San José State University
College of Science / Department of Computer Science
Data Structures and Algorithms, CS 146 S-5, Fall 2020

Course and Contact Information

Instructor: Dr. Faramarz Mortezaie

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Office Hours: Online by appointment

Class Days/Time: MW 9:00 AM-10:15 AM

Classroom: Zoom Meetings

Prerequisites: Math 30 Calculus
Math 42 Discrete Mathematics
CS 46B Introduction to Data Structures

CS 49J Programming in Java (or equivalent knowledge of Java)

Faculty Web Page and MYSJSU Messaging

Course materials such as syllabus, handouts, notes, assignment instructions, etc. can be found on MySJSU Canvas. You are responsible for regularly checking with the email system through MySJSU at http://my.sjsu.edu to learn of any updates.

Course Description

"Implementations of advanced tree structures, priority queues, heaps, directed and undirected graphs. Advanced searching and sorting (radix sort, heap sort, merge sort, and quicksort). Design and analysis of data structures and algorithms. Divide-and conquer, greedy, and dynamic programming algorithm design techniques."
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Course Learning Outcomes (CLO)

Upon successful completion of this course, students should be able to:
- Analyze the running time of algorithms using asymptotic notation
- Implement search trees, heaps, and graphs and use these data structures in programs they design
- Perform breadth-first search and depth-first search

- Use advanced sorting techniques
- Solve recurrence relations representing the running time of an algorithm designed using a divide-and-conquer strategy
- Comprehend the basic concept of NP-completeness and realize that they may not be able to efficiently solve all problems they encounter in their careers
- Comprehend algorithms designed using greedy, divide-and-conquer, and dynamic programming techniques

Required Texts/Readings

Textbook:

Cormen, Leiserson, Rivest and Stein, Introduction to
Algorithms, 3rd Edition
ISBN-10: 0262033844
ISBN-13: 978-0262033848
MIT Press, 2009

Course Requirements and Assignments

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, and so on.

Assignments

You are expected to learn all the material presented in the lectures. Assignments include written and programming and must be done individually. Assignments must be turned in on time; **late submission will NOT be accepted** except for medical emergencies or similar exceptional circumstances that must be discussed in advance with the instructor. Programming assignments must be written in Java. More information regarding requirements and submission format will be given at the time of each programming assignment. Never use any codes you find on the web or given by someone else. Plagiarism Detection tools and similar codes checking software will be used.

There will be a homework assigned for each major topic we study in this course. These include assignments for Complexity analysis, Lists and stacks, Trees, Hashing, sorting, graph and algorithm techniques. The schedule of classes below indicates the due date, assignment weights and how each assignment is aligned with the learning outcomes.

Grading Policy

Make-Up Exam

Make-up exams are possible only under exceptional circumstances.

Grading

Homework, Weekly Quiz, discussion and project	25%
Exam-1	25%
Exam-2	25%
Comprehensive Final Exam	25%

Makeup exams will only be given in cases of illness (with signed documentation from a medical facility – original copy).

Course Grading Standards

A+	98 – 100%
A	93 – 97%
A-	90 – 92%

B+	88 – 89%
B	83 – 87%
B-	80 – 82%

C+	78 – 79%
C	73 – 77%
C-	70 – 72%

D+	68 – 69%
D	63 – 67%
D-	60 – 62%

F	59% and less

Note that "All students have the right, within a reasonable time, to know their academic scores, to review their grade-dependent work, and to be provided with explanations for the determination of their course grades." See University Policy F13-1 at http://www.sjsu.edu/senate/docs/F13-1.pdf for more details.

Classroom Protocol

Attendance
Students are expected to attend zoom meetings and participate in the discussion.
Instructors may drop students from class if they fail to attend respond to instructor email.

Use of Camera in Class

Using camera during lecture is optional. But during the exams and weekly quizzes, you must turn on your webcam. If you there are any issues, please let me know in advance.

Recording of Zoom Classes

It is strongly recommended that you attend all the zoom meetings. Just in case you cannot attend a zoom lecture, zoom lectures will be recorded and recordings will be posted on Canvas. If there are technical issues with zoom recordings, the topics discussed will be posted.

