CS 321H: Theory of Computation

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Meets: MWF 9, in STAG 112

Website: http://eecs.oregonstate.edu/~rosulekm/cs321h
Please check often for announcements, assignments, resources, etc.

Disclaimer: I am teaching two sections of CS321 this quarter, with different structure, different homeworks, different requirements. Make sure you visit the correct website!

Textbook: *Automata & Computability* by Dexter Kozen.

What Does it Mean to Study Theory of Computation?

Theory of computation is about **understanding the limits of what computers can do.** In order to do that, we must do some things that are often a challenge for students:

- We want to understand computation at a fundamental level, not just specific technologies. In order to do that, we can only discuss *highly abstract models of computation.* These models may not bear an obvious resemblance to the kinds of computations you're used to. These models describe computations at a low level to make *reasoning about computation* easier, but a side-effect is that actually "programming" in these models can be cumbersome.
- We want to be able to say things like "No computing device of this kind can solve this particular problem." In order to have certainty about this kind of statement, our discussions about computation must be *mathematically rigorous.* This means we use precise definitions and formal proofs.

Course Structure

This course will have **no lectures.** Instead, every class meeting serves as the middle segment of a larger sequence of student-centered activities:

$$\underbrace{\text{reading/exercises}}_{\text{before class}} \rightsquigarrow \underbrace{\text{discussion}}_{\text{during class}} \rightsquigarrow \underbrace{\text{problems}}_{\text{after class}}$$

Your learning depends on your engagement in these activities. Here are the details, along with their proportion of the final grade.

20% **Reading questions:** Before every class, you will read the assigned reading and prepare short written responses to the assigned questions. Responses to reading questions are **due 24 hours before** the class meeting (electronically via TEACH) so that they can guide the in-class discussion on the next day. They will be graded for a good-faith effort. No late submissions accepted, so even if you are not finished, submit whatever is ready at the deadline.

The course structure is new for me, so I will also use the reading questions as an opportunity to ask for your feedback about the course itself.

20% **Warm-up exercises:** Before every class you will complete some easy/medium difficulty exercises about the material.

You are welcome to work together with others but you must write up *your own* solutions by yourself. These problems are **due during the class period** via hardcopy (hand-written is fine). They will be graded for a good-faith effort. No late submissions accepted, so even if you are not finished, submit whatever is ready at the deadline.

- **In-class discussion:** Classtime will be a chance for us to engage with the exercises and discuss common questions/problems prompted by the reading questions. You will come to class having already worked on the warm-up exercises. I will ask students to present their ideas to the class for discussion.

30% **Final problems:** After class, you will be assigned a few homework problems. Your solutions should be beautifully typed and represent your highest level of mastery of the material. These will be graded carefully.

30% **Exams:** One midterm & one final exam. Date of the midterm is TBA.

Collaboration

We are learning theory of computation as a team. You are encouraged to work collaboratively. I only have the following requirements:

- Always make a good-faith effort to **do the work by yourself *first***, before working together. Not only is this a more effective way to learn, it will also make your collaborative time more effective.
- Everything you *write* for this course (reading questions, warm-up exercises, but especially final problems) must be **written entirely by you**, and reflect your personal understanding of the material. Submissions from different students should never look similar.
- No collaboration on exams!

Accommodation for Disabilities

Accommodations for students with disabilities are determined and approved by Disability Access Services (DAS). If you, as a student, believe you are eligible for accommodations but have not obtained approval please contact DAS immediately at 541-737-4098 or at http://ds.oregonstate.edu. DAS notifies students and faculty members of approved academic accommodations and coordinates implementation of those accommodations. While not required, students and faculty members are encouraged to discuss details of the implementation of individual accommodations.