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

Course and Contact Information

Instructor:	Dr. Faramarz Mortezaie
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Office Hours:	T TH 7:30 AM – 8:00 AM classroom 337 Engineering Building
Class Days/Time:	MW 7:30 AM-8:45 AM
Classroom:	SCI 258
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.

Exams: Exams are in-class, closed-book, and comprehensive. Makeup exams will only be given in cases of verifiable emergency.

NOTE that University policy F69-24 at http://www.sjsu.edu/senate/docs/F69-24.pdf states that "Students should attend all meetings of their classes, not only because they are responsible for material discussed therein, but because active participation is frequently essential to insure maximum benefit for all members of the class. Attendance per se shall not be used as a criterion for grading."

Grading Policy

Make-Up Exam

Make-up exams are possible only under exceptional circumstances.

Grading

Homework, class work, participation* and project	20%
Exam-1	25%
Exam-2	25%
Comprehensive Final Exam	30%

*Participation includes class attendance.

The final and exams have fixed dates and can only be taken in the classroom during class time. Makeup exams will only be given in cases of illness (with signed documentation from a medical facility – original copy). Exams are closed book, closed notes, closed neighbor and comprehensive. The final exam is cumulative.

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

Students are expected to participate all the lectures. Please turn off your cell phones during the lecture time.

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](http://www.sjsu.edu/senate/docs/S07-2.pdf) 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](http://www.sjsu.edu/studentconduct/) 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](http://www.sjsu.edu/president/docs/directives/PD_1997-03.pdf) 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](http://www.sjsu.edu/aec) (AEC) at http://www.sjsu.edu/aec to establish a record of their disability.

CS 146 S-5 / Data Structures and Algorithms, Spring 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	1/27 1/29	Java Review Review Data Structures (lists, stacks, queues, trees), recursion, basic algorithms	Chapter-2
2	CLO-1	2/3 2/5	Stack Applications Algorithm Analysis	Chapter-2
3	CLO-1	2/10 2/12	Divide and Conquer technique: Merge Sort Algorithm Analysis and Asymptotic Notation Solving Recurrences - Master Theorem	Chapter-3 Chapter-4.3 and 4.5
4		2/17 2/19	Intro to Heaps and Priority Queue Heapsort	Chapter-6
5		2/24 2/26	Hashing Hashing	Chapter-11
6	CLO-1	3/2 3/4	Review Exam-1	Chapters 1, 2, 3, 4, 6 and 11
7		3/9 3/11	Binary Search Tree B-Trees, 2-3 and 2-3-4 trees	Chapter-12 Chapter-18
8		3/16 3/18	AVL Trees Red Black trees	Chapter-13
9	CLO-5 CLO-4	3/23 3/25	Quicksort and Radix sort Analysis of Quicksort	Chapter-7
10		3/30 4/1	Spring Break	
11		4/6 4/8	The Disjoint Set Class Graphs breadth-first search and depth-first search	Chapter-8 Chapter-9
12	CLO-3	4/13 4/15	Review Exam-2	Chapters 4 to 8
13	CLO-3	4/20 4/22	Graphs Dijkstra	Chapter-9
14	CLO-7	4/27 4/29	Minimum Spanning Tree Dynamic Programming	Chapter-9 Chapter-10

15	CLO-6	5/4 5/6	Dynamic Programming Algorithm Design Tech NP-completeness	Chapter-10
16	CLO-8	5/11	Other Topics in Data Structures	Lecture notes Lecture notes
17		Thursday May-14	Final Exam (Comprehensive)	Thursday May-14 7:15 – 9:30 AM