

CS 6363.003.21S — Design and Analysis of Computer Algorithms

Spring 2021

Tuesdays and Thursdays 1:00pm–2:15pm

Live lectures: MS Teams. Link will be given in the "CS 6363.003 2212" team.

Recorded lectures: Posted in the Lectures channel of the "CS 6363.003 2212" team as soon as they are available.

Instructor:

Kyle Fox

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Office Hours: Wednesdays 10:30am–11:30am and Thursdays 2:30pm–3:30pm via MS Teams. Additional or private office hours available by request. Please email Kyle directly.

Homepage: <https://personal.utdallas.edu/~kyle.fox/>

Teaching Assistant:

Gregory Van Buskirk

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Office Hours: Mondays 12:00pm–2:00pm via MS Teams.

Administrivia:

Electronic Text and Assorted Notes: Jeff Erickson: [Algorithms](#)

Required Textbook for all CS 6363 Sections: Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein: *Introduction to Algorithms, 3rd Edition*. MIT Press 2009 (CLRS)

[About this course](#)

[Writing policies and advice](#)

Course syllabus: ([MS Word](#)) ([pdf](#))

Announcements

- May 17: Exams have been graded, and final grades have been posted to eLearning and submitted to Orion. The [final exam](#) you all took is also available for future reference. Thank you all again for a tough but hopefully fulfilling semester. And best of luck to all of you taking the QE!
- May 14: Grades for Midterm 2 are now available on eLearning. The mean score was a 31.7 out of 40, and the standard deviation was 5.1. If Kyle were assign grades based purely on this midterm, he would set the lower bound for a B- around 21, for a B around 24, for a B+ around 28, for an A- around 31, and for an A around 35.

Obviously, your Final Exam will be graded much more quickly.

- May 12: By request, the whole notebook of scribbles from this semester's [office hours](#) is now available. The last few pages cover problems from the [Spring 2019](#) final exam.

As a reminder, the Final Exam will be made available on eLearning Thursday, May 13th at 6:00am CDT. The exam [instructions](#) are available on the course website now in case you would like to look over them before you start the eLearning exam. Be sure to submit by Friday, May 14 at 5:59am CDT.

Good luck on the exam!

- May 11: Homework 5 [solutions](#) are now available.

- May 10: Sorry about the late notice, but Kyle will hold a review session tomorrow, Tuesday, May 11th from 1:00pm–2:15pm. Feel free to ask any questions you'd like in preparation for the Final Exam. The session will be recorded and uploaded to Microsoft Stream.

The Final Exam will be made available on eLearning Thursday, May 13th at 6:00am CST. The eLearning exam consists of a single "question" which links to the pdf containing all exam problems (there will likely be six or seven problems total). You should upload all of your solutions as your response to this eLearning question. You'll have **three** hours to submit your solutions once you start the exam. You must also submit by Friday, May 14 at 5:59am CST regardless of when you start the exam. Do not hesitate to email Kyle if you have any questions, and good luck on the exam!

Finally, Kyle apologizes for still grading Midterm 2. Even a minor illness can put a big dent in one's schedule.

- May 5: [Midterm 2 solutions](#) are now available. Grades should be available this week.
- May 4: A practice QE exam is available on eLearning. Please email Kyle if you do not have access to the file. As a reminder, we will not have class on Tuesday, May 5th, so you have time to take the practice QE.
- April 23: Apologies for releasing it so soon after Midterm 2, but the semester ends in only two weeks. [Homework 5](#) is now available. Is it due **Saturday**, May 8th on eLearning. In case you would like to typeset your solutions using LaTeX, you may find the [source files](#) useful.
- April 21: Homework 4 [solutions](#) are now available.

The recording for the Midterm 2 review session is now available in the Locally Recorded Lectures tab of our Team's Lectures channel. Handwritten [notes](#) from the session are available as well.

