

CS378 - Algorithms and Complexity (Spring 2013)

Professor: David Zuckerman, diz@cs.utexas.edu, 471-9729

Office: CSA 1.120A

Office Hours: MW 4-5, or by appointment.

TAs: Eshan Chattopadhyay, Office Hours: Thursday 12-1, ACES 3.102.

Muhibur Rasheed, Office Hours: Tuesday 10:30-11:30, CS TA station desk 4, Painter Hall.

Fangkai Yang, Office Hours: Tuesday 1-2, MAI 2010.

Logistics: MWF 3-4, ECJ 1.202

Unique Number (Discussion Section Time; TA): 53536 (F 11-12; TAs alternate), 53537 (F 12-1; Eshan), 53538 (F 2-3; Fangkai), 53539 (F 2-3; Muhibur).

Course web page: <http://www.cs.utexas.edu/~diz/378>

Text: Kleinberg and Tardos, *Algorithm Design*.

Prerequisite: The following courses with a grade of at least C- in each course: CS 313K or 313H, 314 or 314H, 429 or 429H; M 408C or 408N; SSC 321 or M 362K; and a pre-req or co-req of M 340L or SSC 329C.

Grading:

45%: 3 In-Class Exams

40%: Final Exam

15%: Homework

Exams: The three in-class exams will be given on the following dates: Exam 1 on Friday, February 8; Exam 2 on Wednesday, March 6; and Exam 3 on Friday, April 12. The final exam will be cumulative, and given on Wednesday, May 8, from 7-10pm. No make-up exams will be given, so plan accordingly. You may bring a single, 8.5x11 inch, handwritten sheet of paper (you may use both sides). No calculators are allowed (they won't be necessary).

Homework: There will be a problem set almost every week, posted on Blackboard.

Collaboration policy: While you should first think about the problems on your own, you are encouraged to discuss the problems with your classmates. Moreover, you must write up your own solutions. In particular, nobody should email partial or full solutions to anybody. You must acknowledge any collaboration by writing your collaborators' names on the front page of the assignment. You don't lose points by having collaborators.

Citation policy: Try to solve the problems without reading any published literature or websites, besides the class text and links off of the class web page. If, however, you do use a solution or part of a solution that you found in the literature or on the web, you must cite it. Furthermore, you must write up the solution in your own words. You will get at most half credit for any solution found in the literature or on the web.

Submission policy: Homeworks are due at the beginning of class.

Late policy: Late homeworks will not be accepted.

Class Schedule: See the next page.

Date	Topic	Book Section(s)
Jan 14	Introduction, Stable Matching	1.1
Jan 16	Implementing Stable Matching and Analysis	1.1, 2.3
Jan 18	Polynomial Time, Priority Queues.	2.1, 2.5
Jan 23	Undirected Graph Traversal	3.2
Jan 25	Implementing Undirected Graph Traversal	3.3
Jan 28	Testing Bipartiteness, Directed Graph Traversal	3.4, 3.5
Jan 30	Directed Acyclic Graphs and Topological Ordering	3.6
Feb 1	Greedy Algorithms: Scheduling	4.1
Feb 4	Scheduling and an Exchange Argument	4.2
Feb 6	Review	
Feb 8	Exam 1	
Feb 11	Shortest Paths in a Graph	4.4
Feb 13	Minimum Spanning Trees	4.5
Feb 15	Union-Find Data Structure	4.6
Feb 18	Clustering	4.7
Feb 20	Recurrence Relations	5.1, 5.2
Feb 22	Counting Inversions	5.3
Feb 25	Closest Pair of Points	5.4
Feb 27	Integer Multiplication	5.5
Mar 1	Dynamic Programming and Scheduling	6.1
Mar 4	Review	
Mar 6	Exam 2	
Mar 8	Discussion	
Mar 18	Principles of Dynamic Programming	6.2, 6.3
Mar 20	Subset Sum and Knapsack	6.4
Mar 22	Sequence Alignment	6.6
Mar 25	More Shortest Paths	6.8
Mar 27	Undecidability	
Mar 29	An Explicit Undecidable Problem	
Mar 31	Reductions	
Apr 1	Polynomial-Time Reductions, Satisfiability	8.1, 8.2
Apr 3	NP	8.3
Apr 5	NP-Complete Problems	8.4
Apr 8	More NP-Complete Problems	8.5-8.10
Apr 10	Review	
Apr 12	Exam 3	
Apr 15	PSPACE	9.1, 9.2
Apr 17	Approximation: Load Balancing	11.1
Apr 19	Approximating Set Cover	11.3
Apr 22	Approximating Vertex Cover	11.4
Apr 24	Randomized Algorithms: Contention Resolution	13.1
Apr 26	Linearity of Expectation	13.3, 13.4
Apr 29	Randomized Selection and Sorting	13.5
May 1	Hashing	13.6
May 3	Review	

Students with Disabilities: Any student with a documented disability (physical or cognitive) who requires academic accommodations should contact the Services for Students with Disabilities area of the Office of the Dean of Students at 471-6259 (voice) or 471-4641 (TTY for users who are deaf or hard of hearing) as soon as possible to request an official letter outlining authorized accommodations.