CS 473: Algorithms (Spring 2017)

Instructor	Jeff Erickson (jeffe)	**Resources**	Lecture schedule with notes and videos
Assistants	Alex Steiger (ajsteig2)		Lecture videos
	Charles Carlson (ccarlsn2)		Gradescope (self-enrollment code: M54G49)
	Vivek Madan (vmadan2)		• **Register your Gradescope identity**
			Piazza (access code: CS473)
	Tong Li		Moodle (self-enrollment code: CS473)
	Timothy Sanchirico		**Other useful resources**
	Phillip Shih		
	Shunping Xie	**Important dates**	Midterm 1: Tue Feb 21, 7-9pm
	Yuhang Yang		Midterm 2: Tue Apr 4, 7-9pm
			Final exam: Wed May 10, 1:30–4:30pm
Administrivia	About this course		
	Regular weekly schedule		
	Academic integrity policies		
	Homework, exam, and grading policies		
	Some stuff you already know		

❖ Announcements ❖

May 11 | Solutions and tentative rubrics for the final exam are available. We hope to have the final exam graded by Monday next week.

May 7 | Overheads from Jeff's review session are available: one sheet per page or 4 sheets per page.

May 6 | Jeff will hold a final review session tomorrow afternoon from 2pm to 4pm in 1404 Siebel. Please bring questions.

May 3 |
- The final exam will be held next Wednesday, May 10, from 1:30pm to 4:30pm. Please go to the following rooms, based on the first letter of your last name:
  - **A–J:** 1404 Siebel
  - **K–R:** 0216 Siebel
  - **S-Z:** 1404 Siebel

- You may bring **TWO hand-written** double-sided 8½"×11" cheat sheet to the exam. Otherwise the exam is closed-everything.

- Jeff will hold a final review session this Sunday afternoon. Watch for further details.

- We will offer a conflict exam next week (*after* the Sunday review session); the date will depend on when conflicted students are available. If you need to take the conflict exam, please register no later than Saturday, May 6.

- Solutions for Homework 11 are available.

April 29 | Solutions for Homework 10 are available.

April 26
- **Homework 11** is available. This homework is for practice only; you will not be able to submit solutions for grading. However, the material covered on this homework *may* appear on the final exam. Solutions will be released next Wednesday, May 3.

- Jeff will distribute ICES forms at the end of class next Monday, May 1. Please come for at least the last 15 minutes of class, *even if you previously dropped the class*.

April 25 | **Midterm 2 has (finally) been graded**, and all graded exams have been released on Gradescope.

Here is the distribution of scores (except for a few minor last-minute changes). All statistics and letter-grade cutoffs were computed after excluding outliers **above 95%** and **below 25%**, as described in the grading policies, which is why the overall average is slightly **lower** than reported on Gradescope. However, these stats include grades from both undergraduates and graduate students; I expect the undergraduates-only cutoffs to be slightly lower.

Scores on this exam were *significantly* higher than for Midterm 1; in particular, a high percentage of the class earned more than 95% of the points. As a result, letter grades for the individual midterms should not be taken too seriously.

A **40 40 40 40 40 40 39½ 39½ 39½ 39½ 39 39 38½ 38½ 38½ 38½ 38½ 38½ 38 38 38 38 38 38 38 38 38** 37½ 37½ 37½ 37½ 37½ 37¼ 37 37 37 37 37 36½ 36½ 36 36 36 35¾ 35½ 35 35

B 34¼ 34¼ 34 34 34 33½ 33¼ 33¼ 32¾ 32¾ 32¼ 32 31¾ 31¼ 31½ 31½ 31 30½ 30 29½ 29½ 29 28¾ 28½ 28½ 28¼ 28 27¾ 27¼ 26¾ 26½ 26½ 25 24

C 22 21½ 21 21 21 20¾ 20¼ 19½ 19½ 19 18¾ 18 17¼ 16 15½ 14¾ 13¾ 13¾ 13½ 13¼

D 11 11

F **10 10**

Problem	1	2	3	4	sum
Mean	7.06	8.01	7.03	7.17	29.27

Stdev   2.81 1.97 3.28 2.92 8.07

And here is the distribution of combined scores for both midterms, again with letter grade cutoffs computed after removing outliers. **Please keep in mind that these letter grades are still only rough predictions, based on only 40% of your overall coursework.** Based on past experience, we expect most students' final course grades to be within half a letter grade of these estimates, but larger differences (in either direction) are not uncommon. (In particular, one student's score on Midterm 2 was 35 points higher than their score on Midterm 1!)

