CS 473G: Graduate Algorithms, Fall 2005

TuTh 12:30–1:45, 1310 Digital Computer Laboratory

Instructor: Jeff Erickson (jeffe@cs.uiuc.edu), 3304 Siebel Center

Tentative office hours: Wed 4–5 and Fri 11–12

Teaching Assistants: (office locations and hours TBA)
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Course web site: http://www.cs.uiuc.edu/class/cs473g

Lecture notes, lecture videos, homeworks, solutions, handouts, grades, and important announcements will be posted here. Except for exams, this is the last piece of paper we will hand out in class. *Please read the Homework Instructions and FAQ.*

Newsgroup: class.cs473g

The newsgroup is an online forum for students to ask each other and the course staff questions about the course material. We will also post important announcements here: bugs in homework problems, deadline extensions, etc. *Read the newsgroup at least once a day!* Visit http://news.cs.uiuc.edu to register for access and for more information.

Audience:

This section of CS 473 is intended for graduate students in computer science and related fields, including students in the 5-year CS master's program, who have not already had a graduate-level algorithms class. Intellectually mature undergraduates are welcome, but please come talk to me first. If you have already taken an "advanced" or "graduate" algorithms class, you may be overqualified for this course; please come talk to me.

Prerequisites:

Students are assumed to have mastered the material taught in CS 225 (basic algorithms and data structures) and CS 273 (discrete mathematics). Please note that 'mastery' is not the same as 'exposure', 'familiarity', or even 'a good grade'. Hence, Homework Zero.

Coursework:

All students have the same workload and are graded on the same scale. Grades will be based on 6–8 homeworks (30% total), two midterms (20% each), and a final exam (30%). See the course web page for more details.

Recommended Textbooks:

- Thomas H. Cormen, Charles Leiserson, Ronald L. Rivest, and Clifford Stein. *Introduction to Algorithms*, 2nd edition. MIT Press/McGraw Hill, 2001. The CD-ROM that comes prepackaged with the book is useless. The first edition of the book (without Stein) is also fine.

- Jon Kleinberg and Éva Tardos. *Algorithm Design*. Addison Wesley, 2005. (This is the required textbook for 473U.)

- Theodore S. Giesel [Dr. Suess]. *The Cat in the Hat Comes Back*. Random House, 1958. One of the finest books ever written about recursion. And toilets.

Homework Zero

...is due *in class* on Thursday, September 1. You can get it from the course web page.

Tentative Course Outline

Lecture topics and homework deadlines are subject to change. Exam dates are set in stone.

Date	Topics	Due
Thu Aug 25	0. administrivia and introduction	
Tue Aug 30	1. NP-completeness *[Erin]*	
Thu Sep 1	2. more NP-completeness *[Erin]*	hw 0
Tue Sep 6	3. recursion	
Thu Sep 8	4. smart recursion: graph coloring, SAT	
Tue Sep 13	5. dynamic programming	hw 1
Thu Sep 15	6. more dynamic programming	
Tue Sep 20	7. greedy algorithms, matroids	
Thu Sep 22	8. [slack]	hw 2
Tue Sep 27	**— Midterm 1 —**	
Thu Sep 29	9. greedy approximation: set cover, art galleries	
Tue Oct 4	10. more approximation algorithms	
Thu Oct 6	11. even more approximation algorithms	
Tue Oct 11	12. randomized approximation: MAX SAT, graph coloring	
Thu Oct 13	12. randomization: nuts and bolts	hw 3
Fri Oct 14	*— Online drop deadline —*	
Tue Oct 18	13. treaps and skip lists	
Thu Oct 20	14. tail bounds; perfect hashing	
Tue Oct 25	15. randomized min-cut	
Thu Oct 27	16. [slack]	hw 4
Tue Nov 1	**— Midterm 2 —**	
Thu Nov 3	18. graph review: shortest paths, minimum spanning trees	
Tue Nov 8	17. flows, cuts, and matchings	
Thu Nov 10	19. max-flow: Ford-Fulkerson, Edmonds-Karp	
Fri Nov 11	*— Paper drop deadline —*	
Tue Nov 15	20. maximum weighted matching	
Thu Nov 17	21. linear programming	hw 5
Nov 21–25	*— Thanksgiving break —*	
Tue Nov 29	24. the ~~simplex~~ falling marble algorithm	
Thu Dec 1	25. linear programming in low dimensions	
Tue Dec 6	26. approximation via LP relaxation	
Thu Dec 8	∞. review session	hw 6
Tue Dec 13	**— Final Exam — 7:00–10:00 pm —**	