

CMSC 351: Algorithms

Spring 2013

Instructor:

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Office hours: Friday: 2:00pm–5:00pm
Also by appointment.

Teaching Assistants:

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Course Overview: This course presents an introduction to the techniques for designing efficient computer algorithms and analyzing their running times. General topics include asymptotics, solving summations and recurrences, algorithm design techniques, analysis of data structures, and introduction to NP-completeness.

Recommended Text: Thomas Cormen, Charles Leiserson, Ron Rivest, and Clifford Stein, *Introduction to Algorithms*, McGraw Hill and MIT Press. Any edition.

Prerequisites: Each student is expected to know the basic concepts of programming (e.g. loops, pointers, recursion), discrete mathematics (proof by induction, sets), simple data structures (lists, stacks, queues, trees), and calculus (logarithms, differentiation, integration).

Course Work: Course work will consist of written homework assignments, and two exams (a midterm and a final). The midterm will be on an evening to be determined. You may discuss homework problems and general solution strategies with classmates, but you must write up the solutions yourself.

As a courtesy to the grader, homeworks are to be written clearly and neatly. Poorly written work will not be graded. When writing algorithms be sure not only that your solution is correct, but also that it is easy for the grader to understand why your solution is correct. Part of your grade will be based not only on correctness, but also on the simplicity, clarity, and elegance of your solutions.

Piazza: We will be using Piazza (www.piazza.com), a question-and-answer system designed to streamline discussion outside of the classroom. It supports LaTeX, code formatting, embedding of images, and attaching of files. It will be moderated by the TA and instructor, but students are encouraged to answer questions.

Grading: Final grades will be based on the written assignments, a midterm exam, and a final exam. The relative weights of these will be 10% for the homework total, 40% for of the midterm, and 50% for the final exam (the last day of class).

Laptops: Laptops and similar devices may not be used during class, except to take notes, in which case the notes must be shared with the instructor.

Syllabus: The following is a *tentative* list of topics and readings in *approximate* order.

1. Introduction, Ch. 1,2
2. Growth of Functions, Ch. 3
3. Summations, Appendix A
4. Recurrences, Ch. 4
5. Probability, Appendix C
6. Heapsort, Ch. 6
7. Quicksort, Ch. 7
8. Sorting in Linear Time, Ch. 8
9. Medians and Order Statistics, Ch. 9
10. Graphs and Trees, Appendix B
11. Dijkstra's algorithm, Ch. 24.3
12. Brief introduction to NP-completeness, Ch. 34