SJSU | SAN JOSÉ STATE UNIVERSITY

College of Science · Computer Science

Data Structures and Algorithms Section 08 CS 146

Spring 2023   3 Unit(s)   01/25/2023 to 05/15/2023   Modified 04/04/2023

👤 Contact Information

Instructor: Dr. Faramarz Mortezaie

Email: faramarz.mortezaie@sjsu.edu

Office Hours

Thursday at 4:00 PM to 5:00 PM
https://sjsu.zoom.us/j/87161337092

Office hour Zoom Link:

https://sjsu.zoom.us/j/87161337092

💻 Course Description and Requisites

Implementations of advanced tree structures, priority queues, heaps, directed and undirected graphs. Advanced searching and sorting (radix sort, heapsort, mergesort, and quicksort). Design and analysis of data structures and algorithms. Divide-and-conquer, greedy, and dynamic programming algorithm design techniques.

Prerequisite(s): MATH 30, MATH 42, CS 49J (or equivalent knowledge of Java), and CS 046B (with a grade of "C-" or better in each); Computer Science, Applied and Computational Math, Forensic Science: Digital Evidence, Software Engineering, or Data Science majors only; or instructor consent.

Letter Graded

✳ Classroom Protocols

Attendance

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

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.

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)

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

Course Materials

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 Information

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).

🏛 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.

📅 Course Schedule

Week-1: Java Review,Review Data Structures (lists, stacks, queues, trees)

Week-2: Stack Applications, Algorithm Analysis

Week-3: Divide and Conquer technique: Merge Sort, Algorithm Analysis and Asymptotic search

Week-4: Solving Recurrences - Master Theorem

Week-5: Intro to Heaps and Priority Queue Heap-sort, Dictionary and Hashing

Week-6: Review, Exam-1

Week-7: Binary tree, BST Traversals

Week-8: 2-3 and 2-3-4 trees, B-trees

Week-9: AVL Trees, Red Black trees

Spring Break

Week-10: QuickSort and Radix sort, Analysis of QuickSort

Week-11: Graphs: BFS and DFS, Articulation point

Week-12: Review, Exam-2

Week-13: The Disjoint Set Class

Week-14: Graphs Dijkstra, Minimum spanning tree

Week-15: Algorithm Design Technique, NP Complete

Week-16: Final Exam