

San José State University
Department of Computer Science
CS 146, Data Structures and Algorithms, Section 5 and 6

Spring Semester, 2016

Course and Contact Information

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| Instructor: | Anna Shaverdian |
| Office Location: | MH 215 |
| Email: | anna.shaverdian@sjsu.edu |
| Office Hours: | 5:30-6pm and 7:15-7:30pm every Tuesday and Thursday (before and between classes). |
| Class Days/Time: | Tuesday and Thursdays Section 5: 6-7:15pm. Section 6: 7:30-8:45pm |
| Classroom: | MH 222 |
| 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. |

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.

Learning Outcomes

Course Learning Outcomes (CLO)

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

1. Implement lists, stacks, queues, search trees, heaps, union-find ADT, and graphs and use these data structures in programs they design
2. Prove basic properties of trees and graphs
3. Perform breadth-first search and depth-first search on directed as well as undirected graphs
4. Use advanced sorting techniques (radix sort, heapsort, mergesort, quicksort)
5. Determine the running time of an algorithm in terms of asymptotic notation
6. Solve recurrence relations representing the running time of an algorithm designed using a divide-and-conquer strategy

7. 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
8. Comprehend algorithms designed using greedy, divide-and-conquer, and dynamic programming techniques
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Required Texts/Readings

Textbook

Title: Data Structures and Algorithm Analysis in Java, 3rd edition Author: Mark Allen Weiss Publisher: Pearson ISBN-13: 978-0-13-257627-7 Errata: <http://users.cis.fiu.edu/~weiss/dsaajava3/errata.htm>

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>.

There will be several programming assignments requiring you to use the major data structures and algorithms covered in the course. Programs must be appropriately documented via javadoc comments and should adhere to the coding style posted on the CS Department web page: http://www.cs.sjsu.edu/web_mater/java_code.html. If you work together with another student on an assignment, both of you will receive the same score.

Each assignment is worth a maximum of 100 points. Late assignments will lose 20 points and an additional 20 points for each 24 hours after the due date.

The midterms and final examinations will allow 3 pages of printed notes - (front and back).

NOTE that [University policy F69-24](http://www.sjsu.edu/senate/docs/F69-24.pdf) 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

Your individual class grade will be weighted as follows:

20% Written Assignments

40% Programming Assignments

20% Midterm exam

20% Final exam

Each project and exam will be scored (given points) but not assigned a letter grade. The mean score and standard deviation will be announced after each project and exam.

There will be pop quizzes which will count toward your Written Assignments.

Final individual class letter grades will be assigned based on the class curve. Your final class grade can be adjusted up or down depending on your level and quality of participation on your project team as determined by the project tracking tools and your team members' assessments of your 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.

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](http://www.sjsu.edu/senate/docs/S90-5.pdf) 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](http://info.sjsu.edu/web-dbgen/narr/catalog/rec-12234.12506.html), 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](http://info.sjsu.edu/static/catalog/policies.html) 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](http://www.sjsu.edu/provost/services/academic_calendars/) at http://www.sjsu.edu/provost/services/academic_calendars/. The [Late Drop Policy](http://www.sjsu.edu/aars/policies/latedrops/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](http://www.sjsu.edu/advising/) 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), <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.”
 - 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.
 - 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.

CS146 Data Structures and Algorithms, Spring 2016, Course Schedule

Course Schedule

| Week | Date | Topics, Readings, Assignments, Deadlines |
|------|------|--|
| 1 | 1/28 | Introduction From arrays to generics Algorithm analysis |
| 2 | 2/2 | Algorithm analysis |
| 3 | 2/9 | Lists |
| 4 | 2/16 | Stacks and queues |
| 5 | 2/23 | Trees |
| 6 | 3/1 | Trees |
| 7 | 3/8 | Priority queues (heaps) |
| 8 | 3/15 | Midterm Review. Midterm on Thursday, 3/17, during class |
| 9 | 3/22 | Sorting |
| 10 | 4/5 | Sorting Disjoint set class |
| 11 | 4/12 | Graphs |
| 12 | 4/19 | Graphs |
| 13 | 4/26 | Hashing |
| 14 | 5/3 | String pattern matching |
| 15 | 5/10 | Algorithm design techniques |

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| 16 | 5/17 | NP-completeness Special Topics |
| Final Exam | 5/24 | MH 222. Section 5: 1715-1930 Section 6: 1945-2200 |