A 80 79 78 78 78 78 77 76 75 75 74½ 74½ 74½ 73½ 73½ 73½ 73¼ 72½ 72½ 72 71¾ 71½ 71½ 71 71 71 71 70½ 70½ 70½ 70 69½ 69½ 68¼ 68 68 67¾ 67½ 67

B 66¼ 66 66 65½ 65½ 65 64¼ 64 63 63 62½ 62 62 61¼ 60½ 60 60 60 59¾ 59½ 57½ 56¾ 56¼ 56 53½ 52½ 52½ 51¼ 50¾ 50¼ 50 49¾ 48¾ 48 47½ 47½

C 47 46½ 44¼ 44 43¼ 42¼ 42¼ 42 41¾ 41 40½ 40½ 39½ 39¼ 38½ 37¾ 35 33½ 33 32½ 31½ 28¾

D 27 25 23½

F 19¾ 19 18½ 18 16¼

April 21	Solutions for Homework 9 are available.
April 20	**Homework 10** is due Wednesday, April 26 at 8pm.
April 17	Homework 9 has been revised. In particular, problem 2 has been removed (because apparently Jeff was sleep-deprived when he wrote it).
April 15	Solutions for Homework 8 are available.
April 13	**Homework 9** is due Wednesday, April 19 at 8pm.
April 6	Solutions and tentative rubrics for Midterm 2 are available.
April 5	**Homework 8** is due Wednesday, April 12 at 8pm.
March 31	Solutions for Homework 7 are available.
March 30	**Midterm 2 will be held Tuesday, April 4, 7–9pm.**

- Please go to the following rooms, based on the first letter of your last name:

  - **A–R:** 1404 Siebel
  - **S–Z:** 1310 DCL

- There will be a conflict exam on Wednesday, April 5. If you need to take the conflict exam, please register no later than Monday, April 3.
- There will be no lecture on Monday, April 3. Instead, Jeff will offer an optional review session.
- The exam will focus on material covered in Homeworks 4 through 7, although questions may rely on earlier material, including

preprequisite material. The best source of study materials are the notes and previous semesters' exams. (See links below.)

- You may bring **one hand-written** double-sided 8½"×11" cheat sheet to the exam. Otherwise the exam is closed-everything.
- Again, we plan to scan the exams and upload them to Gradescope for grading. **Please remember to write your Gradescope name and email address on your exam, not your real name and University email address (if they are different).**

March 16
- **Homework 7** is due Wednesday, March 29 at 8pm, after spring break.
- Solutions for Homework 6 are available.

March 9
- **Midterm 1 has been graded**, and grades have been published on Gradescope.

  Here is the distribution of scores. All statistics and letter-grade cutoffs were computed after excluding outliers **above 95%** and **below 25%**, as described in the grading policies, which is why the overall verage is slightly higher than reported on Gradescope. However, these stats include grades from both undergraduates and graduate students; I expect the undergraduates-only cutoffs to be slightly lower.

  Please keep in mind that these letter grades are *extremely* rough predictions, based on only 20% of your overall coursework. Based on past experience, we expect most students' final course grades to be within one letter grade of these estimates, but differences of a full letter grade (in either direction) are not uncommon.

  That said, if your midterm score is significantly below 25%, you should seriously consider dropping the class.

  A 40 40 39 39 38½ 38 38 38 37 37 37 36 36 36 36 35½ 35 35 35 35 35 35 34½ 34 34 33½ 33½ 33½ 33½ 33 32½ 32½ 32½ 32½ 32 32 31½ 31½ 31 31

  B 30½ 30½ 30 30 29½ 29½ 29 28½ 28 28 26 26 26 26 25½ 25½ 25 25 25 25 24½ 24½ 24½ 24½ 24½ 24½ 24 24 23 23 23 23 22½ 22½ 22 22 21½ 21

  C 20½ 20½ 19½ 19½ 19 19 19 18½ 17½ 17 16½ 16½ 15½ 15 14 14 13½ 13 13 13 12½ 11½

  D 10½ 10½ 10

  F 9¾ 9¾ 9½ 8¼ 8 8 7½ 7¼ 7 6 5½ 5¼ 5 2¾ 2½ 2½ 2½

Problem	1	2	3	4	sum
Mean	5.68	5.40	7.61	7.39	25.74
Stdev	3.87	3.17	2.96	2.72	7.60

- **Jeff will hold extra office hours from 9am to noon tomorrow (March 10)**, specifically for students who need to discuss their exams before the drop deadline. Please do *not* ask homework questions.

March 8	• **Homework 6** is due next Wednesday, March 15 at 8pm. • Solutions for Homework 5 are available.
March 1	• **Homework 5** is due next Wednesday, March 8 at 8pm. • Solutions for Homework 4 are available.
February 28	Homework 4 has been revised. In problem 1(b), we only want the analysis in terms of the number of nodes.
February 24	Homework 4 has been revised to clarify problem 2.
February 23	• **Homework 4** is due next Wednesday, March 1 at 8pm. • Solutions for Midterm 1 are available.

