

CSOR W4231: Analysis of Algorithms I

Class time: Tuesdays and Thursdays 4:10 - 5:25 PM

Class location: MUDD 833

Instructor: Allison Lewko

Office hours for Instructor: Wednesday 10:00 AM - 12:00 PM in CSB 519

Instructor email: alewko@cs.columbia.edu

1 TAs

1) Sam Frank, email: smf2147@columbia.edu

Office hours: Monday 10:30 - 11:30, Wednesday 4:30 - 5:30

2) Xin Lu, email: xinlu@cs.columbia.edu

Office hours: Tuesday and Friday, 2 - 3

3) Zhan Zhang, email: zz2291@columbia.edu

Office hours: Monday and Friday, 3-4

4) Ke Wu, email: kw2542@columbia.edu

Office hours: Tuesday, 6-8 pm

All TA office hours will be in the TA Room, 122 Mudd. The hours listed above are subject to change.

2 Course Information

The required textbook is Introduction to Algorithms, 3rd edition, by Cormen, Leiserson, Rivest, and Stein. Class announcements, including homeworks and lecture notes will be posted on courseworks.

Schedule of Topics to be Covered (*Subject to Change)

Lecture	Date	Topic	Reading in CLRS
1	9/2	Course introduction, insertion sort, asymptotics	Ch. 1,2
2	9/4	Divide and Conquer, Merge Sort, Recursion	Ch. 2,3
3	9/9	Solving Recurrences	Ch. 4
4	9/11	Randomized Algorithms	Ch. 5
5	9/16	Quicksort	Ch. 7
6	9/18	Order statistics	Ch. 9
7	9/23	Comparison lower bounds, more sorting	Ch. 8
8	9/25	Priority queues, heaps, heapsort	Ch. 6
9	9/30	Binary search trees	Ch. 12
10	10/2	2-3-4 trees, B-trees, Red-black trees	Ch. 13,18
11	10/7	Augmenting data structures	Ch. 14
12	10/9	Greedy algorithms	Ch. 16
13	10/14	Dynamic programming	Ch. 15
14	10/16	Graphs, Breadth-first search, Dijkstra's algorithm	Ch. 22.1, 22.2, 24.3
	10/21	Midterm in class	
15	10/23	Depth-first search, connected components, topological order	Ch. 22.3-5
16	10/28	Minimum spanning trees, Disjoint sets	Ch. 21,23
17	10/30	Shortest paths with negative weights	Ch. 24
	11/4	Election Day - University Holiday	
18	11/6	All-pairs shortest paths, transitive closure and MM	Ch. 25
19	11/11	Network flow, bipartite matching	Ch. 26.1-3
20	11/13	Linear programming models	Ch. 29.1-2, 29.4
21	11/18	NP-completeness	Ch. 34
22	11/20	NP-completeness	Ch. 34
23	11/25	NP-completeness	Ch. 34
	11/27	Thanksgiving - University Holiday	
24	12/2	Approximation algorithms	Ch. 35
	12/4	Final in class	

3 Grading

Homeworks will be assigned approximately every two weeks and will be posted on courseworks. They will be due in class on their due date before the lecture starts. Please follow the posted Homework Submission Guidelines. Late homeworks will be penalized at the rate of 10% per late day or part thereof (i.e. fractions of a day are rounded up). Exceptions will be made only for exceptional unforeseen circumstances (eg. serious illness). The homework with the lowest score will not count in the grade.

Homeworks will consist of a mix of easier and more challenging problems. It is recommended that you start early working on the problems. You are encouraged to ask questions in a timely fashion and make effective use of the office hours of the teaching staff.

One of the aims of this class is to teach you to reason about algorithms, describe them and formally prove claims about their correctness and performance. In writing up your assignments, it is important to be as clear, precise and succinct as possible. Understandability will be an important factor in the grading of the assignments.

You are permitted to discuss the homework assignments. If you do collaborate, you must still write the solutions individually (without looking at anybody else's solutions), and acknowledge anyone with whom you have discussed the problems. It will be considered an honor code violation to consult solutions from previous years, from the web or elsewhere, in the event that homework problems have been previously assigned or solutions are available elsewhere.

The CS department web page <http://www.cs.columbia.edu/education/honesty> lists the department's academic honesty policies. All students are expected to abide by these policies.

The course grade will be based on:

- 45% homework assignments
- 25% midterm exam
- 30% final exam