Midterm 2 will be made available on eLearning Thursday, April 22nd at 6:00am CST. The eLearning exam consists of a single "question" which links to the pdf containing all four exam problems. You should upload all of your solutions as your response to this eLearning question. The exam [instructions](#) are available on the course website now in case you would like to look over them before you start the eLearning exam. As stated in the instructions, you'll have two hours to submit your solutions once you start the exam. You must also submit by Friday, April 23rd at 5:59am CST regardless of when you start the exam. **Please be aware that this deadline is four hours earlier than the one given for Midterm 1, because eLearning is not expected to go down for maintenance this time.** Do not hesitate to email Kyle if you have any questions, and good luck on the exam!

- April 8: Homework 3 [solutions](#) are now available.

Also, Midterm 2 will take place Thursday, April 22nd. It will primarily cover Lectures 8 through 17 (February 25th through April 6th) on subjects like greedy algorithms, graph algorithms through all-pairs shortest paths, and dynamic programming on trees and DAGs.

As before, the exam questions will be given as a pdf on eLearning. The exam will be written as if it had a 1 hour 15 minute time limit, but you will be given 2 hours to read, write your solutions, and upload a scanned copy of your solutions to eLearning. Each student may take the exam within any 2 hour block they'd like between 6am CST on April 22nd and 5:59am CST on April 23rd. Similar to before, it would be best to take the exam between 9am CST and 3:30pm CST on the 22nd so Kyle can more quickly respond to questions about the exam problems or technical issues with uploading solutions.

- April 4: [Homework 4](#) is now available. Is it due Sunday, April 18th on eLearning. In case you would like to typeset your solutions using LaTeX, you may find the [source files](#) useful.

In addition, grades for Midterm 1 are now available on eLearning. The mean score was a 31.1 out of 40, and the standard deviation was 5.5. If Kyle were assign grades based purely on the midterm and these statistics, he would set the lower bound for a B- around 20, for a B around 23, for a B+ around 27, for an A- around 31, and for an A around 34. He apologizes for his tardiness in posting your grades.

- March 30: [Homework 3](#) and its [source files](#) have been updated to provide clarification on Problem 1 and fix an error in the figure caption for Problem 2.
- March 20: [Homework 3](#) is now available. Is it due Sunday, April 4th on eLearning. In case you would like to typeset your solutions using LaTeX, you may find the [source files](#) useful.
- March 18: We hope you are enjoying your Spring Break! Midterm 1 [solutions](#) are now available. Please wait a little while longer for Kyle to grade them. Homework 3 will be released very early next week, and you'll be given the normal two weeks to complete it.

The recording for the Midterm 1 review session is now available in the Locally Recorded Lectures tab of our Team's Lectures channel. Handwritten [notes](#) from the session are available as well.

Midterm 1 will be made available on eLearning Thursday, March 11th at 6:00am CST. The eLearning exam consists of a single "question" which links to the pdf containing all four exam problems. You should upload all of your solutions as your response to this eLearning question. The exam [instructions](#) are available on the course website now in case you would like to look over them before you start the eLearning exam. As stated in the instructions, you'll have two hours to submit your solutions once you start the exam. You must also submit by Friday, March 12th at 5:59am CST regardless of when you start the exam. **Please be aware that eLearning may be down for maintenance between 1:00am and 5:00am CST the morning of Friday, March 12th.** This maintenance period is why we are delaying the end of the originally planned exam period by a few hours. Do not hesitate to email Kyle if you have any questions, and good luck on the exam!

- April 8: Homework 3 [solutions](#) are now available.

As before, the exam questions will be given as a pdf on eLearning. The exam will be written as if it had a 1 hour 15 minute time limit, but you will be given 2 hours to read, write your solutions, and upload a scanned copy of your solutions to eLearning. Each student may take the exam within any 2 hour block they'd like between 6am CST on March 11th and 5:59am CST on March 12th. That said, it would be best to take the exam between 9am CST and 4pm CST on the 11th so Kyle can more quickly respond to questions about the exam problems or technical issues with uploading solutions.

