

Welcome To CS 375 — Analysis of Algorithms Colby College, Spring '20

Course: CS 375 — Analysis of Algorithms

Lecture: M / W 1:00–2:15 PM (...or so ...), meetings in Davis 117 ... It's complicated ...

Website URL: <http://cs.colby.edu/courses/S20/cs375>

Course Description

Analysis of Algorithms focuses on classic algorithms in computer science, their design, and the analysis of their correctness and efficiency. Algorithms covered include sorting, searching, and other problem solving with various data structures, including arrays, lists, trees, and graphs. Major categories of algorithm design are discussed, including the iterative, divide-and-conquer, dynamic programming, and greedy paradigms. Intractable problems are also discussed, as is the role of NP-completeness.

Prerequisites: CS231 and a 200-level Math or Statistics course.

Your Professor: Eric Aaron

Website: <http://cs.colby.edu/eaaron>

Office: Davis 113

Office Hours (which may change if demands arise): M 2:30–4:00pm, Tu 1:30–2:30pm,
W 2:30–4pm, Th 1:30–2:30pm, 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 Algorithms, Third Edition* by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein.

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

- Presentations and Projects (~~3 ± 1 expected~~) (1-ish): ~~25%~~ 6%
- Homework assignments and class participation: ~~45%~~ 24%
- Exams (~~one Midterm, one regularly scheduled Final~~) (one Exam): ~~60%~~ 70%

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

Desired Course Outcomes

- Students understand and can calculate the time and space efficiency of algorithms, including big-O, big-Omega, and Theta notations.
- Students understand and can employ conventional approaches to demonstrate algorithm correctness.
- Students understand and can analyze classic sorting, searching, and graph algorithms, and their advantages and disadvantages in various contexts.
- Students understand and can design and analyze algorithms in various categories, including iterative, divide and conquer, dynamic programming, and greedy.
- Students understand the concept of NP-Completeness and its significance in studying the time efficiency of algorithms.
- Students can work in teams to present algorithms, including analysis, implementation, and applications of the algorithms presented.

Assignments for this course may include projects that involve implementing algorithms in Java or Python. In addition,

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 correct; it is important, however, that students try 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

Policy for Before Break: Homework provides the main opportunity for students to learn CS375 course material—daily homework exercises will be assigned in most classes and should be done before the next class meeting. Homework assignments will be due at the beginning of the class meeting (1 PM) on the specified due date and should be turned in directly to me; 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). **Late assignments will not be given credit**—but please turn them in anyway (see below)!

Please submit paper copies, not electronic (e.g., emailed) copies, of all homework. (Please use both sides of the paper!)

You are welcome to work with one other classmate on the homework. In that case, you may hand in a joint solution (with both names on it) or separate solutions. If you hand in separate solutions, it is important to indicate with whom you worked.

Policy for After Break: There will be one homework assignment for each course module, as posted on the CS375 website; due dates / deadlines will be presented with each assignment. Homeworks should be submitted as PDF files and emailed to me (eaaron@colby.edu). Any homework submitted by its deadline will receive timely written feedback. Any homework submitted after its deadline but before going over the assignment in a class meeting will not be subject to a lateness penalty, but it may not be graded immediately, so the submitter may not receive written feedback before the end of the semester. Any homework submitted after we've gone over the assignment but before the Exam is assigned will receive a 25% deduction.

Due to the change in the modality of the course, after-break HW should be done individually; joint solutions from two-person teams are not permitted. (Course policies for collaboration apply.)

Policy for Entire Semester: Homework will not be accepted for a grade on or after the day the course Exam is assigned. When computing your Homework grade for the course, your three lowest homework scores **from among the homeworks that were turned in (on time or late)** by the ~~semester's last day of classes~~ day the Exam is assigned will be dropped.

As with all CS375 course policies, homework and other grading 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

Computer science, both academically and professionally, is a collaborative discipline. In any collaboration, however, all parties are expected to make their own contributions and to generously credit the contributions of others. In our class, therefore, collaboration on homework and programming assignments is encouraged, but every individual is responsible for understanding all the material in the assignment and doing your own work. Always strive to do your best, give generous credit to others, start early, and seek help early from both your classmates and your professors.

The following rules are intended to help maximize your educational experience and clarify the line between honest and dishonest work:

- If you have had a substantive discussion of any homework or programming solution with a classmate, please be sure to cite them in your write-up. If you are unsure of what constitutes "substantive," then ask your professor or err on the side of caution.

As part of giving generous credit to others, on all assignments for CS375, please be sure to write down all sources of assistance, including everyone with whom you worked on the assignment and any other material consulted.

- **You must not copy answers or code from another student either by hand or electronically, without the explicit permission of your professor.** (Projects or HWs done in teams are examples where permission has been granted!) Another way to think about it: You should be talking in English with one another, not in Python, Java or some other programming language.

Your professor reserves the right to ask students to verbally explain the reasoning behind any answer or code that they submit and to modify project grades based on the answers. 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/>.

On exams, collaboration will not be allowed unless explicitly indicated by your professor.

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!