Welcome To CS 375 — Analysis of Algorithms Colby College, Spring '19

Course: CS 375 — Analysis of Algorithms
Lecture: M / W 1:00–2:15 PM, meetings in Davis 117
Website URL: *http://cs.colby.edu/Courses/S19/cs375*

Course Description

Analysis of Algorithms focuses on classic algorithms in computer science, their design, and the analysis of their space and time efficiency. Such algorithms include sorting arrays and lists and searching various data structures, including lists, trees, and graphs. All major categories of algorithm design are discussed, including the iterative, divide-and-conquer, dynamic programming, and greedy, paradigms. Unsolvable and 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 (immediately following the CS375 class meeting),
- T 11:00am–12:00 noon,
- R 11am–12:00noon and 2:30-3:30pm (immediately following the CS152 lab section),
- and by email appointment.

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: 25%
- Midterm exam: 30%
- Final exam: 30%
- Homework assignments and class participation: 15%

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-Oh, little-Oh, omega, and theta notation.
- Students understand and can implement classic sorting, searching, and graph algorithms, including breadth-first and depth-first traversals, and their advantages and disadvantages in various contexts.
- Students understand and can create and implement algorithms in various categories of algorithms, including iterative, divide-and-conquer, dynamic programming, and greedy designs.
- Students understand the concept of NP-Completeness and know its significance in studying the time efficiency of algorithms.
- Students are aware of undecidable problems, such as the halting problem, and intractable problems.
- Students make team presentations on algorithms, including an analysis and implementation and applications.

Assignments for this course may include projects that involve implementing algorithms in Java or Python. In addition, as part of student presentations to the class, it may be necessary to demonstrate implementations of various algorithms.

Assignments for this course are also expected to include two short presentations for each student during the semester. (The number of presentations for the class may change if administrative concerns demand it.) Presentations will be about 10–15 minutes long. In at least one presentation, students will give a lecture to the class, answering questions from the class, and assigning and evaluating homework assignments. Please see *How to Give Technical Presentations*, linked from the Notes / Readings page of the course website, for advice on giving a good talk.

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 to with about how best to accommodate you.

Homework Policies

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!).

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)** will be dropped.

Homework provides the main opportunity for students to learn the material. However, I also want to give students credit for sincere effort, even if it doesn't always lead to the correct answer. Therefore, the homework portion of your final grade will be based both on your grade on homework assignments *and* on whether or not you regularly hand in reasonable attempts at the assignments. Working hard and making a real effort is the key to a good CS375 homework grade!

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.

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 one rule of thumb, if you see more than 10 lines of someone else's code, cite them!
- **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!