Winter 2021 CS 584/684

Algorithm Design & Analysis

Instructor:	Fang Song
Course Meeting Schedule:	T/R 16:40 – 18:15 via Zoom (check D2L for details).
Email:	fsong@pdx.edu Stat email subject line with "w21-5684-alg"
Course webpage:	https://fangsong.info/teaching/w21_5684_alg/
Office hours:	F 8:30 – 10 am via Zoom. (Link to be announced in class)
Zoom links:	Course webpage under "Schedule" tab. Also check your "PSU Classes" calendar.
Teaching assistant	Steven Libby slibby@pdx.edu

Course Description

Algorithms are becoming a central technology for solving problems from a variety of fields. This course will cover the core techniques for designing and analyzing efficient algorithms. The focus will be on the key mathematical ideas and methods, as opposed to implementations.

Course Prerequisites

CS 350 or equivalent.

Text and/or Materials

No required text. Suggested texts:

- [**CLRS**] Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein. Introduction to Algorithms, 3rd edition, MIT Press, 2009. Electronic copy available via PSU library.
- [**KT**] Jon Kleinberg, Éva Tardos. Algorithm design, Pearson Addison-Wesley, 2006.
- [**DPV**] Sanjoy Dasgupta, Christos Papadimitriou, and Umesh Vazirani. Algorithms, McGraw-Hill Higher Education, 2008.

Grading Policies

- Homework: 40%. Weekly assignments.
- Mid-term exam: 25%.
- Final exam: 30%.
- Participation: 5%.

Homework Policy

- You have a quota of 5 days in total for late submissions without penalty. You can use them at your will. You need to clearly mark on late submissions. Once the quota runs out, no late homework will be accepted.
- Collaboration on homework problems is highly encouraged, but you must write up solutions entirely on your own and clearly list who you discussed with for each problem. You must also clearly cite any other source you have referenced other than the text (a person, a book, a research paper, a webpage, etc.).

- All assignments must be submitted in PDF format. It is recommended to type-set your solutions using LaTeX, and you will get extra credit doing so. A tutorial and learning materials on LaTeX will be provided.
- "I'll take 15%" option. You solutions should be as clear and concise as possible. Partial credit will only be given for answers that make significant progress towards correct solutions. If you realize you cannot solve a problem, you may write "I'll take 15%" instead of your answer, so you get 15% for this problem (or part of the problem). But if you do write an answer, you will get 0 if your solution is completely wrong. There will be optional problems sometimes with bonus credit, and the "I'll take 15%" option does not apply.
- For each assignment, a random subset of problems will be graded.

Course Topics and Tentative Schedule

Check course webpage for details and updates

Week	Topic	Main Reading
1 – 2	Review. Asymptotic notations, recurrences, merge sort, divide-and-conquer, elementary graph algorithms.	CLRS 1 – 4, 22
3 – 4	Dynamic Programming.	CLRS 15, KT 6
5 – 6	Greedy algorithms, amortized analysis. Take-home mid-term covering weeks 1 – 4.	CLRS 16
7	Advanced graph algorithms, network flow.	CLRS 28,31
8 – 9	Computational complexity, NP,NPC.	CLRS 34
10	Approximation and randomized algorithms. Selected topics: quantum algorithms.	CLRS 5,35. DPV 10
11	Final take-home exam	

PSU Policies & Resources

Academic Integrity

Academic integrity is a vital part of the educational experience at PSU. Please see the [PSU Student Code of Conduct](#) for the university's policy on academic dishonesty. A confirmed violation of that Code in this course may result in failure of the course.

Student Services

Disability Access Statement

If you have, or think you may have, a disability that may affect your work in this class and feel you need accommodations, contact the Disability Resource Center to schedule an appointment and initiate a conversation about reasonable accommodations. The DRC is located in 116 Smith Memorial Student Union, 503-725-4150, drc@pdx.edu, https://www.pdx.edu/disability-resource-center/

Safe Campus Statement

Portland State University desires to create a safe campus for our students. As part of that mission, PSU requires all students to take the learning module entitled Creating a Safe Campus: Preventing Gender Discrimination, Sexual Harassment, Sexual Misconduct and Sexual Assault. If you or

someone you know has been harassed or assaulted, you can find the appropriate resources on PSU's Enrollment Management & Student Affairs: Sexual Prevention & Response website at http://www.pdx.edu/sexual-assault

Title IX Reporting

As an instructor, one of my responsibilities is to help create a safe learning environment for my students and for the campus as a whole. Please be aware that as a faculty member, I have the responsibility to report any instances of sexual harassment, sexual violence and/or other forms of prohibited discrimination. If you would rather share information about sexual harassment, sexual violence or discrimination to a confidential employee who does not have this reporting responsibility, you can find a list of those individuals on PSU's Enrollment Management & Student Affairs: Sexual Prevention & Response website at http://www.pdx.edu/sexual-assault. For more information about Title IX please complete the required student module "Creating a Safe Campus: Preventing Gender Discrimination, Sexual Harassment, Sexual Misconduct and Sexual Assault" in the "My Courses" section of D2L.

Cultural Resource Centers

The Cultural Resource Centers (CRCs) create a student-centered inclusive environment that enriches the university experience. We honor diversity, explore social justice issues, celebrate cultural traditions, and foster student identities, success, and leadership. Our centers include the Multicultural Student Center, La Casa Latina Student Center, Native American Student & Community Center, Pan African Commons, Pacific Islander, Asian, Asian American Student Center and the Middle Eastern, North African, South Asian program. We provide student leadership, employment, and volunteer opportunities; student resources such as computer labs, event, lounge and study spaces; and extensive programming. All are welcome!

Recording Technology Notice

We will use technology for virtual meetings and recordings in this course. Our use of such technology is governed by FERPA, the Acceptable Use Policy and PSU's Student Code of Conduct. A record of all meetings and recordings is kept and stored by PSU, in accordance with the Acceptable Use Policy and FERPA. Your instructor will not share recordings of your class activities outside of course participants, which include your fellow students, TAs/GAs/Mentors, and any guest faculty or community-based learning partners that we may engage with. **You may not share recordings outside of this course. Doing so may result in disciplinary action.**