via Zoom (section 2)

Prerequisites

- CSCI 1321 and CSCI 1120.

Instructor contact information

- Dr. Berna Massingill
- Office: CSI 270J (not really applicable this semester)
- Office phone: (210) 999-8138
- E-mail: (Use the address TMail has for me.)

Office hours

This semester I plan to have office hours via Gather. Hours and a link to the department's Gather space can be found on my home Web page <http://www.cs.trinity.edu/~bmassing>. If none of the listed times work for you, please get in touch by e-mail and we can negotiate about other options.

Also, e-mail is almost always a good way to reach me (really probably the best way); I normally check it fairly often and reply to student questions as promptly as I can. (You can help by using a subject line with the word "question". Like a lot of people these days, I get a lot of e-mail, and we don't want messages that are important to you to get lost in the clutter!)

3 Course materials

Web site

Most course-related information (this syllabus, homework and reading assignments, etc.) will be made available via the course Web site. You can find it linked from my home page <http://www.cs.trinity.edu/~bmassing> (which is usually easy to find with a Web search on my full name) or directly at http://www.cs.trinity.edu/~bmassing/Classes/CS2321_2021spring/HTML/; there is also a link in TLearn. *A request:* If you spot something that doesn't seem right, such as a broken link, please tell me about it!

Textbook

- David A. Patterson and John L. Hennessy. *Computer Organization and Design: The Hardware/Software Interface*. Morgan Kaufmann Publishers, sixth edition, 2020.

4 Course requirements

Grading

Grades in this course will be determined by scores on a major exam, several reading quizzes, several homework assignments, and class attendance, weighted as follows.

| Component | Perfect-score points |
|------------------|----------------------|
| Final exam | 200 |
| Reading quizzes | about 80 |
| Homework | about 300 |
| Class attendance | 20 |

Numeric grades will be calculated as a simple percentage, by dividing total points earned on the above components by total perfect-score points. These numeric grades will then be converted to letter grades in a way that takes into account the performance of all students, but in no case will the resulting letter grades be worse than you would receive based on the following scheme.

| Numeric grade | Letter grade |
|---------------|--------------|
| 90 – 100 | A-/A |
| 80 – 89 | B-/B/B+ |
| 70 – 79 | C-/C/C+ |
| 60 – 69 | D/D+ |
| 0 – 59 | F |

Exams

Exams are comprehensive but will emphasize the most recent material. This semester they will be essentially take-home and untimed, and you will have at least a few days between when the exam is made available and when it is due. Dates will be announced in class and via the course Web site.

Homework assignments

Homework is an important part of this course; some (perhaps much) of what you learn will likely be learned in the course of completing the assignments. Some assignments will require programming; others will not. Detailed requirements will be provided as part of each assignment; due dates will be announced via the course Web site. For programming assignments, you are encouraged to use the department's network of Linux machines, including ITS's new Linux virtual desktop, since everything you need is installed there, and that's the environment in which I test. However, unless otherwise specified for individual assignments, you may use any other system that provides a suitable environment. (Details about setting up suitable environments will be provided via the course Web site, under "Links and other resources".)

Note that every assignment asks you to do two things in addition to the assigned problems: You must pledge the work and document any collaboration, as described in the assignment, and you must include a short essay commenting on anything you found noteworthy about it.

Reading quizzes

In addition to homework assignments, in which my intent is for you to apply and even extrapolate from material from reading and lectures, this semester I will also be assigning reading quizzes, to encourage you to actually read assigned material and understand it. These will consist of mostly short-answer or essay questions to be answered solely based on the reading (i.e., it's okay to find things with its index, but no Web searches). There will likely be eight to ten of them over the course of the semester, each worth 10 points or so.

Attendance

Regular class attendance is strongly encouraged, and part of your grade is based on it. I recognize, however, that not all students are on campus or even in the US, and for some it may not be reasonable or even possible to participate in scheduled class meetings. I plan to record all class meetings via Zoom, so if you miss a class for whatever reason, you can watch the recording at another time. (Because of this, I expect that even if circumstances would normally allow an excused absence — conflict with a religious holiday, e.g., or illness during this pandemic — you will watch the recording when you can.) I track attendance by asking you to complete a "minute essay" at the end of each class. This consists of one or more short questions, which I ask that you answer by e-mail. You can do this at the end of the Zoom meeting or after you watch the recording.

E-mail

I frequently communicate important or useful course-related information by sending e-mail to the Trinity e-mail addresses of all registered students, almost always with a subject line that begins with the course number (e.g., "csci 1120"). I therefore strongly encourage you to keep up with your Trinity e-mail. If you find that these course-related messages get lost in your inbox, TMail allows setting up filters to put messages that match specified criteria into its equivalent of folders, and I encourage you to do that to help manage these messages.

Late and missed work

Unless otherwise stated for a particular assignment, assignments will be accepted up to one class period late, *but no more*, at a penalty of 10 percent off per working day. For homeworks only, this penalty will be waived if you submit a preliminary version of the assignment on time and a revised version no more than one class period later. It may also be waived or additional time allowed *at the instructor's discretion* in cases of illness, conflict with a university-sponsored activity or religious holiday, or other circumstances beyond your control. In semesters past I've quoted a retired colleague:

If you have unusual circumstances (as we all sometimes do), please discuss these with me as far in advance as possible.

and I suspect that this semester more of you than usual will indeed have unusual circumstances, ranging from problems with technology to family emergencies. Keep me informed and I will try to work with you. (Be advised, however, that being too busy with other classes does not count as “unusual circumstances”.)