Students are not allowed to record without instructor permission
Students are prohibited from recording class activities (including class lectures, office hours, advising sessions, etc.), distributing class recordings, or posting class recordings. Materials created by the instructor for the course (syllabi, lectures and lecture notes, presentations, etc.) are copyrighted by the instructor. This university policy (S12--7) is in place to protect the privacy of students in the course, aswell as to maintain academic integrity through reducing the instances of cheating. Students who record, distribute, or post these materials will be referred to the Student Conduct and Ethical Development office. Unauthorized recording may violate university and state law. It is the responsibility of students that require special accommodations or assistive technology due to a disability to notify the instructor.

Proctoring Software and Exams
Exams will be proctored in this course through Respondus Monitor and LockDown Browser. Please note it is the instructor's discretion to determine the method of proctoring. If cheating is suspected the proctored videos may be used for further inspection and may become part of the student's disciplinary record. Note that the proctoring software does not determine whether academic misconduct occurred, but does determine whether something irregular occurred that may require further investigation. Students are encouraged to contact the instructor if unexpected interruptions occur during an exam.

Testing Environment
Before students can access the test questions, they are expected to conduct a scan around their testing environment to verify that there are no materials that would give the student an unfair advantage during the test. The scan will include:
- the desk/work--space
- a complete view of the computer including USB ports and power cord connections

- a 360--degree view of the complete room

Students must:
- Remain in the testing environment throughout the duration of the test.
- Keep full face, hands, workspace including desk, keyboard, monitor, and scratch paper, in full view of the webcam.

Technical difficulties Internet connection issues

Canvas AutoSaves responses a few times per minute as long as there is an internet connection. If your internet connection is lost, Canvas will warn you but allow you to continue working on your exam. A brief loss of internet connection is unlikely to cause you to lose your work. However, a longer loss of connectivity or weak/unstable connection may jeopardize your exam. Other technical difficulties: Immediately email the instructor a current copy of the state of your exam and explain the problem you are facing. Your instructor may not be able to respond immediately or provide technical support. However, the copy of your exam and email will provide a record of the situation.

Contact the SJSU technical support for Canvas:

> Technical Support for Canvas
> Email: ecampus@sjsu.edu
> Phone: (408) 924--2337
> https://www.sjsu.edu/ecampus/support/

If possible, complete your exam in the remaining allotted time, offline if necessary. Email your exam to your instructor within the allotted time or soon after.

Zoom Classroom Etiquette

- Mute Your Microphone: To help keep background noise to a minimum, make sure you mute your microphone when you are not speaking.
- Be Mindful of Background Noise and Distractions: Find a quiet place to "attend" class, to the greatest extent possible.
  - Avoid video setups where people may be walking behind you, people talking/making noise, etc.
  - Avoid activities that could create additional noise, such as shuffling papers, listening to music in the background, etc.
- Position Your Camera Properly: Be sure your webcam is in a stable position and focused at eye level.
- Limit Your Distractions/Avoid Multitasking: You can make it easier to focus on the meeting by turning off notifications, closing or minimizing running apps, and putting your smartphone away (unless you are using it to access Zoom).
- Use Appropriate Virtual Backgrounds: If using a virtual background, it should be appropriate and professional and should NOT suggest or include content that is objectively offensive or demeaning.

University Policies

General Expectations, Rights and Responsibilities of the Student

As members of the academic community, students accept both the rights and responsibilities incumbent upon all members of the institution. Students are encouraged to familiarize themselves with SJSU's policies and practices pertaining to the procedures to follow if and when questions or concerns about a class arises. See University Policy S90–5 at http://www.sjsu.edu/senate/docs/S90-5.pdf. More detailed information on a variety of related topics is available in the SJSU catalog, at http://info.sjsu.edu/web-dbgen/narr/catalog/rec-12234.12506.html. In general, it is recommended that students begin by seeking clarification or discussing concerns with their instructor. If such conversation is not possible, or if it does not serve to address the issue, it is recommended that the student contact the Department Chair as a next step.

Dropping and Adding

Students are responsible for understanding the policies and procedures about add/drop, grade forgiveness, etc. Refer to the current semester's Catalog Policies section at http://info.sjsu.edu/static/catalog/policies.html. Add/drop deadlines can be found on the current academic year calendars document on the Academic Calendars webpage at http://www.sjsu.edu/provost/services/academic_calendars/. The Late Drop Policy is available at http://www.sjsu.edu/aars/policies/latedrops/policy/. Students should be aware of the current deadlines and penalties for dropping classes.

