Math 382: Algorithms and Data Structures

Spring 2015

Basic information

Professor: Adam Groce, agroce@reed.edu

Class schedule: Class meets Monday, Wednesday, and Friday at 2:10 in Physics 240A.

Office hours: I hold office hours (in Library 390) Monday 1-2, Wednesday 4-5, Thursday 3-4, and Friday 1-2. I can also meet with you by appointment if those times are bad or if you would like to discuss something privately. You are also welcome to stop by other times, but I might be busy.

Website: The course website is http://people.reed.edu/~agroce/math382/. Homework and other information will be posted on that website.

Textbook: The textbook is *Introduction to Algorithms* by Cormen, Leiserson, Rivest, and Stein (third edition).

Course overview

This course will introduce you to the formal study of algorithms, which has taken on extreme importance in the age of computers. We will learn algorithms for a variety of common problems, but the goal is also to build a larger set of skills. These skills, ranging from specific definitions and techniques to general ways of thinking, will let you design, analyze, and understand algorithms on your own.

We will not be programming in this course. The algorithms we write will be in pseudocode. This lets us ignore some implementation details and focus on the underlying ideas. Nevertheless, the algorithms we will be talking about are very closely tied to real-world problems, and you should be able, assuming you are very familiar with a particular programming language, to implement any algorithm we discuss in class in that language without difficulty.

Coursework and grading

Homework: There will be regular homework assignments throughout the course. Late homework will be accepted, but will be greatly penalized in grading. You are allowed and encouraged to work with others on the homework, but the final result must be your own. Remember, the most important consequence of the homework isn't the grade but rather the learning and understanding that it gives you. If you think working with someone else is reducing your need to struggle through the problems and wrestle with them sufficiently, you will probably be better off working on your own.

Take-home quizzes: There will be three take-home quizzes during the semester. These will be short, open-ended questions that ask you to design and analyze an algorithm for a given problem. They are not timed, and you will have several days to work on them. Unlike with homework, there is no collaboration whatsoever allowed on these quizzes, and you are to limit yourself to only the course textbook and your notes as references when working on them. I expect answers to be written carefully and clearly.

Tests: There will be two in-class tests during the course, a midterm and a final. These will be less open-ended than the quizzes and focus on the specific algorithms and methods that we have been studying in class.

Weights for grading	
Homework	20%
Quizzes	30% (10% each)
Midterm	20%
Final	30%

Other policies

Attendance: I trust you to make decisions regarding attendance for yourself. I think you should attend every class because I think that is important to learning the course material, but it is that learning of the material on which you will be judged, not the attendance directly. I will, however, assume everyone is in class, and if you miss class you should make sure to talk to someone else in the class to find out if you missed any announcements, schedule changes, etc. If you miss a test you will receive no credit unless your absence is excused. Some excuses (such as illness) will require documentation (such as a doctor's note). I expect that if you will be

missing class for an excusable but predictable reason (say, a religious holiday) that you inform me before the absence. I will not excuse absences after the fact for reasons that were known about ahead of time.

Academic integrity: You are allowed to work with classmates on the homework, but you should write on the homework the names of anyone you collaborated with. You must also write up the actual solutions on your own, and you must actually do the homework together – copying and collaborating are very different things, and I expect you to know the difference. Take-home quizzes must be done entirely on your own with absolutely no discussion with others, and with no materials aside from those explicitly allowed. I take academic integrity very seriously, and I will not hesitate to report inappropriate behavior.

Advice

Don't procrastinate! To some extent the homework and *especially* the quizzes will require clever thought and puzzle-solving. That sort of thing takes time. Look at homework and quizzes immediately, even if you aren't going to put lots of work in them until later. Being able to think things over as you go about the rest of your life is surprisingly helpful.

Ask for help! This class is not supposed to be easy. Sometimes something will be confusing or difficult. When this happens, don't be afraid to come to talk to me. I'm here to help. It is also much, much easier to work through problems if you ask for help quickly than if you get very far behind and then say something.

Use the textbook! The textbook for this class is not the best for reading through and learning things for the first time, but it's *excellent* as a reference book once you have a basic familiarity with the ideas. I won't be requiring reading for the most part, but almost everything we do is covered in the textbook. It can be a really good resource if your notes are missing something if you just want to see another way of explaining what we covered in class.

Have fun! This class will contain a lot of cool puzzles, ingenious solutions, and useful information. It should be fun and interesting to study. Don't get so caught up in the work that you can't take a step back from time to time and enjoy it.