

CSE 460 Basic Information

Course Overview:



In this course, we take a step back to think about the following question:

What are the capabilities and limitations of computer programs?

- We will study what can be done in various models of computation.
- We also will show that there are problems which CANNOT be solved by any program or algorithm in any reasonable computational model.
 - What does this imply about Dan?
 - Hopefully, this course will be more pleasant than electric shock therapy.

Instructor: [Dr. Eric Torng](#)

- Feel free to call me Eric, Professor Torng, or Dr. Torng, whichever you feel most comfortable with. My default for addressing students is to go by first names unless you tell me something different.
- Email: torng@msu.edu
- Phone number: 353-3543
- Office: 3132 Engineering Building (*but moving soon into main CSE office*)
- Office Hours
 - Tuesday 4:30-5:00 PM
 - Thursday 4:30-5:00 PM
 - By appointment.

ULAs:

- Andrew Haas
- Jamie Schmidt
- Will provide helproom times later on a separate document

Classroom and Meeting Time

- Tuesday and Thursday 3-4:20 PM (see hybrid format below)
- Anthony 1257

Hybrid Format:

- Due to Delta, I have decided to make this a hybrid course rather than an in-person course.
- I will divide you into two cohorts based on last name. I will meet with one cohort on Tuesday and the other cohort on Thursday.
- During cohort meetings, I will answer questions and administer weekly quizzes. Occasionally I will conduct a live, interactive lecture.
- We will alternate months for the cohorts to ensure fairness (unless everyone prefers to stay on the same meeting day) [September/November before Thanksgiving and October/after Thanksgiving].
- During exam weeks, Tuesdays will be review sessions and Thursdays will be exams for everyone.

Attendance Policy

- I will not grade based on attendance, but quizzes are a critical component of grades.
- If you know you are going to miss a class and want to make sure you do not lose any points due to a missed quiz, you must contact me ahead of time except for an emergency.
- If you cannot come to class due to COVID restrictions or some other emergency, we will waive the individual quiz and compute your quiz average based on the quizzes you are able to attend in person. Such a missed quiz will not count as your dropped quiz.
- When you do come to class, I ask you to observe a few simple rules which are designed to create a better learning environment.
 1. Once class begins, I expect students to pay attention and not use their phones or devices to look at non-course materials or talk while others are talking.
 2. If you have a question, do not hesitate to ask. Others are likely to have the same question.

Accommodations for Persons with Disabilities

Michigan State University is committed to providing equal opportunity for participation in all programs, services and activities. Requests for accommodations by persons with disabilities may be made by contacting the Resource Center for Persons with Disabilities at 517-884-RCPD or on the web at rcpd.msu.edu. Once your eligibility for an accommodation has been determined, you will be issued a verified individual services accommodation (“VISA”) form. Please present this form to me at the start of the term and/or two weeks prior to the accommodation date (test, project, etc). Requests received after this date will be honored whenever possible.

Key Websites

- MSU Google Classroom: Used for homework assignments
- Piazza: Used for almost everything else including the first place to ask questions.

Textbook

- *Introduction to Languages and the Theory of Computation*
 - by John Martin
 - McGraw Hill
 - Fourth Edition, 2011
- Index to Notation: page 427
- I am listing this textbook as required. However, I will not strictly enforce this requirement other than assigning homework questions from this textbook.

Videos and PowerPoint presentations

- Videos will be posted in the Kaltura Media Space in the CSE 460 channel. You will be subscribed to this channel.
- I will also post links to the videos in Piazza when videos are added.
- All power point presentations will be available from Piazza.

Worksheets

- There will be worksheet assignments associated with most videos/modules.
- Some questions are associated with specific slides (marked with * at top).
- It is recommended that you have the worksheet open while you watch the videos and answer the questions associated with slides, pausing the video as you do so.
- You are encouraged to work collaboratively on these; just make sure you understand any answers you submit.

Homework

- There will be one homework assignment most weeks.
 - Homework will be due Tuesdays at noon.
- Some of these may be group assignments, others will be individual assignments.
- The intent of the group homework assignments is to encourage discussion of the material with other students outside of class.
- When the assignment is a group assignment, all group members will receive the same score for the homework assignment unless it is clear that certain members are not contributing at all.
- You will complete these assignments online using Google Classroom and Google Docs. These require logging in to your MSU google apps account. Feel free to create an Overleaf project for your assignments; if you do this, include the link to your Overleaf site on your Google Doc and share that Overleaf project with both ULAs and me.
- Please remember to submit your homework assignment when complete.

Quizzes

- In-class quizzes will occur at the END of class (Tuesday or Thursday depending on your cohort) starting with the third week of the semester.
- They will test material covered in class through the previous Thursday.
- Practice quizzes and solutions based on quizzes used in previous years will be posted on the course website during the previous week.

