CS 321: Theory of Computation

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Meets: MWF 12-1, in CORD 1109

Website: http://eecs.oregonstate.edu/~rosulekm/cs321
         Please check often for announcements, homeworks, etc.

Office hours: Mike: MW 1-2, or by appointment, in my office (KEC 3063)
              TAs: TBA, in KEC atrium

Textbook: There is no required text. Lecture notes from various sources and in-class slides will be posted on the course website. If you prefer killing trees, then one of my favorite books of all time is *Automata & Computability* by Dexter Kozen (at the campus bookstore).

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 is 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.

Assessment

40% problem sets

Expect roughly 8 problem sets throughout the quarter. Your submissions must be typed (not handwritten) and submitted on TEACH.

60% exams

Expect two midterms and a final, each accounting for 20% of the final grade.
Approximate Schedule

1 lecture: Decision problems, strings
3 lectures: Deterministic finite automata, closure properties, correctness proofs
3 lectures: Nondeterministic finite automata
3 lectures: Regular expressions and their equivalence to finite automata
3 lectures: Non-regular languages, the pumping lemma
1 lecture: DFA minimization
3 lecture: Context-free grammars and pushdown automata
2 lectures: Equivalence of CFGs and pushdown automata
2 lectures: Chomsky normal form, parsing
2 lectures: Pumping lemma for context-free languages
3 lectures: Turing machines and variants, closure properties
4 lectures: Undecidable problems and implications

Other Policies

Cheating: Academic dishonesty (including plagiarism and cheating) will not be tolerated. Consult the university’s student conduct code for more details. I will follow the guidelines given there, and seek out the maximum allowable penalty for violations that occur in this course.

If you have a question about what constitutes academic dishonesty, please ask me.

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.