Welcome To CS 378 —
Theory of Computation
Colby College, Fall '19

Course: CS 378 — Theory of Computation
Lecture: Tu / Th 1:00–2:15 PM, meetings in Davis 117
Website URL: *https://cs.colby.edu/courses/F19/cs378*

Course Description

Focuses on formal languages, automata, computability, and undecidability. Languages discussed include regular languages, context-free languages, and recursively enumerable languages. Both deterministic and non-deterministic machines (finite automata, push-down automata, and Turing machines) are also discussed. Unsolvable and intractable problems are addressed, as is the definition of NP-completeness. Students will learn through problem sets (possibly augmented by short programming projects).

Prerequisites: CS231 and either Math 274 or 275.

Your Professor: Eric Aaron
Website: *https://cs.colby.edu/eaaron*
Office: Davis 113
Office Hours (which may change if demands arise): M 2:30–4:00pm, Tu 10:45–11:45am,
 W 2:30–4pm, Th 11am–12noon, and by email appointment (but may change)
 Please feel free to come by and chat—I look forward to talking with you!
Phone/Voicemail: 207-859-5857
E-mail: *eaaron@colby.edu*
NB: The above email address is the best way to contact me.

Your textbook

- *Introduction to the Theory of Computation, 3rd Edition* by Michael Sipser.

Grading: Grades for the course will be computed (roughly) based on

- Exams (one Midterm, one regularly scheduled Final): 60%
- Problem sets: 15–20%
- Other small assignments and class participation: 10–15%
- Presentations (one expected): 10%

The above percentages may be changed slightly if administrative concerns demand it.

Course Outline

The course will focus on formal languages and automata theory. We will study regular expressions and the associated finite automata, context-free grammars and the associated pushdown automata, context-sensitive grammars, and Turing machines. These various automata have many applications in areas of computer science, such as compiler design and analysis of algorithms, some of which we will address in the course.

Homework assignments will be of two kinds: longer *problem sets*, which will typically be due roughly 1–2 weeks after being assigned; and other *smaller assignments*, which will typically be due in the next class meeting. These smaller assignments may include short exercises to preview or review course concepts, and they may be discussed during lecture on the day they are due.

Lectures, Classroom Discussions, and Classroom Accountability

All students are responsible for **ALL** information given in class, whether or not it is presented in any other form (handout, course website, textbook, etc.). Thus, although lecture attendance is not mandatory, it is strongly encouraged, and it is essential that students who miss lecture consult classmates and find out about any information—academic, administrative, or other—that they missed. There may be severe, unintended consequences for students who do not keep up with all information from class. It is your responsibility to see that this does not happen to you. The easiest way to ensure it: Attend every lecture. (If low lecture attendance becomes a problem, your professor reserves the right to make lecture attendance mandatory for the remainder of the course.)

Before each class, students are expected to review material from the previous class meeting—the new material will build upon previously covered material, so review is important for understanding new material as it is presented. It is also expected that, before each class, you will read (though not necessarily completely understand) the section of material to be covered in the next class. Please use class lecture notes and the course textbook as complementary sources of information; in cases of discrepancy, please notify your professor immediately.

There will be many opportunities for discussion and participation during class meetings; reviewing old material and reading new material can give these discussions more value for everyone in the class. An important part of the value of these discussions is *explanation*: It is *absolutely* not expected that every response in a class discussion will be a correct response to a question; it is important, however, that every student tries to give reasons for their answers. (Note that participation is part of the course grade—students will not receive full credit for that part of the course grade without actively contributing to in-class discussions.)

As a courtesy to your classmates and your instructors, the use of computers, tablets, mobile phones, wearables, or other electronic devices during lectures and labs is discouraged. If for any reason it is important that you use such a device during lecture or lab, please talk with me about how best to accommodate you.

Homework Policies

Homework assignments are typically due at the beginning of class (1pm) on the specified due date and should be turned in directly to me; such assignments received after the beginning of class may be considered late (in particular, assignments left in my office after I leave it for class, whenever that might be, will be considered late).

Both the larger problem sets and smaller assignments serve important purposes for the course, but because of their differences, different policies apply to each.