Academic integrity at Trinity

What Academic Affairs recommends that I say:

All students are covered by a policy that prohibits dishonesty in academic work. Under the Honor Code, a faculty member will (or a student may) report an alleged violation to the Academic Honor Council. It is the task of the Council to investigate, adjudicate, and assign a punishment within certain guidelines if a violation has been verified. *Students are required to pledge all written work that is submitted for a grade: “On my honor, I have neither given nor received any unauthorized assistance on this work” and their signature. The pledge may be abbreviated “pledged” with a signature.*

You will be asked to do this explicitly on everything you turn in for this course. If this strikes you as burdensome and pointless, consider the following words, also from Academic Affairs:

Signing the pledge indicates that students have taken ownership of their intellectual property; like an artist signing a painting, the pledge signals pride in a job well done.

I like this perspective!

Collaboration and academic integrity in this course

Unless otherwise specified, all work submitted for a grade (homework assignments, reading quizzes, and exams) must represent your own individual effort, except as discussed below. All submitted work will be considered pledged work.

For most assignments, getting help is allowed and even encouraged, but not to the point where the helper is providing answers you just transcribe. Similarly, discussion of homework assignments among students is allowed, but not to the point where detailed answers are being written collectively. If you are working with other students in a lab, seeing another student's work may be unavoidable, as it may be if you're working together via Zoom or Gather, but please do *not* share answers electronically in a way that would be make it too easy (and tempting) to just copy and paste. Specifically, please do *not* just mail each other whole code files. share with another student a screen containing your code.)

For a few types of assignments (such as extra credit), the rules are stricter; these exceptional cases will be noted with individual assignments.

However you get answers, you should write or type them up yourself. More importantly, *you should completely understand everything you turn in*, and by turning it in you are implicitly saying that you do.

Graded papers and sample solutions (to exams, reading quizzes, and homeworks) from previous semesters, for this course or other courses I teach, are *strictly off limits*. For most assignments I will post a sample solution after the due date; *these solutions are also off limits*. (Normally this isn't an issue because of timing, but if for some reason you must turn in work very late, it could be.)

Answers that are identical beyond coincidence (either to another student's work or to a sample solution) will be considered to be in violation of the Honor Code, and *will result in appropriate action*.

You will be asked to document any collaboration; details will be provided with assignments. If you are uncertain about whether a particular level of collaboration is acceptable, please ask for clarification.

Note that the major exam for this course will be exceptions to the general rules about collaboration; you will be asked to work completely individually, with restrictions on what sources you can consult. Details will be provided before the exam.

5 Computer resources

Normally in this section I say the following:

As most of you know, the department maintains a network of computers to be used for coursework and research; it includes machines in the classrooms, machines in the other labs, and several server machines housed by ITS. Machines in the classrooms and labs are available for in-person use whenever the room is not in use for a class or other event; all are also available for remote use whenever the appropriate operating system is running. Linux computers in the Server machines should be available all the time. (More information about these computers can be found at [my Web site about department computers](#).)

For this course I strongly encourage you to use these computers for any homework that requires use of particular tools, since they provide a reasonably standard environment with the needed tools already installed. To report problems with the computers or with your account, it's probably best to get in touch with me (by e-mail if it's outside office hours); if I can't resolve the problem myself I'll pass it on to the appropriate person(s) in ITS.

With so many of us teaching and learning remotely this semester, however, we have to consider other options. One is to access department computers remotely using ITS's virtual desktop environments; in addition to the long-available Windows desktop from which you can access our Linux computers via PuTTY, they now support a Linux virtual desktop, configured just like the department classroom/lab Linux computers. Another is to work primarily on your own computer. Details of options for doing that will be provided via the course Web site.

6 More from Academic Affairs

Academic Affairs recommends that I tell you the following:

Title IX reporting

Text from Academic Affairs:

As a Responsible Employee who is committed to creating an environment where every member of our community can thrive, I want to let you know that I am a Mandatory Reporter. What that means is that I am required to report any instances of sexual misconduct, including sexual harassment, non-consensual sexual intercourse, non-consensual sexual contact, sexual exploitation, intimate partner violence, stalking, and related retaliation that I am aware of to the Title IX Coordinator. So, if you share information with me about any incidents that implicate the Sexual Misconduct or Anti-Harassment Policies, I am required to report all information to the Title IX Coordinator to make sure you have information about support resources and complaint resolution options. My report does not initiate the complaint process, and you are in control over how you choose to engage with our Title IX Coordinator. If you or someone you know has experienced sexual misconduct, including sexual harassment, I encourage you to share this information directly with the Title IX Coordinator or one of the individuals who has been designated as a confidential resource on campus. Information about reporting is available [here](#).

The current Title IX coordinator is Ms. Angela Miranda-Clark.

Academic support

Text from Academic Affairs:

Trinity faculty hold students to the highest academic standards, but we also know that the very best students seek out help when necessary. The following resources are in place to support your academic success; learn more at gotu.us/success.

I encourage you to take advantage of any that look useful! (Some are irrelevant for this course, but you might want them for other courses.)

Electronic recordings of course instruction

Text from Academic Affairs:

The COVID-19 pandemic requires the delivery of online instruction. For this reason, please be aware that all classroom instruction, including student participation in classroom activities, is subject to recording and dissemination on the University's secure course management system (T-Learn). The recordings will be made available only to students enrolled in the course to facilitate online learning and review. Students are expressly prohibited from capturing or copying classroom recordings by any means; violations will be subject to disciplinary action. Instructors who wish to use a recording outside of class must obtain the written consent of any students who are personally identifiable in the recording.

I'll be making recordings available via Google Drive rather than T-Learn, but as far as I know this is deemed acceptably secure, and of course recordings will not be made in the actual classroom, but the principle is the same.