

San Jose State University  
Department of Computer Science  
CS146, Data Structures and Algorithms, Section 3  
Spring Semester 2016

**Course and Contact Information**

Instructor: Dr. Saroj Sabherwal

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Office Hours : Mon, Wed 5:45- 6:35 PM and

available on-line or by appointment

Course Days/Time: MW 3:00-4:15 PM

Classroom: MH-223

Prerequisite: Math 30, Calculus, Math 42,

Discrete Mathematics,

CS 46B, Introduction to Data

Structures

CS 49J Programming in Java

(or equivalent knowledge of

Java)

**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.” 3 units*

## Learning Outcomes

Upon successful completion of this course, you should be able to:

1. SLO 1 Implement lists, stacks, queues, search trees, heaps, union-find ADT, and graphs and use these data structures in programs they design
2. SLO 2 Prove basic properties of trees and graphs
3. SLO 3 Perform breadth-first search and depth-first search on directed as well as undirected graphs
4. SLO 4 Use advanced sorting techniques (radix sort, heapsort, mergesort, quicksort)
5. SLO 5 Determine the running time of an algorithm in terms of asymptotic notation
6. SLO 6 Solve recurrence relations representing the running time of an algorithm designed using a divide- and-conquer strategy
7. SLO 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. SLO 8 Comprehend algorithms designed using greedy, divide-and-conquer, and dynamic programming techniques

## Course Learning Outcomes

Upon successful completion of this course, you should be able to:

1. **CLO 1** (insert learning outcome 1)
2. **CLO 2** (insert learning outcome 2, etc.)

## Required Texts/Readings

### Textbook:

**Data Structures and Algorithm Analysis in Java by Mark Allen Weiss, 3<sup>rd</sup> edition**

Publisher; Pearson

ISBN: 13-978-0-13-257627-7

## 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 (normally three hours per unit per week), including preparing for class, participating in course activities completing assignments and so on. More details about student t workload can be found in University Policy S12 -3 at <http://www.sjsu.edu/senate/docs/S12-3.pdf>

There will a homework assignment for each major topic we study in this course. These include assignments for Complexity analysis, Lists and Stacks, Trees, Hashing, sorting, graph and algorithms. The schedule of class below indicates the due date, assignment weights and how much each assignment is aligned with the

learning outcomes.

NOTE that University Policy F69 =24 at <http://www.sjsu.edu/senate/docs/F69-24.pdf> states that student should attend all meetings of their classes, not because they are responsible for material discussed therein, but active participation is frequently essential to ensure maximum benefits 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 under exceptional circumstances.

### **Grading**

Homework	50%
Tests	30%
Final / Final Project	20%

### **Course Grading Standards**

Each test and homework is graded out of 100 points. A late home work will be deducted 20 points from the grade, if it is late by 24 hours, later than that will not be accepted.

At the end all grades will be assigned a letter grade of:

A for the average score of 90-100,

B for the average score of 80 – 89,

C for the average score of 70 – 79

Rest of the students will be assigned a grade of D or F 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 determination of their course grades” See University Policy F 13 -1 at <http://www.sjsu.edu/senate/docs/F13-1.pdf> for more details.

### **Classroom Protocol**

Students are expected to participate in all the lectures, so you need to turn off your cell phones during 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/](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."

- 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.
- It is suggested that the green sheet 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.
- "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 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 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 at [http://www.sjsu.edu/president/docs/directives/PD\\_1997-03.pdf](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 (AEC)

## Schedule

Subject to change!

Weeks	Topics and activities	Dates	Chapters
1	Intro From arrays to Generics Algorithm analysis	Feb 1, 3	1,2
2	Algorithm analysis	Feb 8,10	2
3	Lists	Feb 17,2/15 No CU	3
4	Stacks and queues	Feb 22,24	3
5	Trees	Feb 29, Mar 2	4
6	Trees	Mar 7,9 (Test 1)	4
7	Priority queues (heaps)	Mar 14, 16	6
8	Sorting	Mar 21, 23	7
<b>Spring Break (Mar 25<sup>th</sup> to Apr 3<sup>rd</sup> )</b>			
9	Sorting Disjoint set class	Arp 4, 6 (Test 2)	7, 8
10	Graphs	Apr 11, 13	9
11	Graphs	Apr 18, 20	9
12	Hashing	Apr 25, 27	5
13	String pattern matching	May 2, 4 (Test 3)	9
14	NP-Completeness	May 9, 11	12
15	Algorithm design techniques	May 16	10
	Final Exam	May 20 12.15-2.30 pm	