

CSEE 3827: Fundamentals of Computer Systems

Fall 2017

<https://courseworks2.columbia.edu/courses/38324>

1 Course Overview

Summary

This course examines how the 1s and 0s that form the foundation of digital computing are organized, structured, and manipulated to produce full-fledged computer systems. In bridging this gap, the course will cover many subjects beginning with binary logic, combinatorial and sequential circuit design, memory structures, instruction set architectures, and, ultimately, basic processor design.

Prerequisites

An introductory programming course, such as COMS 1004 or 1007. You need to understand the basics of imperative, sequential programming to understand the assembly language programming we will discuss.

2 Instructional Staff

Professor

Prof. Martha Kim
Email: martha@cs.columbia.edu
Phone: (212) 939-7094
Office: 469 CSB

Teaching Assistants

To be announced.

3 Technical Resources

Office Hours

The schedule is posted and kept up to date on the [course calendar](#).

Piazza

From Canvas you will find a link to a Piazza which we will use for questions and answers. Use Piazza for all technical questions, posting publicly if at all possible, and privately to Instructors if your question reveals individual work.

Recommended Textbook

Digital Design and Computer Architecture, 2nd Edition Harris and Harris 9780123944245

Lecture Materials

Slides and in-class demos will be posted to Canvas.

4 Design Projects

Assessment will be based on six projects. Five of the six projects are digital design tasks, and the other one is a programming assignment. The projects are weighted as follows:

Combinational Design	15%
Sequential Design	15%
Datapath Design	15%
MIPS Programming	20%
Pipeline Design	20%
Cache Design	15%

Project Logistics

All projects must be submitted via Canvas. No submissions will be accepted via email or other means.

Projects are due at 11:59PM on their due date. Canvas interprets that as 11:59:00PM, so if you submit at the last minute you might not make it. That is your responsibility and we recommend providing yourself a grace period by submitting a bit early.

You may submit a project as many times as you wish. We will grade only the last submission.

Parts of the project will be graded automatically. Each assignment prompt will specify “Rules and Regulations” that must be followed exactly. We will not make exceptions.

Late Policy

All students start the semester with a budget of three penalty free late days. However, you may use at most two late days on any given assignment.

Each late day is exactly 24 hours, and if you use even one second of the late day with a submission timestamped 11:59:01PM, you have used the entire thing. Submit early to avoid doing this by accident.

[Update 10/21/17: After your three penalty free late days are used, you may still submit assignments late with a 15 point penalty per day. We will continue to accept assignments at most two days late.]

Safeguarding Your Work

You are responsible for keeping your work safe and backed up in case of a hard drive failure or other technical disaster. We strongly recommend you use web backups and/or a version control system.

You may not post your projects publicly on sites such as github. If you wish to share your work with a prospective employer, do so via private channels.

We also expect that you will not share solutions with classmates. This is a matter of academic integrity and is addressed further below.

Regrades

In the event of an *objective* grading error, we are happy to revisit our grading. If you want to request a regrade, you must submit a request to the Instructors via Piazza explaining the error. The deadline for such requests is one week from the time the scores were posted.

Style Guide and Beauty Prizes

Five of the six projects will use [Logisim](#). Logisim is a schematic capture and simulation tool, meaning after laying out your design, you may simulate and test its operation. Project assessment will primarily be based on function and performance. However, as with code, clarity matters. On Canvas you will find a schematic style guide with specific guidelines and examples.

For each assignment, the instructors will select ten (or more) of the most clear and elegant schematics for the “beauty prize” which carries 10% extra credit on that assignment. Only assignments that are fully functional will be eligible for the beauty prize.

5 Collaboration and Academic Integrity

All students are expected to read and adhere to the Computer Science Department’s [Academic Honesty Policy](#). All projects for this course are *individual projects*. While you may discuss the problems and general strategies with your classmates, each student is expected to ultimately design his/her own circuit. Lifting partial or complete solutions from others is considered cheating and will be referred to the Computer Science Academic Committee as well as to the relevant Dean. If you have any questions about this policy or specific situations, do not hesitate to ask the instructor.