

San José State University
Department of Computer Science
CS146, Section 08

Data Structures and Algorithms

Spring 2017

Course and Contact Information

Instructor:	Vidya Rangasayee
Office Location:	MH 229
Telephone:	(408) 924-5161
Email:	vidya.rangasayee@sjsu.edu
Office Hours:	T/Th 12:30-1:20 PM. Additional hours by appointment only
Class Days/Time:	T/Th 3:00 - 4:15 PM
Classroom:	MH 422
Prerequisites:	MATH 030, MATH 042, CS 049J (or equivalent knowledge of Java), and CS 046B (with a grade of "C-" or better in each); or instructor consent.
GE/SJSU Studies Category:	

Course Format : Technology Intensive, hybrid.

Faculty Web Page and MYSJSU Messaging: We will use Canvas for all class related materials. Discussions will be facilitated via Piazza. Any general questions must be posted on Piazza for benefit of others. Any specific/personal questions (grade related or personal situations) must be communicated via email.

Course Description

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: MATH 030, MATH 042, CS 049J (or equivalent knowledge of Java), and CS 046B (with a grade of "C-" or better in each); Computer Science, Applied and Computational Math or Software Engineering Majors only; or instructor consent.

Course Objectives:

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

Course Learning Outcomes (CLO):

Upon successful completion of this course, students will 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

ALGORITHMS 4th edition

Author: Robert Sedgewick, Kevin Wayne

ISBN:978-0321573513

Publication Date:March 2011

Publisher: Addison-Wesley Professional

Other Readings

INTRODUCTION TO ALGORITHMS (3rd ed.).

Author: Cormen, T.H.; Leiserson, C.E; Rivest, R.L.; and Stein, C. (2009).

ISBN 978-0-262-03384-8

Publisher: MIT Press, Cambridge, MA.

Other technology requirements / equipment / material

Java 7 or higher.

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 S12-3](http://www.sjsu.edu/senate/docs/S12-3.pdf) at <http://www.sjsu.edu/senate/docs/S12-3.pdf>.

- Each student is expected to be present, punctual, and prepared at every scheduled class and lab session. It is assumed that the students already have basic knowledge of digital Boolean logic and fundamentals of programming.
- Attendance is **NOT** optional. Individual participation is also required. There will be no make-ups for missed midterm or assignments, unless any special arrangements is made with the instructor beforehand.
- There will be 6-7 **homeworks**, one **midterm** and **final exam**. All home works should be submitted through Canvas. **No scanned copy** of handwritten solution is allowed.

Final Examination or Evaluation

There is a written Final Exam for this course. Please check the university Final Exam schedule for the exact date and time of the final exam (<http://info.sjsu.edu/static/catalog/final-exam-schedule-spring.html>).

Grading Information (Required)

1. Homework carries **40%** towards final score. Average of 2 score from homework will be contributed.
2. Midterm carries **20%** towards final score.
3. Final carries **40%** towards final score.

Submission is allowed till 11:59 pm on due date. You will lose 20% of the score for every day that your submission is LATE.

I first try scores of 90, 80, and 70 to cut off letter grades of A-, B-, and C-, respectively. If overall class performance is too low to use these cut offs, I set a cut off of C- to a lower score than the class total average but a higher score than 60 (this number may change), and divide the students' group above the cut off of C- into A+, A, A-, B+, B, B-, C+, C, C-. The rest of students will be given by a grade of D+, D, D-, F or WU depending on their class performance.

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](http://www.sjsu.edu/senate/docs/F13-1.pdf) at <http://www.sjsu.edu/senate/docs/F13-1.pdf> for more details.

Classroom Protocol

1. **You must come to class on time!** Students entering the classroom late disrupt the lecture and / or the students already in class who may be engaged in lab or discussion. Late students will not be accepted in class.
2. If you miss a lecture you are still responsible for any material discussed or assignments given. A large portion of each class will be used for hands-on lab / discussion. All students are expected to participate in class activities. Students who are often absent will find themselves at a disadvantage during the tests.
3. No audio / video recording or photography in the classroom without prior permission of instructor.
4. No personal discussion or cell phone activity during class time. Please set the cell phone on **silent/vibrate** mode.

5. All e-mail communication to the instructor must have the subject line start with [CS-146, 08]
6. Email to be sent to the instructor's SJSU email ID (vidya.rangasayee@sjsu.edu) only.
7. Start on your homework early and stay on top of them. Some assignments take way more time than you expect.
8. Have fun learning.

University Policies (Required)

Per University Policy S16-9, university-wide policy information relevant to all courses, such as academic integrity, accommodations, etc. will be available on Office of Graduate and Undergraduate Programs' Syllabus Information web page at <http://www.sjsu.edu/gup/syllabusinfo/>"

CS 146 Data Structures and Algorithms, Spring 2017, 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.

All sections refer to the required textbook.

Week	Date	Topics, Readings, Assignments, Deadlines	Additional Notes
1	1/26/2017	Intro to CS146	
2	1/31/2017	Introduction to asymptotic analysis	Section 1.4 HW01 Assigned
2	2/2/2017	Introduction to asymptotic analysis	
3	2/7/2017	Union Find	Section 1.5
3	2/9/2017	Stack and Queues	
4	2/14/2017	Elementary Sorting	Section 2.1 HW02 Assigned
4	2/16/2017	MergeSort	Section 2.2 HW01 Due
5	2/21/2017	Quicksort	Section 2.3
5	2/23/2017	Priority Queues	Section 2.4
6	2/28/2017	Elementary Symbol Tables	Section 3.1 HW03 Assigned

Week	Date	Topics, Readings, Assignments, Deadlines	Additional Notes
6	3/2/2017	Balanced Search Trees	Section 3.2 HW02 Due
7	3/7/2017	Balanced Search Trees	Section 3.3
7	3/9/2017	Balanced Search Trees	
8	3/14/2017	Hashing	Section 3.4 HW04 Assigned
8	3/16/2017	Hashing	HW03 Due
9	3/21/2017	Midterm review	
9	3/23/2017	Midterm	
10	3/28/2017	SPRING RECESS - NO CLASS	
10	3/30/2017	SPRING RECESS - NO CLASS	
11	4/4/2017	Undirected Graphs	Section 4.1 HW04 Due
11	4/6/2017	Undirected Graphs	HW05 Assigned
12	4/11/2017	Directed Graphs	Section 4.2
12	4/13/2017	Shortest Paths	Section 4.4
13	4/18/2017	Radix Sort	HW06 Assigned
13	4/20/2017	Tries	Section 5.2 HW05 Due
14	4/25/2017	Substring Search	Section 5.3
14	4/27/2017	Reductions and NP-completeness	
15	5/2/2017	Reductions and NP-completeness	HW07 Assigned
15	5/4/2017	Dynamic Programming	HW06 Due

Week	Date	Topics, Readings, Assignments, Deadlines	Additional Notes
16	5/9/2017	Dynamic Programming	
16	5/11/2017	Greedy Algorithms	
17	5/16/2017	Review	HW07 Due
Final Exam	5/18/2017	MH 422 1445 - 1700	