Smaller assignments   Although these smaller assignments do not have as much weight in the final course grade as problem sets, it is nonetheless very important for progress in the course that each assignment be completed on time. These smaller assignments will be graded on a ✓+ / ✓ / ✓− / 0 scale; the lateness policy is that if an assignment is handed in up to 1 week late, there is a penalty of one "level" down; after that, an automatic grade of 0 is given.

Problem sets   Problem sets are essential for learning CS378 course material, and it is extremely important for progress in the course that each assignment be completed on time. **Late problem sets will not be accepted for credit**—but please turn them in anyway! When computing your final grade for the course, your lowest score **from among the problem sets that were turned in (on time or late)** by the semester's last day of classes will be dropped.

On all homework assignments, please submit paper copies, not electronic (e.g., emailed) copies, of all homework. (Please use both sides of the paper!) As always, indicate all sources of assistance and collaborators on every submitted assignment.

As with all policies, homework policies are intended to be fair to everyone involved in the course. They will be enforced fairly. Please feel free to ask me any questions about specific cases that may emerge over the semester!

The Colby Affirmation

Colby College is a community dedicated to learning and committed to the growth and well-being of all its members.

As a community devoted to intellectual growth, we value academic integrity. We agree to take ownership of our academic work, to submit only work that is our own, to fully acknowledge the research and ideas of others in our work, and to abide by the instructions and regulations governing academic work established by the faculty.

As a community built on respect for ourselves, each other, and our physical environment, we recognize the diversity of people who have gathered here and that genuine inclusivity requires active, honest, and compassionate engagement with one another. We agree to respect each other, to honor community expectations, and to comply with College policies.

As a member of this community, I pledge to hold myself and others accountable to these values.

https://www.colby.edu/catalogue/front-of-catalogue/colby-affirmation/

Statement regarding Academic Accommodations *The following is the standard suggested language regarding Academic Accommodations at Colby. It applies to this course.*

I am available to discuss academic accommodations that any student with a documented disability may require. Please note that you'll need to provide a letter from the Dean of Studies Office documenting your approved accommodations. *Please meet with me within two weeks of the start of the semester to make a request for accommodations* so that we can work together with the College to make the appropriate arrangements for you. Kate McLaughlin, Associate Director of Access and Disability Services (kmclaugh@colby.edu), is the primary contact for accommodations and any questions related to educational testing and documentation.

Mental health: I care about our students' well-being and understand they may face mental health challenges. Students are encouraged to seek support from the College's available resources, including your advising dean and Counseling Services. (For immediate care, please call 207-859-4490 and press "0" to reach the on-call counselor.) I am willing to discuss reasonable accommodations during a crisis, but to fulfill our educational mission, students are expected to adhere to the attendance policy. Failure to do so because of mental health challenges may require consultation with the Dean of Studies Office.

Policy on Collaboration and Academic Integrity

Collaboration will not be allowed on exams, unless explicitly indicated by the instructor. There may also be homework exercises on which collaboration is forbidden; such exercises will be explicitly noted by your professor. In other instances, however, collaboration will be permitted.

On homework exercises where collaboration is permitted, you are encouraged to discuss *approaches* to solving problems *on a general level* with your classmates (as well as your professor, of course!). You **may not**, however, discuss specifics with your classmates, and the expression of your answer and your written work must be entirely your own. As part of this, in cases of collaboration, if you know the answer and a classmate does not, telling them the answer is a violation of class policy; if a classmate needs further assistance, they should see your professor.

Receiving and copying solutions from any source (a classmate, a friend, a published text, an online source, etc.) is disallowed; unless explicitly permitted, using proofs or other material as "inspiration" and submitting highly derivative solutions is viewed as copying. In general, on assignments, using any resources (electronic or print, online or otherwise) other than those explicitly permitted as course resources is prohibited. Furthermore, on each submitted assignment, you should always cite and acknowledge sources from which you receive assistance, including your textbook, your Coaches, your classmates, or other people.

It is vitally important that you turn in work that is your own! Reports of academic dishonesty are handled by an academic review board and a finding of academic dishonesty may result in significant sanctions. For more details on Colby's Academic Integrity policies and procedures, see https://www.colby.edu/academicintegrity/.

In general, the highest level of academic integrity is expected of every student in this class. If there are any questions about collaboration or related policies, please come talk with me!