SJSU SAN JOSÉ STATE UNIVERSITY

College of Science · Computer Science

Data Structures and Algorithms Section 05

CS 146

Fall 2024 3 Unit(s) 08/21/2024 to 12/09/2024 Modified 08/27/2024

Contact Information

Instructor: Ricky Koonming Chan

Email: koon-ming.chan@sjsu.edu

Course Information

Class Time: Tuesday and Thursday 9:000am -10:15am

Class Location: MacQuarrie Hall 233

Office Hours:

Time: Tuesday and Thursday 10:15am -11:15am

Location: Student-Faculty Conference Room

Course Description and Requisites

Implementations of advanced tree structures, priority queues, heaps, directed and undirected graphs. Advanced searching and sorting techniques (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 46B, and [(CS 48 or CS 49J) if CS 46B was not in Java], each with a grade of "C-" or better; Computer Science, Applied and Computational Math, Forensic Science: Digital Evidence, Software Engineering, Data Science majors only; or instructor consent.

Letter Graded

Classroom Protocols

The lectures will be as an in-person mode. Regular class attendance is highly recommended and strongly encouraged. This section has online office hours. Please have your camera on during office hours. Do not publicly share or upload material for this course such as exam questions, lecture notes, or solutions without my consent. Students are not allowed to share any of the materials of the course without the instructor's consent.

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 Goals

1. To ensure that students are familiar with ways to implement elementary data structures and their associated
2. To introduce students to the implementation of more complex data structures and their associated
3. To acquaint students with advanced sorting
4. To teach students how to determine the time complexity of
5. To introduce students to algorithm design

Course Learning Outcomes (CLOs)

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

- Understand the implementation of lists, stacks, queues, search trees, heaps, and graphs and use these data structures in programs they design.
- Prove basic properties of trees and graphs.
- Perform breadth-first search and depth-first search on directed as well as undirected graphs.
- Use advanced sorting techniques (radix sort, heapsort, mergesort, quicksort).
- Determine the running time of an algorithm in terms of asymptotic notation.
- Solve recurrence relations representing the running time of an algorithm designed using a divide-and-conquer strategy.
- Understand the basic concept of NP-completeness and realize that they may not be able to efficiently solve all problems they encounter in their careers.
- Understand algorithms designed using greedy, divide-and-conquer, and dynamic programming techniques.

Course Materials

Introduction to Algorithms

Author: Cormen, Leiserson, Rivest, and Stein

Publisher: MIT Press, 2009

Edition: 3rd Edition

ISBN: ISBN-10: 0262033844ISBN-13: 978-0262033848

Course Requirements and Assignments

SJSU classes are designed such that in order to be successful, it is expected that students will spend a minimum of forty-five hours for each unit of credit (normally three hours per unit per week), including preparing for class, participating in course activities, completing assignments, and so on. More details about student workload can be found in University Policy S12-3at http://www.sjsu.edu/senate/docs/S12-3.pdf.

Homework assignments will be individual, regularly assigned, will include written problem assignments and programming exercises. The homework is a tool for you to learn the material and prepare you for the exams.

Grading Information

Your grade for the course will be based on the following components:

Assignments - 30 %

Quizzes - 20%

Exam 1 – 15%

Exam 2 – 15%

Final Exam – 20%

A+ : 97% or higher

A : 93% to 97%

A- : 90% to 93%

B+ : 87% to 90%

B : 83% to 87%

B- : 80% to 83%

C+ : 77% to 80%

C : 73% to 77%

C- : 70% to 73%

D+ : 67% to 70%

D : 63% to 67%

D- : 60% to 63%

F : 0% to 60%

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

This schedule is subject to change with advance notice.

Week	Date	Topic	
1	Thur 8/22	Syllabus and Prerequisite Check	

2	Tue 8/27	Introduction	
2	Thur 8/29	Lists, Stacks and Queues	
3	Tue 9/3	Loop Invariants	
3	Thur 9/5	Growth of Functions	
4	Tue 9/10	Heap Sort	
4	Thur 9/12	Recurrence Relations	
5	Tue 9/17	Recurrence Relations	
5	Thur 9/19	Merge Sort, Quick Sort	
6	Tue 9/24	Decision Trees	
6	Thur 9/26	Counting Sort, Radix Sort and Bucket Sort	
7	Tue 10/1	Review	
7	Thur 10/3	Exam 1	
8	Tue 10/8	Binary Search Trees	
8	Thur 10/10	Introduction to Topological Sort	
9	Tue 10/15	DFS, BFS	
9	Thur 10/17	Disjoint Sets	
10	Tue 10/22	Shortest Path Algorithms	

10	Thur 10/24	Shortest Path Algorithms	
11	Tue 10/29	Minimum Spanning Trees	
11	Thur 10/31	Dynamic Programming	
12	Tue 11/5	Dynamic Programming	
12	Thur 11/7	Dynamic Programming	
13	Tue 11/12	Review	
13	Thur 11/14	Exam 2	
14	Tue 11/119	Subset Sum Algorithm	
14	Thur 11/21	Introduction to P and NP	
15	Tue 11/26	NP-complete problems	
15	Thur 11/28	Thanksgiving Holiday – No Class	
16	Tue 12/3	Review	
16	Thur 12/5	Review	
17	Mon 12/16	Final Exam 7:15 AM - 9:30 AM	