Some time this coming week, we will ask everybody to take a short "technical practice exam" that only asks to you write and upload two pages to make sure your technology is working properly before taking the real exam.

- February 21: [Homework 2](#) is now available. Is it due Sunday, March 7th on eLearning. In case you would like to typeset your solutions using LaTeX, you may find the [source files](#) useful.

Texas guidelines say we must make up for at least one of the classes that we missed, and Midterm 1 is still tentatively schedule for March 11th (the official announcement will come later this week). Here's the plan: On Tuesday, March 9th (the Tuesday after Homework 2 is due), Kyle will hold an extra office hour from 2:30pm to 3:30pm to answer questions relevant to the midterm. Wednesday, March 10th from 10:30am to 11:45am, we'll hold an extra live lecture instead of normal office hours. We'll treat this lecture purely as a review session where you can ask Kyle any questions you have about the first two homework assignments, about things you saw in class, or even about additional problems from the text you would like to better understand before the midterm. Kyle will share recordings of the lecture as quickly as he can so you can watch before the midterm the next day.

Sorry it's been so long since we've met, but the weather outside looks great finally, and we're looking forward to seeing you all later this week!

- February 18: Homework 1 [solutions](#) are now available. Please keep in mind that these are in some sense the "ideal" solutions to these problems, and they contain extra exposition and details to help further your understanding. In particular, our official solutions will generally contain more details than would be necessary for students to receive full credit.

- February 17: The university will remain closed through Friday, February 19th, so we're going to cancel Kyle's office hours and the live lecture for this week. We still plan to release Homework 2 this Friday.

It looks like the weather will be much nicer next week, and we're looking forward to meeting with all of you again. In the meantime, please keep safe and warm!

- February 15: Due to dangerous weather and rolling blackouts, the university has canceled all in-person and virtual activities, and it has asked non-essential employees not to work Monday or Tuesday. Therefore, we are canceling Greg's office hours for Monday, February 15th and lecture for Tuesday, February 16th.

Fortunately, there is some slack built into the schedule, so there is still time to cover all the 6363 learning objectives and prepare students for the QE using only live lectures. Unfortunately, the second homework and first midterm cover material we meant to teach last Thursday and this week, and there's a decent chance lecture will be canceled this Thursday as well.

Here is the current plan: Homework 2 will be released this Friday, February 19th whether or not we meet this week and be made due two weeks later. It will contain one or two problems that will be made easier by the next lecture or two, but you should have technically seen everything necessarily to succeed. The tentative dates for both midterms have been pushed back by a bit. See the [schedule](#) on the course webpage. We'll likely announce the final date for Midterm 1 next Thursday.

Please don't hesitate to send Kyle an email if you have any questions or concerns about the course schedule.

- February 11: Due to inclement weather, the university has canceled all in-person and virtual activities, including today's lecture. We would rather meet with you live than post a video recorded without student participation, so today's scheduled lecture material will be presented next Tuesday. If class is canceled next Tuesday as well, then we may have to post an asynchronous lecture or two after all.

Kyle will show up for today's office hours, because they're more of an informal/optional thing anyway. Please send an email if you were planning to attend office hours but cannot safely do so thanks to the weather. Maybe we can schedule another time to chat.

Homework 1 is still due tomorrow, February 12th. We are still trying to decide how to handle scheduling for future homework and the midterms, because you might benefit from seeing the next lecture before starting Homework 2. We'll keep you updated on any decisions we make.

- February 2: We have a TA! Gregory Van Buskirk will assist the class in holding office hours and grading homework. His office hours will run from 12pm to 2pm every Monday on MS Teams.

Speaking of office hours, you are all highly encouraged to attend office hours with both Kyle and Greg. You can ask any questions you'd like about the homework or lectures, including getting help with the homework problems. You can even ask about problems in the texts if you'd like extra practice. We hope to see you there!

- January 29: [Homework 1](#) is now available. Is it due Friday, February 12th on eLearning. In case you would like to typeset your solutions using LaTeX, you may find the [source files](#) or [solutions template](#) useful.