February 17	• Both of our midterms will be held in 1404 Siebel and 1310 DCL. For Midterm 1, please go to the following rooms, based on the first letter of your last name:
	
	    ○ **A–J:** 1310 DCL
	    ○ **K–Z:** 1404 Siebel
	
	(These will change for Midterm 2. If we get the same rooms for the final exam, everyone will have two of their three exams in 1404.)
	
	• Here are links to several exams from Jeff's previous iterations of CS 473. (The order that we cover material changes from semester to semester, so don't just look at past Midterm 1s.)
	
	    ○ Spring 2016: Midterm 1, Midterm 2, Final exam
	    ○ Spring 2015: Midterm 1, Midterm 2, Final exam
	
	For lots of even earlier exams, see the bottom of Jeff's lecture notes page.

February 16	Homework 3 solutions are available.
February 15	**Midterm 1 will be held next Tuesday, February 21, from 7pm to 9pm.** • There will be a conflict exam on Wednesday, February 22. If you need to take the conflict exam, please register no later than Monday, February 20. • There will be no lecture on Monday, February 20. Instead, Jeff will offer an optional review session. • The exam will cover everything covered in Homeworks 0 through 3, including prerequisite material. The best source of study materials are the notes and previous semesters' exams. Yes, the exam will be significantly easier than the homework. • You may bring **one hand-written** double-sided 8½"×11" cheat sheet to the exam. Otherwise the exam is closed-everything. • We plan to scan the exams and upload them to Gradescope for grading. **Please remember to write your Gradescope name and email address on your exam, not your real name and University email address (if they are different).**
February 9	• **Homework 3** is due next Wednesday, February 15 at 8pm.

- This is the last homework before Midterm 1.
- Problem 0 is just for practice/amusement; do not submit solutions.

- Homework 2 solutions are available.

- Homework 0 has been graded; see Gradescope.

- **Midterm 1 will be held Tuesday, February 21, 7–9pm**, not "Tuesday, February 20" as previously announced. Stay tuned for location info. The midterm will cover all material covered in Homeworks 0 through 3. There will be no lecture Monday February 20; Jeff will hold an optional review session instead.

February 2	Homework 1 solutions are available.
February 1	**Homework 2** is due next Wednesday, February 8 at 8pm. Only two problems this time (but the first one is long).
January 30	• Homework 1 has been revised. We split problem 2 to give more opportunity for partial credit. You may find the notes on greedy algorithms helpful for proving your algorithm in part (b) correct. • **Class is in 100 Gregory Hall today.**
January 26	Homework 0 solutions are available.
January 25	**Homework 1** is due next Wednesday, February 1 at 8pm.
January 24	Jeff is holding extra office hours 4-5 today and 11-12 tomorrow.
January 23	A wild LaTeX solution template appeared.
January 18	**Class will be held in 100 Gregory Hall on Monday, January 30,** so that 1404 Siebel can be used by a distingushed visiting speaker. This will likely happen a couple more times this semester.
January 15	• Welcome! We're working hard to get everything set up before the semester begins. Meanwhile, you may notice broken links and/or text that refers to previous semesters. • **The first lecture is this Wednesday, January 18.** • **Homework 0** is due next Wednesday, January 25 at 8pm. Each student must submit their own individual solutions on Gradescope. A LTeX solution template will be available soon.

❖ Regular weekly schedule ❖

Lectures	Mon Wed 4:00–5:15, 1404 Siebel
Office hours:	**All in 3300G Siebel (the open area near 3304)** (Watch for rescheduling announcements on Piazza) Jeff Tue 11–12 / Thu **4-5** Alex Fri 4-5

Charlie   Mon 1:30–2:30
Vivek   Wed **11:30-12:30**

Homework | Due **Wednesdays at 8pm**, uploaded to Gradescope.
Homeworks are released at least one week before the due date.
Under normal circumstances, graded homework should be returned within 10 days of submission.

Si maintenant vous me donnez une équation que vous aurez choisie à votre gré, et que vous desirez connaître si elle est ou non soluble par radicaux, je n'aurai rien à y faire que de vous indiquer le moyen de répondre à votre question, sans vouloir charger ni moi ni personne de la faire. En un mot les calculs sont impracticables.

— Évariste Galois

For every polynomial-time algorithm you have, there is an exponential algorithm that I would rather run.

— Alan Perlis

Algorithms are for people who don't know how to buy RAM.

— Clay Shirky