CS 473U: Undergraduate Algorithms, Fall 2006

TuTh 11:00–12:15, 1404 Siebel Center

Instructor: Jeff Erickson (jeffe@cs.uiuc.edu), 3304 Siebel Center
Tentative office hours: Mon 11–12 and Wed 1–2
Assistant: Elaine Wilson (ewilson@cs.uiuc.edu), 3329 Siebel Center

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Course web site: http://www.cs.uiuc.edu/class/cs473

Important announcements, lecture notes, homeworks, solutions, grades, and (if possible) lecture videos from previous semesters will be available here. This is the last piece of paper we will hand out in lecture. *Please read the Homework Instructions and FAQ.*

Newsgroup: class.cs473

Your online forum to ask the course staff (and each other) questions about the course material. We will also post important announcements here: bugs in homework problems, deadline extensions, etc. *Please 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 undergraduate students in computer science and related majors. Graduate students, including students in the 5-year CS master's program, *must* take 473G (or another graduate-level theory class) to satisfy their degree requirements.

Prerequisites:

Students are assumed to have mastered the material taught in CS 125, CS 173, CS 225, and CS 273 (basic algorithms, data structures, and discrete mathematics). Please note that 'mastery' is not the same as 'exposure', 'familiarity', or even 'a good grade'. Hence, Homework 0.

Coursework:

Grades will be based on weekly-ish homeworks (30% total, lowest score dropped), two midterms (20% each), and a final exam (30%). There will be many opportunities for extra credit, which is applied *after* the curve. See the course web site for more details.

No Textbook:

There is no required textbook for this class. Lecture notes will be posted to the course web site as the semester progresses. For almost every topic we will cover, both Jeff Erickson and Sariel Har-Peled have lecture notes online from previous semesters.

For students who would like an actual paper book for further reference, we highly recommend *Algorithm Design* by Jon Kleinberg and Éva Tardos (Addison Wesley, 2005).

Another (not quite as) good reference is *Introduction to Algorithms* by Thomas H. Cormen, Charles Leiserson, Ronald L. Rivest, and Clifford Stein (MIT Press/McGraw Hill, 2001).

Other things you might not be used to:

Head-banging sessions. Group homeworks (after Homework 0). Oral homework presentations. The "I don't know" and "and so on" rules. Legal use of *any* source for homework solutions as long as proper credit is given. See the course web site for more details.

Homework 0

. . . is due Friday, September 1 at noon. You can download it from the course web site.

Tentative Course Outline

Lecture topics and homework due dates are subject to change, especially later in the semester. Exam dates, however, are set in stone.

Date	Topics	Due
Thu Aug 24	0. administrivia and introduction	
Tue Aug 29	1. recursion	
Thu Aug 31	2. more recursion	hw 0 (Fri)
Tue Sep 5	3. fast Fourier transforms	
Thu Sep 7	4. dynamic programming	
Tue Sep 12	5. more dynamic programming	hw 1
Thu Sep 14	6. randomization: nuts and bolts	
Tue Sep 19	7. treaps and skip lists	hw 2
Thu Sep 21	8. uniform and universal hashing	
Tue Sep 26	**— Midterm 1 — 7:00–9:00 pm —**	
Thu Sep 28	9. amortized analysis: dynamic tables	
Tue Oct 3	10. scapegoat and splay trees	hw 3
Thu Oct 5	11. union-find	
Tue Oct 10	12. union-find analysis	hw 4
Thu Oct 12*	12. representing and searching graphs	
Tue Oct 17	13. minimum spanning trees	hw 5
Thu Oct 19	14. single-source shortest paths	
Tue Oct 24	15. all pairs shortest paths	hw 6
Thu Oct 26	16. maximum flows, minimum cuts	
Tue Oct 31	**— Midterm 2 — 7:00–9:00 pm —**	
Thu Nov 2	17. maximum flow algorithms	
Tue Nov 7	18. applications of maximum flows	hw 7
Thu Nov 9	19. lower bounds: information theory	
Tue Nov 14	20. adversary arguments	hw 8
Thu Nov 16	21. lower bound reductions	
Nov 20–24	*— Thanksgiving break —*	
Tue Nov 28	24. NP-easy, NP-hard, and NP-complete problems	
Thu Nov 30	25. more NP-completeness	
Tue Dec 5	26. approximation algorithms	hw 9
Thu Dec 7	∞. review session	
Fri Dec 15	**— Final Exam — 1:30–4:30 pm —**	

*last class before October 13 drop deadline