Course Syllabus

Edit

San José State University

College of Science/Computer Science
CS 155, Introduction to the Design and Analysis of Algorithms, 02, Spring, 2022

Course and Contact Information

Instructor(s): Ben Reed

Office Location: MH 213 https://sjsu.zoom.us/j/4077267356

Telephone: (408) 924-5174

Email: ben.reed@sjsu.edu

Office Hours: M & W 4-5:30PM in office (over zoom while remote)

Tues 10-11 over zoom

Thur 6-7 over zoom

Class Days/Time: M & W 6-7:15PM

Classroom: DH 450

Prerequisites: CS 146

Course Description

Algorithm design techniques: dynamic programming, greedy algorithms, Euclidean and extended Euclidean algorithms, Discrete and Fast Fourier transforms. Analysis of algorithms, intractable problems and NP-completeness. Additional topics selected from: selection algorithms and adversary arguments, approximation algorithms, parallel algorithms, and randomized algorithms.

Course Format

This is an in-person class. Lectures will usually be recorded over Zoom, but once in-person classes begin the Zoom room will not be monitored during lecture.

Course Learning Outcomes (CLO)

Upon successful completion of this course, students will be able to:

1. Analyze the time and space complexity of algorithms.
2. Explain the relationship between P and NP complexity classes and be able to reduce
3. Adapt general algorithms to solve specific problems.
4. Use polynomial-time reduction to map a solution for one problem to another problem.
5. Show how the halting problem is useful for evaluating potential solutions to problems.

Required Texts/Readings

Textbook

Thomas H. Cormen, et al. Introduction to Algorithms, Third Edition. Vol. 3rd ed, The MIT Press, 2009.

http://libaccess.sjlibrary.org/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=343613&site=ehost-live&scope=site (http://libaccess.sjlibrary.org/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=343613&site=ehost-live&scope=site)

Course Requirements and Assignments

Programming is a significant part of the course. Each programming assignment is an individual assignment. Since this is a algorithms design class, you are expected to come up with your own design. Do not collaborate with other students or use outside resources to implement your solution. If you use sources outside the class to understand algorithms, you must cite them in your code. Any sharing of code or aid from others will result in a zero on the assignment and an academic integrity report with the university. Sharing includes posting on a public github account before the class has finished. All assignments will be in Java.

University Policy S16-9 *(http://www.sjsu.edu/senate/docs/S16-9.pdf), Course Syllabi requires the following language to be included in the syllabus:*

“Success in this course is based on the expectation that students will spend, for each unit of credit, a minimum of 45 hours over the length of the course (normally three hours per unit per week) for instruction, preparation/studying, or course related activities, including but not limited to internships, labs, and clinical practica. Other course structures will have equivalent workload expectations as described in the syllabus.”

Final Examination or Evaluation

The final exam will have two parts: an exam administered on Canvas and a programming problem administered on Kattis. Both parts will be done in class on the final exam day.

Grading Information

Determination of Grades

- 60%: programming assignments. An assignment will be given each class, based on the lecture. Assignments are submitted via Kattis. If the assignment is done on time (by the next class) using the algorithm that corresponds to the assignment, 100% will be awarded. If the assignment is turned in after the next class but before two classes, 85% will be awarded. No other late assignments are accepted. Because life can be difficult and things come up, the lowest 4 assignments will be dropped. However, bonus points will be awarded for the completion of all assignments. Submissions that are accepted but do not use the method covered in class will lose 20 points. (The assignment is to ensure that the method covered in class has been mastered.)
- 20%: two in class problems to solve.
- 10%: one in class midterm.
- 10%: one in class final.

Grade	*Percentage*
A plus	*96 to 100%*
A	*93 to 95%*

Grade	*Percentage*
A minus	*90 to 92%*
B plus	*86 to 89 %*
B	*83 to 85%*
B minus	*80 to 82%*
C plus	*76 to 79%*
C	*73 to 75%*
C minus	*70 to 72%*
D plus	*66 to 69%*
D	*63 to 65%*
D minus	*60 to 62%*

Classroom Protocol

While the class is remote, students are expected to have their webcams on for non-verbal feedback during lecture. The lecture will use Zoom in focused mode so students do not need to be worried about other students watching them. Please contact the instructor if you have problems with this policy.

University Policies

Per **University Policy S16-9** **(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 **Syllabus Information web page (https://www.sjsu.edu/curriculum/courses/syllabus-info.php)** (https://www.sjsu.edu/curriculum/courses/syllabus-info.php). Make sure to visit this page to review and be aware of these university policies and resources.

CS 155 / Title, Semester, Course Schedule

List the agenda for the semester including when and where the final exam will be held. Indicate the schedule is subject to change with fair notice and how the notice will be made available.

Course Schedule

Week/Lesson/Module	Date	Topics, Readings, Assignments, Deadlines
1	1/26	Intro to Kattis
2	1/31, 2/2	Complexity
3	2/7, 2/9	Reductions, Halting problem
4	2/14, 2/16	Path finding and sequences
5	2/21, 2/23	Math algorithms
6	2/28, 3/2	Math algorithms
7	3/7, 3/9	Strings
8	3/14, 3/16	Greedy

Week/Lesson/Module	Date	Topics, Readings, Assignments, Deadlines
9	3/21, 3/23	Midterm exam (3/21) In class programming exam (3/23)
10	4/4, 4/6	Divide and Conquer
11	4/11, 4/13	Dynamic Programming
12	4/18, 4/20	Dynamic Programming
13	4/25, 4/27	Graph Algorithms
14	5/2, 5/4	Graph Algorithms
15	5/9, 5/11	Geometry
16	5/16	Review
Final Exam	5/18/2022	DH 450 at 5:15PM.