CMSC 351: Algorithms
Fall 2013

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Instructor:
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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 instructors and TAs, but students are encouraged to answer questions.

Exams: We will have two exams, a midterm and a final. The midterm will be held for all sections on Wednesday, October 30th, in the **evening**. If you will have a time conflict, you must let Vibha Sazawal know via email by September 16th. The final exam will be held at the assigned final exam time. There will be one joint final exam time for all sections.

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

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: This is the current version of the syllabus. The instructors reserve the right to change it at any time.

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

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