Exams

- Exam 1: Thursday, September 30, in class
- Exam 2: Thursday, October 28, in class
- Exam 3: Thursday, November 18, in class
- Final Exam: Wednesday, December 15, 10:00-noon
 - These exams WILL contain harder questions than the weekly quizzes.
 - Notes Policy: No notes or books are allowed during exams.
 - Location: All exams will be in the regular classroom Anthony 1257 (unless I can get a bigger classroom)

Grading Scheme

- Homework: 15%, drop lowest score
- Quizzes: 15%, drop lowest score
- Worksheets: 5%, loosely graded, will receive full points if there is evidence of sincere effort to answer the questions.
- 3 exams: 45%
- Final exam: 20%
- Piazza participation: Up to 5% extra credit for being an active and helpful respondent on Piazza to questions posed by other students. In most cases, the instructional team will give students a chance to respond first before responding to questions. The goal is to spark discussions.
- Grading Scale (minimum percentage to guarantee a grade)
 - 92%: 4.0
 - 85%: 3.5
 - 80%: 3.0
 - 75%: 2.5
 - 70%: 2.0
 - 65%: 1.5
 - 60%: 1.0

Feedback

- This class exists to help you learn some important concepts and skills.
- We will do our best to create the best possible learning environment.
- However, we are sure to do things that are not optimal for all students.
- If things are not going well, let us know. We can't promise we will change, but we do promise to listen and consider any suggestions.

Academic Dishonesty

- The Department of Computer Science and Engineering expects all students to adhere to MSU's policy on Integrity of Scholarship and Grades, which includes the statement, "... all academic work will be done by the student to whom it is assigned, without unauthorized aid of any kind" and the new Spartan Code of Honor Pledge: **"As a Spartan, I will strive to uphold values of the highest ethical standard. I will practice honesty in my work, foster honesty in my peers, and take pride in knowing that honor in ownership is worth more than grades. I will carry these values beyond my time as a student at Michigan State University, continuing the endeavor to build personal integrity in all that I do."**
- Students who violate this policy will face sanctions. Specifically, submission of student work based on those found anywhere on the Internet including Chegg, Brainly, Quizlet, and other similar sites will in an Academic Dishonesty Report (ADR) and an automatic failing grade of zero (0.0) for the course. The ADR for students personally posting questions from assignments or exams to these sites will request additional sanctions.

CSE 460: Computability and Languages Course Schedule

| Week | Topic | Required Reading | Assignments |
|-----------------------|--|---|--------------------------|
| 1: 9/2* | Course Overview Problems, Programs, Models of Computation Church's Thesis, Strings and Languages, Proofs | Modules 1, 2a-2c Chapter 1, 7.6, 8.1 | |
| 2: 9/7-9/9 | Decision Problems Solvable, Unsolvable and Half-Solvable Problems Proving problems are unsolvable Countable and uncountable infinities Diagonalization | Modules 2d, 3 Section 8.5 | |
| 3: 9/14-9/16 | Program behavior problems, Halting Problem Universal Turing Machines Half-solving the Halting Problem Automata Theory Preview/Complexity Theory Overview | Modules 4-6 7.8, 9.1 | Homework 1 due Quiz 1 |
| 4: 9/21-9/23 | Regular expressions and regular languages FSAs and LFSA, Closure Properties (cross product) NFAs | Modules 7-10a Section 2.1, 2.2, 3.1 | Homework 2 due Quiz 2 |
| 5: 9/28-9/30* | NFA- λ s More closure properties Kleene's Theorem: LFSA = regular languages | Modules 10b-13 2.2, 3.2-3.4 | Exam 1 (Solvability) |
| 6: 10/5-10/7 | Distinguishability and Equivalence Classes Myhill-Nerode Theorem Decision Problems about Regular Languages | Modules 15-17 2.3, p67, 2.5 | Homework 3 due Quiz 3 |
| 7: 10/12-10/14 | Proving languages are not regular Pumping Lemma for regular languages | Module 18ab 2.4 | Homework 4 due Quiz 4 |
| 8: 10/19-10/21 | CFGs and CFLs Derivations and Derivation Trees Ambiguous CFGs Programming with CFSs Normal Forms | Chapter 4 | Homework 5 due Quiz 5 |
| 9: 10/28* | Mini-break, exam 2 | | Exam 2 (Regular Langs) |

| Week | Topic | Required Reading | Assignments |
|-------------------------|--|------------------|------------------------------------|
| 10: 11/2-11/4 | PDA's and LPDA Equivalence of PDA and CFG Parsing | Chapter 5 | Homework 6 due Quiz 6 |
| 11: 11/9-11/11 | Pumping Lemma for CFLs Non-Context Free Languages Closure Properties of CFLs Decision Problems for CFLs | Chapter 6 | Homework 7 due Quiz 7 |
| 12: 11/16-11/18* | Answer-preserving input transformations | 9.2, 9.3 | Exam 3 (CFLs) |
| 13: 11/23* | Answer-preserving input transformations | 9.2, 9.3 | No quiz |
| 14: 11/30-12/2 | Closure Properties P and NP | 8.1 11.1-11.2 | Homework 8 due Quiz 8 |
| 15: 12/7-12/9 | Polynomial Time Answer-preserving input transformations | 11.3 | No quiz |
| Finals: 12/15* | Final Exam | | Homework 9 due 12/14 Final Exam |

* Entire class meets: no cohorts