

CS 5150/CS 6150: Graduate Algorithms

Administrative Details and Syllabus
Spring 2021

Course Web Page: <https://utah.instructure.com/courses/714588>

Description. Algorithms are at the core of any computation, and designing efficient algorithms is one of the basic goals in many areas of CS. The goal of the course is to study some of the fundamental principles and techniques for developing algorithms and analyzing them. Given the growing role of algorithms in our lives, it is crucial to understand if/when algorithms produce the “correct” output (via rigorous mathematical analysis), and to study the running time and resource utilization of algorithms.

Broadly, we will cover the following topics:

1. Basic paradigms, including divide and conquer, greedy selection, dynamic programming and local search
2. Using randomization in algorithm design
3. Formulating problems as optimization (e.g., linear and convex programming)
4. Understand the limits of efficient computation, NP completeness, hardness of approximation

Along the way, we will encounter the notion of approximation algorithms for optimization problems. We will also see the role that the computational “model” plays in designing algorithms. To illustrate, we will briefly study models of computation such as streaming, online and distributed computing.

Instructor. Aditya Bhaskara. *Office:* 3470 MEB. *Email:* bhaskara.course@gmail.com. You can also send email to my CS address, bhaskara@cs.utah.edu. Please allow a day or so for me to respond to email. If you have a question that is time sensitive, please send a reminder!

Class Meetings. Tuesdays and Thursdays, 12:25 – 1:50pm, in room GC 1900 (Gardner Commons). There will also be a Zoom video link that is available on the Canvas webpage for the course. However, note that this is an in-person class, and questions on Zoom **will not be monitored**.

Getting Help. Try your best to take advantage of the instructor and TA office hours. We will work hard to be accessible to students. Please post a message to the instructors on Piazza if you need to meet outside of office hours. Don’t be shy if you don’t understand something: come to office hours, post on Piazza, or speak up in class!

Piazza will be the main tool we use for discussions and announcements. Feel free to post questions regarding anything related to the course: homeworks, schedule, material covered in class. Students are encouraged to answer questions posted by other students! It creates a good classroom atmosphere. However, do NOT post fully formed homework solutions. Such posts will be immediately removed, and the students will face appropriate penalty. The TAs will also monitor questions and answer them, but do not rely on them answering questions immediately (especially outside of working hours).

Logistics. For information about possible textbooks, requisite background and pre-requisites, please see the Canvas page.

Grading Policy. The final course grade is based on the homeworks and two exams.

Homeworks: There will be six homeworks, the best five of which will count towards your grade. Together, HWs will account for 65% of your grade.

Exams: We will have two exams, one in the middle of the term (first week of October), and the other at the end of the semester. These exams will be administered on Canvas. The midterm and final will account for 15% and 20% of the course grade respectively.

		83-87	B+	60-64	C+	45-49	D+		
93-100	A	73-82	B	55-59	C	40-41	D	0-34	E
88-92	A-	65-72	B-	50-54	C-	35-39	D-		

Homework assignments will involve designing algorithms for problems (that you might not have seen in class), writing proofs of correctness, and sometimes performing experiments (by implementing an algorithm). You can use any major programming language (Python, Java, C/C++) to write your code. Please include compilation instructions with your code.

Homeworks must be prepared either **using LaTeX or Markdown**. In particular, using Microsoft Word is not acceptable. This is mainly because writing equations, algorithms, etc. in Word makes it much harder to read. Homeworks need to be submitted through Canvas, as PDF file uploads. We will be strict about deadlines, and the late policy is as follows: for each HW, submissions will be accepted until 4 days after the deadline, but there will be a 10% penalty for each late day. Since this is the first ‘normal’ semester post-pandemic, we will allow 6 “free” late days that you can use over the course of the semester.

Regrade requests. If you believe there is an error in grading (homeworks or quizzes), you may request a regrading within one week of receiving your grade. Requests must be made in writing (as a post on Piazza to the instructors, or by email to the designated TA), explaining clearly why you think your solution is correct.

Working Together. You are allowed to discuss the concepts in a homework assignment with your fellow classmates. However, you must develop and write up your own solutions. Do not read another person’s answers or code, and do not show your answers or code to anyone else. *Presenting someone else’s solutions as your own will be considered cheating.* Also, it is important that you first try to solve problems on your own, and discuss them only when you are stuck or to reassure yourself about your answer.

Posting homework questions on internet forums is **not** allowed and is considered cheating. This is cheating regardless of whether or not you use any of the posted answers. Posting fully formed answers to the class discussion forum is not allowed.

Finally, there must be no collaboration during the exams. If a student is caught cheating on a homework or quiz, they will receive a failing grade for the course. For a detailed description of the university policy on cheating, please see the University of Utah Student Code: <http://www.regulations.utah.edu/academics/6-400.html>.

School of Computing Cheating Policy. The School of Computing has instituted a “two strikes and you’re out” cheating policy, meaning if you get caught cheating twice in any SoC classes, you will be unable to take any future SoC courses.

Students with Disabilities. The University of Utah seeks to provide equal access to its programs, services, and activities for people with disabilities. If you need accommodations in this class, reasonable prior notice needs to be given to the Center for Disability Services, 162 Olpin Union Building, 581-5020 (V/TDD). CDS will work with you and the instructor to make arrangements for accommodations.

University Safety Statement. The University of Utah values the safety of all campus community members. To report suspicious activity or to request a courtesy escort, call campus police at 801-585-COPS (801-585-2677). You will receive important emergency alerts and safety messages regarding campus safety via text message. For more information regarding safety and to view available training resources, including helpful videos, visit: <http://safeu.utah.edu>.

Addressing Sexual Misconduct. Title IX makes it clear that violence and harassment based on sex and gender (which Includes sexual orientation and gender identity/expression) is a civil rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, color, religion, age, status as a person with a disability, veteran's status or genetic information. If you or someone you know has been harassed or assaulted, you are encouraged to report it to the Title IX Coordinator in the Office of Equal Opportunity and Affirmative Action, 135 Park Building, 801-581-8365, or the Office of the Dean of Students, 270 Union Building, 801-581-7066. For support and confidential consultation, contact the Center for Student Wellness, 426 SSB, 801-581-7776. To report to the police, contact the Department of Public Safety, 801-585-2677(COPS).

Wellness statement. Personal concerns such as stress, anxiety, relationship difficulties, depression, cross-cultural differences, etc. can interfere with a student's ability to succeed and thrive at the University of Utah. For helpful resources, contact the Center for Student Wellness online, or on the phone at 801-581-7776.