- January 19: The first set of lecture notes have been posted to the [schedule](#) below. Also, the first locally recorded lecture has been uploaded to MS Stream. You can access it through the "Locally Recorded Lectures" tab on the "Lectures" channel in the "CS 6363.003 2212" team. Please continue to check for notes and recordings regularly. I won't do future announcements about them to avoid overwhelming your inboxes.

Also, if you still don't have access to the MS Team, and you haven't done so already, please send an email to let me know.

- January 18: Hello all, and welcome to CS/SE 6363.003.21S — Design and Analysis of Computer Algorithms. I'm Kyle, an assistant professor at UTD and your instructor for the course.

This section of the course is intended for students planning to take the Algorithms QE. While I won't assume prior knowledge beyond the prerequisites common to all sections of CS 6363, I do want you to gain skills in designing and analyzing algorithms beyond a baseline understanding of the process. You'll likely find things more difficult relative to other CS 6363 sections, especially with the homework.

Midterm 1 will have regular lectures presented by myself and office hours where we can discuss class topics or homework problems. I plan to do live lectures and office hours through MS Teams, under the "CS 6363.003 2212" team. I will also post recorded lectures there in case you can't attend in person, and we can use it as a discussion space if you'd like. If you have a strong preference for a different platform, please let me know, but we may not be able to change much due to the size of the class. I find eLearning in particular to be very frustrating to use, so I'd prefer to keep as much off of eLearning as possible, all things being equal.

This course has a website at <https://personal.utdallas.edu/~kyle.fox/courses/cs6363.003.21s/>. I will post copies of every announcement and homework assignment on the website. The website will also contain the only copy of the (always changing) course schedule along with links to relevant readings and lecture notes I use for myself as a script. I keep old class websites around forever in case you want to read up on algorithms topics that I've taught before. The website is also the best resource for understanding course policies and getting general writing advice.

We'll also use eLearning as the way I email announcements to everybody, the place to submit homework and do exams, and the place I put your grades.

I'm looking forward to a great semester with you all, and I'll see most of you this Tuesday, January 19th at 1pm in the Live Lectures meeting of MS Teams.

Schedule and Homework

The schedule below will be updated with new subjects and recommended readings throughout the semester. Exact topics discussed in each lecture may change.

Shortly before or after each lecture, I will update the readings with my own notes/script. Use at your own risk! My notes likely have typos or maybe even a few bugs!

Date	Subject/Event	Reading	Notes
Tue, Jan. 19th	Administrivia, "What is an algorithm?", designing and describing algorithms	Erickson 0; CLRS 2–2.2; lecture notes ; scribbles	
Thur, Jan. 21st	Reductions, induction, recursion	Erickson 1 (through Section 2 plus however many examples you think would be helpful); Erickson 1–1.2 ; lecture notes ; scribbles	
Tue, Jan. 26th	Divide-and-conquer, mergesort, quicksort	Erickson 1.4–1.6; CLRS 2.3, 4.0, 4.3, 7–7.1; lecture notes ; scribbles	
Thur, Jan. 28th	Asymptotic notation, solving divide-and-conquer running time recurrences	Erickson 1.7, 1.9; CLRS 3, 4.4–4.5; typeset notes on asymptotic notation from CS 4349 ; lecture notes ; scribbles	
Tue, Feb. 2nd	Quicksort analysis, element selection	Erickson 1.5, 1.8; CLRS 7–7.2, 7.4.1, 9.0, 9.3; lecture notes ; scribbles	
Thur, Feb. 4th	Closest pair of points in the plane, Karatsuba multiplication	Suri; CLRS 33.4; lecture notes ; scribbles (recommended)	
Tue, Feb. 9th	Dynamic programming, Fibonacci numbers, rod cutting	Erickson 2.4–2.5, 3.1, 3.3–3.5; CLRS 15–15.1, 15.3; lecture notes ; scribbles	
Thur, Feb. 11th	No class; university closed due to inclement weather		Homework 1 due Friday, February 12th (<a