Information about the latest changes and news is available at the Advising Hub at http://www.sjsu.edu/advising/.

Consent for Recording of Class and Public Sharing of Instructor Material

University Policy S12-7, http://www.sjsu.edu/senate/docs/S12-7.pdf, requires students to obtain instructor's permission to record the course and the following items to be included in the syllabus:

- "Common courtesy and professional behavior dictate that you notify someone when you are recording him/her. You must obtain the instructor's permission to make audio or video recordings in this class. Such permission allows the recordings to be used for your private, study purposes only. The recordings are the intellectual property of the instructor; you have not been given any rights to reproduce or distribute the material."
    - o It is suggested that the greensheet include the instructor's process for granting permission, whether in writing or orally and whether for the whole semester or on a class by class basis.
    - o In classes where active participation of students or guests may be on the recording, permission of those students or guests should be obtained as well.
- "Course material developed by the instructor is the intellectual property of the instructor and cannot be shared publicly without his/her approval. You may not publicly share or upload instructor generated material for this course such as exam questions, lecture notes, or homework solutions without instructor consent."

Academic integrity

Your commitment, as a student, to learning is evidenced by your enrollment at San Jose State University. The University Academic Integrity Policy S07-2 at http://www.sjsu.edu/senate/docs/S07-2.pdf requires you to be honest in all your academic course work. Faculty members are required to report all infractions to the office of Student Conduct and Ethical Development. The Student Conduct and Ethical Development website is available at http://www.sjsu.edu/studentconduct/.

Campus Policy in Compliance with the American Disabilities Act

If you need course adaptations or accommodations because of a disability, or if you need to make special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible, or see me during office hours. Presidential Directive 97-03 at http://www.sjsu.edu/president/docs/directives/PD_1997-03.pdf requires that students with disabilities requesting accommodations must register with the Accessible Education Center (AEC) at http://www.sjsu.edu/aec to establish a record of their disability.

CS 146 S-5 / Data Structures and Algorithms, Fall 2020, Course Schedule

The schedule is subject to change with fair notice announced in class.

Week	Related CLO	Date	Topics	Reading Assignments and homework
1	CLO-2 CLO-5	8/19	Java Review Review Data Structures (lists, stacks, queues, trees), recursion, basic algorithms	Chapter-2
2	CLO-1	8/24 8/26	Stack Applications Algorithm Analysis	Chapter-2
3	CLO-1	8/31 9/02	Divide and Conquer technique: Merge Sort Algorithm Analysis and Asymptotic Notation	8/31 is the last day to drop Chapter-3
4		9/07 9/09	Labor Day – Campus Closed Solving Recurrences - Master Theorem	Chapter-4.3 and 4.5
5		9/14 9/16	Intro to Heaps and Priority Queue Heapsort Dictionary and Hashing	Chapter-6 Chapter-11
6	CLO-1	9/21 9/23	Dictionary and Hashing Exam-1	Chapters 1, 2, 3, 4, 6 and 11
7		9/28 9/30	Binary tree, BST Traversals Expression tree, Huffman tree	Chapter-12 Chapter-18
8		10/05 10/07	2-3 and 2-3-4 trees B-Trees	Chapter-13
9	CLO-5 CLO-4	10/12 10/14	AVL Trees Red Black trees	Chapter-7
10		10/19 10/21	Quicksort and Radix sort Analysis of Quicksort	
11		10/26 10/28	Graphs: BFS and DFS Articulation point	Chapter-8 Chapter-9
12	CLO-3	11/02 11/04	Veteran's Day – Campus Closed Exam-2	Chapters 4 to 8
13	CLO-3	11/09	The Disjoint Set Class	Chapter-9

		11/11	Minimum Spanning Tree	
14	CLO-7	11/16 11/18	Graphs Dijkstra Dynamic Programming	Chapter-9 Chapter-10
15	CLO-6	11/23 11/25	Dynamic Programming Non-Instructional Day --	Chapter-10
16	CLO-8	11/30 12/02	Floyd Warshall Algorithm Algorithm Design Technique	Lecture notes Lecture notes
17		12/07	NP Complete	
		12/15	Final Exam (Comprehensive)	7:15 – 9:30 AM Tuesday