SJSU SAN JOSÉ STATE UNIVERSITY

College of Science · Computer Science

Design and Analysis of Algorithms

CS 255

Fall 2025 Section 01 In Person 3 Unit(s) 08/20/2025 to 12/08/2025 Modified 08/20/2025

Contact Information

Instructor: David S Taylor

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Office Hours

Monday, 1:30 PM to 2:30 PM, MacQuarrie Hall 212

Tuesday, 11:00 AM to 12:00 PM, MacQuarrie Hall 212

Course Information

Add/Drop date for this semester is September 16th. By that date, ideally well before it, you need to make sure that you are enrolled if you are taking the course, or are dropped if you are not.

Lecture, Section 1

Monday, Wednesday, 9:00 AM to 10:15 AM, Dudley Moorhead Hall 149A

Course Description and Requisites

Randomized algorithms. Parallel algorithms. Distributed algorithms. NP-completeness of particular problems. Approximation algorithms.

Prerequisite(s): CS 155 and Graduate standing. Allowed Declared Major: Computer Science, Bioinformatics, Data Science. Or instructor consent.

Letter Graded

Classroom Protocols

Class participation and feedback are very important to keep the course interesting. *If I am covering material too slowly or quickly, or if I am not clearly explaining things, you must let me know.* I prefer an interactive learning environment. If you disagree with something I say, speak up. Argue material with me in front of the class. It will make the class better, and right or wrong, constructive interaction will not not hurt your grade. If you are correct, clearly my mistake should be corrected. If you are incorrect, probably I have not explained something clearly anyway, and at least half of the class is confused by it. Point it out right then and there. In cases of exceptional participation that seem to benefit the class as a whole, I reserve the right to improve a student's grade by up to 1/3 grade.

Program Information

Diversity Statement - At SJSU, it is important to create a safe learning environment where we can explore, learn, and grow together. We strive to build a diverse, equitable, inclusive culture that values, encourages, and supports students from all backgrounds and experiences.

Course Learning Outcomes (CLOs)

At the end of this course, students should be able to:

- analyze and code randomized algorithms
- analyze or code a parallel algorithm, using an appropriate library if needed
- evaluate a distributed algorithm's runtime and prove its correctness
- categorize various problems as being in P or NP-Complete, with proof
- prove simple approximation ratios for optimization versions of NP complete decision problems

Course Materials

We will use material from enough textbooks this semester that I cannot justify asking you to buy them all. However, you should definitely have Introduction to Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein. It is currently in its 4th edition. I generally use the 3rd edition, which should be widely and cheaply available. The 2nd edition is also fine, and the 4th edition should also be fine. The first edition was different enough, and might be hard enough to find now, that I recommend a later edition.

Laptop Computer

Seems like you should have one of these.

Course Requirements and Assignments

Homework

There will be homework assigned throughout the semesterL some will be short, individual assignments, ohers will have a longer timeframe and allow for groups. Some might not be turned in. Each homework will involve written questions, and some may also involve programming. For group assignments, each student in a group (of up to 3) should understand everything that the group submits.

Unless specifically allowed, you cannot use ChatGPT or any other AI LLM to help with any homework assignment that will be turned in. You should also not be searching for solutions to the specific problems assigned. The purpose of the homework is for you to work out the answers, not for you to look up the answers. Any references outside those assigned (such as the textbook) need to be cited.

Unannounced Quizzes

We will regularly have unannounced quizzes in class, usually taking no more than 5 minutes. For uncollected homework assignments, ideally the knowledge needed for those assignments will help you with these quizzes.

Exams

There will be 7 or 8 exams, each taking approximately no more than half of a class period, during the course of the semester. **Each exam date will be announced at least one class in advance, but won't be set at the start of the semester, as the schedule given below is not set in stone.** Because these will be frequent, and held immediately after covering a topic, there will not be a large review before any of these exams.

Project

There may be a project. It would start no earlier than mid-semester, and take no more than 3 weeks.

✔ Grading Information

The course will be weighted as follows:

- Homework: 20-25% of your course score total, depending on if we have 7 or 8 exams.
- Unannounced quizzes: 10% of your course score. I will drop the lowest 25% of these grades for each student.
- Exams: 5% of your course score each.
- Final: 30% of your course score.
- Project?: if there is a project, it will be worth up to 10% of your course grade, replacing your lowest exam score, as well as your lowest homework score(s).

I try to set grade breaks such that a few points on one quiz won't change your grade. That is, I will look for gaps in student scores when deciding where cut-offs are. However:

- The grade cut-off for an A- will be no higher than 75%.

- The grade cut-off for a B- will be no higher than 65%.
- The grade cut-off for a C will be no higher than 55%.

I reserve the right to make the cut-offs above more generous. My general tendency is to be somewhat strict when assigning numeric scores, and more lax when translating those scores into letter grades.

University Policies

Per University Policy S16-9 (PDF) (http://www.sjsu.edu/senate/docs/S16-9.pdf), relevant university policy concerning all courses, such as student responsibilities, academic integrity, accommodations, dropping and adding, consent for recording of class, etc. and available student services (e.g. learning assistance, counseling, and other resources) are listed on the Syllabus Information (https://www.sjsu.edu/curriculum/courses/syllabus-info.php) web page. Make sure to visit this page to review and be aware of these university policies and resources.

Course Schedule

The schedule below is tentative, and may be adjusted as needed during the semester. As the semester progresses, I will fill in additional detail to the "Notes" column.

When	Topic	Notes
Weeks 1 and 2	Introductions, Review Basics	
Weeks 3, 4, 5	NP and Approximation Algorithms	
Weeks 6 and 7	Randomized Algorithms	
Weeks 8, 9, 10, 11	Parallel Algorithms	
Weeks 12 and 13	Distributed Algorithms	
Weeks 14 and 14.5	To be determined	Some possibilities: • Online Algorithms • Numeric Algorithms • Max-Flow Algorithms • External Memory Algorithms • Algorithmic Game Theory
December 8	Last day of Classes: Review	
Final Exam, Section 1 12/15/2025 8:30 AM - 10:30 AM		