

## Final Exam Announcements

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The final examination will be held on **Thursday, May 1, at 11:30am - 2:20pm in B6A Boggs-Chemistry**.

The exam will be cumulative and closed book. You may, however, bring one 8.5" x 11" sheet of paper as a crib sheet. Preparing a crib sheet can be a useful study aid, so take time in selecting material for it. You may use BOTH SIDES of the sheet and write as small as you like. No mechanical or electronic reproductions are allowed. You must hand in your crib sheet when you hand in your exam.

**Form:** The form of the final exam is similar to the form of midterm exams. The problems will require your knowledge and understanding of the material more than creativity.

**Material covered:** You are responsible for the material covered in lectures and assigned for reading till Wednesday, April 23 (inclusive). In particular, it includes:

1. **Theory of Computation:** DFAs, regular languages, closure under regular operations, NFAs, the equivalence of NFAs and DFAs, regular expressions, equivalence of regular expressions and regular languages (GNFAs), pumping lemma for regular languages, CFGs and CFLs, Chomsky normal form, PDAs, the equivalence of PDAs and CFGs, closure properties of CFLs, pumping lemma for CFLs, Turing machines, Turing-recognizable and decidable languages, the halting problem, Turing undecidable and unrecognizable languages (Sipser, Chapters 0-4.2, p. 1-170).

Complexity classes P and NP, NP-completeness. (Sipser: Chapters 7.1-7.5 p.225-276; also CLR; Chapter 34, p.966-1021)

2. **Theory of Algorithms:** Introduction, insertion sort (Ch.2.1-2.3), asymptotic growth of functions (Ch.3.1-3.2), recurrences (Ch.4.1-4.3), heapsort(Ch.6.1-6.4), quicksort(Ch.7.1-7.4), sorting in linear time (Ch.8.1-8.2), medians and order statistics (Ch.9.1-9.3), Strassen's algorithm for matrix multiplication (Ch.28.2) dynamic programming (Ch.15.3-15.4), CYK algorithm (Sipser, p. 240), Huffman's algorithm (Ch.16.2-16.3), minimum spanning trees (Kruskal's and Prim's algorithms)(Ch.23.1-23.2), BFS, DFS and topological sort (Ch.22.1-22.4), Shortest paths (Dijkstra's, Bellman-Ford and Floyd-Warshall algorithms)( 24.1-24.3,24.5, 25.2) Ch. ), String matching (Knuth-Morris-Pratt algorithm) (Ch.32.1,32.3-32.4),

**Office hours:** I am setting additional office hours next week

**on Monday, April 28 at 10:00-1:00, 2:00-3:00 pm**

**on Wednesday, April 30 at 10:00-1:00, 2:00-3:00 pm**

Tom will have office hours on **Tuesday, April 29 at 6-8pm.**

**Sample problems:** Review all homework assignments and problems from the first and second midterm exam. A sample final will be posted soon.

**Algorithms:** For all algorithms presented in class you should know their main ideas, general techniques used (e.g. dynamic programming, greedy method, etc.), data structures and the running time. Moreover, you should be able to perform a comparison analysis of different algorithms solving the same problem. No pseudocodes are required.