CMSC 351: Algorithms
Fall 2004

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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.

Text: Thomas Cormen, Charles Leiserson, Ron Rivest, and Clifford Stein, *Introduction to Algorithms*, McGraw Hill and MIT Press, Second Edition, 2001.

Prerequisites: CMSC 214 and CMSC 250. 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 exam will be in the evening.* You may discuss homework problems and general solution strategies with classmates, but you must write up the solutions yourself.

As a courtesy to the graders, 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.

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.

Syllabus: The following is a *tentative* list of topics and readings in *approximate* order. The chapters in parenthses are the chapter numbers from the First Edition. The topics in square brackets may or may not be covered.

1. Introduction, Ch. 1,2 (Ch. 1)
2. Growth of Functions, Ch. 3 (Ch. 2)
3. Basic sorting algorithms
4. Summations, Appendix A (Ch. 3)
5. Recurrences, Ch. 4 (Ch. 4)
6. Heapsort, Ch. 6 (Ch. 7)
7. Quicksort, Ch. 7 (Ch. 8)
8. Sorting in Linear Time, Ch. 8 (Ch. 9)
9. Medians and Order Statistics, Ch. 9 (Ch. 10)
10. Graphs and Trees, Appendix B (Ch. 5)
11. {Sorting Networks, Ch. 27 (Ch. 28)}
12. {String Matching, Ch. 32 (Ch. 34)}
13. Brief introduction to NP-completeness, Ch. 34 (Ch. 36)