CMSC 351: Algorithms
Summer 2018

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 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. 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), calculus (logarithms, differentiation, integration), and asymptotic notation.

Course Work and Exams: Course work will consist of written homework assignments, a midterm exam, and a final. You may discuss homework problems and general solution strategies with classmates, but you ***must*** write up the solutions yourself.

Homework assignments will be turned in on Gradescope.

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.

The midterm and final exam dates and times are posted on the website.

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.

Grading: Final grades will be based on the written assignments, the midterm exam, and final exam. The weights of these will be approximately 1% for each regular homework, 3% for the NP-completeness homework, 40% for the midterm exam, and 47% for the final exam.

Laptops: Laptops and similar devices should not be used during class, except to take notes.

Syllabus: This is the current version of the syllabus. The instructor reserves 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. Recurrences (Integer Multiplication) Ch. 4
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. Minimum Spanning Trees, Ch. 23
12. Dijkstra's algorithm, Ch. 24.3
13. Brief introduction to NP-completeness, Ch. 34