San José State University
College of Science / Department of Computer Science
Data Structures and Algorithms, CS146-S6, Fall, 2017

Course and Contact Information

Instructor:	Dr. Mike Wu
Office Location:	MacQuarrie Hall 214
Telephone:	(408) 666-0773 (Preferred mode of contact is via email.)
Email:	Ching-seh.Wu@sjsu.edu
Office Hours:	Tuesday 1:45PM – 2:45PM Wednesday 2:45PM– 3:45PM (please drop me email with time info and subject)
Class Days/Time:	MW 13:30-14:45
Classroom:	MacQuarrie Hall 222
Prerequisites:	Math 030 Calculus I Math 042 Discrete Mathematics CS 049J Programming in Java or equivalent knowledge of Java CS 046B Introduction to Data Structures

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.

Course Learning Outcomes (CLO)

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

Required Texts/Readings

Textbook

Cormen, Leiserson, Rivest and Stein, Introduction to Algorithms, 3rd Edition
ISBN-10: 0262033844
ISBN-13: 978-0262033848
MIT Press, 2009
You can find errata (bug reports) for the book http://www.cs.dartmouth.edu/~thc/clrs-bugs/bugs-3e.php.

Course Requirements and Assignments

Assignments

You are expected to learn all of the material presented in the lectures. Assignments include written and programming. Assignments must be turned in on time; late submission will not be accepted with the exception of medical emergencies or similar exceptional circumstances that must be discussed in advance with the instructor. All assignments are due at the beginning of the class period on the announced due date.

Mid-Terms and Final Exams

Exams will consist of questions and problems aimed at assessing student mastery of course topics. Conceptual questions may be in the form of essay or multiple-choice format and questions that require pseudo code and/or computations. Exams may be split into closed book and open-book sections at the instructor's discretion.
If you are unable to attend any one of the exams, arrangements may be made only if you have a legitimate reason. You need to inform your instructor ahead of time and have written documentation available. If you are unable to attend the exam due to illness or emergency, you also need to inform your instructor before the exam and bring documentation afterwards to request a make-up exam, or the points for that exam will be allocated to other exams.

Grading Information

Determination of Grades

The components of the final grade will be distributed as follows:

- Assignments : 30% (3 written worth 4% each, 3 programming worth 6% each)
- Midterm exams: 40% (20% each)
- Final exam: 30%

Digit number grades will be assigned according to the following policy:

85 – 100 ---- A
80 -- 84 ---- A-
77 -- 79 ---- B+
73 -- 76 ---- B
70 -- 72 ---- B-
67 -- 69 ---- C+
63 -- 66 ---- C
60 -- 62 ---- C-
57 -- 59 ---- D+
53 -- 56 ---- D
50 -- 52 ---- D-
0 -- 49 ---- F

Each assignment and exam will be scored (given points) but not assigned a letter grade.
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 class performance.

Classroom Protocol

Attendance: University policy F69-24 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.

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: 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. Course material 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.

University Policies

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/

Data Structures and Algorithms, CS146-S6, Fall 2017, Course Schedule

This schedule is subject to change with fair notice.

Course Schedule

Week	Date	Topics, Readings, Assignments, Deadlines
1	08/23	Motivation, Orientation /Syllabus, Introduction: Algorithms & Computers (Ch 1 & Appendix A) (Student Information Due)
1	08/28	Review Data Structures (lists, stacks, queues, trees), recursion, basic algorithms (Ch 10)
2	08/30	Growth of functions- O, Ω, Θ, o, ω (Ch 3)
2	09/04	Labor Day - Campus Closed
3	09/06	Insertion Sort (Ch 2.1)
3	09/11	Speaker from Google Headquarters Divide and Conquer technique: Merge Sort & Matrix multiplication (Ch 2.2, 2.3)
4	09/13	Solving recurrences - Master Theorem (Ch 4.3-4.5)
4	09/18	Master Theorem - Intro to Heaps (Ch 6.1)

Week	Date	Topics, Readings, Assignments, Deadlines
5	09/20	Heapsort, Priority Queues (Ch 6)
5	09/25	Quicksort (Ch 7)
6	09/27	Analysis of Quicksort (Ch 7)
6	10/02	**Midterm 1**
7	10/04	Sorting in linear time, Counting sort, Radix Sort, (Ch 8)
7	10/09	Order statistics - Selection Algorithm (Ch 9)
8	10/11	Hashing (Ch 11)
8	10/16	Union Find, Dynamic sets, Binary Search Trees (Ch 12)
9	10/18	Red Black trees (Ch 13)
9	10/23	B-trees (Ch 18)
10	10/25	Greedy technique (Ch 16)
10	10/30	Dynamic Programming technique (Ch 15)
11	11/01	Graphs (Appendix B.1, B.4-5)
11	11/06	**Midterm 2**
12	11/08	BFS (Ch 22.1)
12	11/13	DFS (Ch 22.2)
13	11/15	Topological sort (Ch 22.3-5)
13	11/20	Minimum Spanning Tree – Prim's and Kruskal's Algorithm, Data Structures for Disjoint Sets (Ch 23, Ch 21)
14	11/22	Non-Instructional Day – Campus Open
14	11/27	Single Source Shortest Paths: Dijkstra's Algorithm (Ch 24)
15	11/29	All-Pairs Shortest Paths: Floyd-Warshall (Ch 25.1-2)
15	12/04	NP-completeness, Reductions (Ch. 34.1-4)
16	12/06	NP-complete problems (Ch. 34.5)
16	12/11	Review
Final Exam	12/18	12:15PM~2:30PM