CS 161
Introduction to Automata Theory
Syllabus, Spring 2024

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Office hours:
Thursday 10:30am - 1:30pm
By appointment Monday, Wednesday
Prerequisite: A C- or better in CSC-024, or permission of the professor
Text:
Introduction to Computer Theory, Daniel Cohen, Second Edition
ISBN 0-471-13772-3

1 Overview

This course builds on Discrete Mathematics, and it can be considered the first course in theoretical computer science. In this course we study formal languages. Examples of formal languages are the set of all valid passwords for the Hofstra portal, the set of all grammatically correct English sentences, and the set of all valid Python programs. Here are some of the questions we will look at in this class:

- How can we develop a mathematical definition of a language that allows us to prove useful theorems about them?
- Once we have defined a language precisely, what kinds of problems would we like to be able to solve about that language on a computer? Is it always possible to do so?
- How can we compare the complexity of two languages?

Automata theory gives us one way to approach these questions. We focus on a system developed by Noam Chomsky that relates the complexity of a language to the complexity of the kind of machine (or "automaton") that is needed to decide if a particular "word" is in the given language.

2 Graded Work

Your grade in this class will be based on your quizzes, your two midterm exams, and your final exam.

Grade Breakdown:

1. quizzes **30%**
2. midterms and final **70%**

Quizzes: Regular quizzes will be used to test your understanding of all the concepts discussed in class. Quizzes will be announced ahead of time. The lowest quiz grade will be dropped when calculating the average quiz grade. There will be no makeup quizzes: if you miss a quiz, that will be the one that is dropped.

Midterm and Final Exams: There will be two midterm exams and one final exam. The final exam will be cumulative. The midterm grades will each be written down once, and the final exam grade will be written down twice. The lowest of those four grades will be dropped, and the remaining three grades will be averaged. There will be no makeups. If you miss a midterm exam, that's the one that is dropped. If you miss the final (for a valid reason), you will need to take the final at a mutually agreed upon time – usually at the start of the next semester.

Homework: Homework will *not* be collected or graded *even though in one sense it is the most important learning activity for this class.* Rather, quizzes are based closely on the homework. Students are encouraged to ask questions about the homework at the start of every class. I encourage each of you to form a study group that meets twice a week (either face-to-face with social distance, or remotely) to work on homework together, and to develop the habit of coming with at least one question about homework to each class meeting. It is important to understand that most of the learning for this class takes place at home when working on homework problems by yourself, or with other students, as this is the setting in which you are most actively engaged with the material.

Definitions In order to succeed in this class you need to be able to understand and use precise mathematical definitions of the terms introduced. Each of you is required to keep a stack of index cards with the relevant definitions from class. Each definition should be a complete sentence that incorporates the word being defined, and that avoids constructions like "is when". You are encouraged to copy these definitions verbatim from class notes. Note that Cohen (our text) does *not* have precise enough definitions for this purpose. You must not include any examples or theorems on your index cards. You are allowed to bring

these index cards to every quiz and exam. You are not allowed to share index cards, and each student should prepare his or her own stack of index cards.

3 Policies

Attendance and Makeup Policies and the use of Email Students are expected to attend class everyday, and are expected to attend office hours regularly as well.

If you miss a class, please reach out to a member of your class for lecture notes and announcements.

Email Policy Please feel free to contact me via email or phone if you need to make an appointment (either face-to-face or remote) outside of my regularly scheduled office hours, or if you need to let me know about an illness or other situation that is making it difficult for you to do your work. You can also ask me after class for an individual appointment.

Please do not use email to ask for announcements and materials from a class you missed: use your peer study group for that. All handouts will be posted on my website. I cannot answer technical questions over email: ask questions in lecture and in office hours.

I will make every effort to get back to you within two business days of your email to me.

Academic Honesty: Students enrolled in this class implicitly promise to adhere to Hofstra's policies regarding academic honesty. Students who are found to have violated their promise (either by cheating or by assisting another student in cheating) are given a 0 on the given assignment, are reported to the dean, and may, furthermore, receive an automatic F in the class.

4 Important Dates

- Friday, February 23: last day to withdraw without a "W"
- Thursday, April 11: last day to withdraw with a "W"
- Thursday, May 9 and Friday, May 10: snow days for makeup classes
- Monday, May 13 or Wednesday, May 15 (TBA): final exam