San José State University
College of Science / Department of Computer Science
Data Structures and Algorithms, CS146-S8, Fall, 2018

Course and Contact Information

Instructor:	Dr. Mike Wu
Office Location:	MacQuarrie Hall 211
Telephone:	(408)924-8144 (Preferred mode of contact is via email.)
Email:	Ching-seh.Wu@sjsu.edu
Office Hours:	Tuesday 14:30~15:30PM and Wednesday 15:00~16:00PM (Please drop me email with time info and subject.)
Class Days/Time:	MW 16:30 ~17:45 PM
Class Room:	MacQuarrie Hall 225
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

Faculty Web Page and MYSJSU Messaging

Course materials such as syllabus, handouts, notes, assignment instructions, etc. can be found on MySJSU Canvas. You are responsible for regularly checking with the email system through MySJSU at http://my.sjsu.edu to learn of any updates.

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

Success in this course is based on the expectation that students will spend, for each unit of credit, a minimum of 45 hours over the length of the course (normally three hours per unit per week) for instruction, preparation/studying, or course related activities, and so on.

Assignments
You are expected to learn all of the material presented in the lectures. Assignments include written and programming and must be done individually. 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 written assignments are due at the beginning of the class period on the announced due date. Programming assignments must be written in Java. More information regarding requirements and submission format will be given at the time of each programming assignment. Never use any codes you find on the web or given by someone else. Plagiarism Detection tools and similar codes checking software will be used to check programming cheating behavior. You will be asked to set up appointments with me to demo and explain your code.

Pop Quizzes
Unannounced quizzes may be given anytime during class. The purpose of pop quizzes is to encourage you to study and review the concepts and materials we discussed in the previous lecture. These will generally be problems covered in the previous lecture.

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:
- **Class Participation : 10%** (pop quizzes, pop questions discussion, interaction with instructor, etc.)
- **Assignments : 30%** (3 written worth 4% each, 3 programming worth 6% each)
- **Midterm exams: 40%** (Two midterms, 20% each)
- **Final exam: 20%** (Accumulative/Comprehensive)

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

$$95 \sim 100 \text{ ---- } A+$$
$$90 \sim 94 \text{ ---- } A$$
$$88 \sim 89 \text{ ---- } A-$$
$$85 \sim 87 \text{ ---- } B+$$
$$80 \sim 84 \text{ ---- } B$$
$$78 \sim 79 \text{ ---- } B-$$
$$75 \sim 77 \text{ ---- } C+$$
$$70 \sim 74 \text{ ---- } C$$
$$68 \sim 69 \text{ ---- } C-$$
$$65 \sim 67 \text{ ---- } D+$$
$$60 \sim 64 \text{ ---- } D$$
$$58 \sim 59 \text{ ---- } D-$$
$$0 \sim 57 \text{ ---- } F$$

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 and Other Notes

- **Absences in attending the first two lectures will be dropped out from the class.**
- Every student must attend class and participate actively.
- You will be called in most class sessions for Pop questions and to discuss material contained in lectures by using Random Roster Checker.
- **When emailing me, please always start your email subject line with "CS146-?S: XXXXX" to get my attention. (?S: Section, XXXXX:Subject)**
- **Cheating will not be tolerable; a ZERO will be given to any cheated assignment/exam, and will be reported to the Department and the University.**
- **Your laptop must remain closed** (preferably in your backpack and not on your desk)
- To encourage participation from students, **no recording** is allowed.
- Students must be respectful of the instructor and other students. For example: turn off/silence **cell phones and other mobile devices**.
- Attendance is crucial to doing well on assignments and examinations.
- Students are responsible for all materials distributed and discussed in the class.

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/" Make sure to review these policies and resources.

Data Structures and Algorithms, CS146-S8, Fall 2018, Course Schedule

Tentative Course Schedule (This schedule is subject to change with fair notice.)

Week	Date	Topics, Readings, Assignments, Deadlines
1	8/22	Motivation, Orientation /Syllabus, Introduction: Algorithms & Computers (Ch 1 & Appendix A) (Student Information Due)
1	8/27	Review Data Structures (lists, stacks, queues, trees), recursion, basic algorithms (Ch 10) Growth of functions- O, Ω, Θ, o, ω (Ch 3)
2	8/29	Growth of functions- O, Ω, Θ, o, ω (Ch 3)
2	9/3	Labor Day - Campus Closed
3	9/5	Insertion Sort, Analyzing and Designing Algorithms (Ch 2)
3	9/10	Divide and Conquer technique: Merge Sort(Ch 2.2, 2.3)
4	9/12	Solving Recurrences - Master Theorem (Ch 4.3-4.5) HW Assignment 1 (Out)
4	9/17	Master Theorem(Ch 4.3-4.5), Intro to Heaps (Ch 6.1)
5	9/19	Heapsort (Ch 6), Priority Queues (Ch 6) HW Assignment 1 (Due)
5	9/24	Quicksort (Ch 7)
6	9/26	Analysis of Quicksort (Ch 7)
6	10/1	Sorting in linear time(Ch 8)
7	10/3	**Midterm 1**
7	10/8	Midterm 1 solutions Sorting in linear time, Counting Sort(Ch 8) Programming Assignment 1 (Out)
8	10/10	RadixSort, Bucket Sort (Ch 8)
8	10/15	Hashing (Ch 11) Programming Assignment 1 (Due)
9	10/17	Hashing (Ch 11), Binary Search Trees (Ch 12) HW Assignment 2 (Out)
9	10/22	Binary Search Trees (Ch 12)
10	10/24	Red Black trees (Ch 13) HW Assignment 2 (Due) Programming Assignment 2 (Out)
10	10/29	Red Black trees (Ch 13), Graph Algorithms(Ch22)
11	11/31	BFS (Ch 22.2). DFS (Ch 22.3) Topological sort (Ch 22.4) Programming Assignment 2 (Due)
11	11/05	Graph Algorithms(Ch22), BFS (Ch 22.2). DFS (Ch 22.3)

Week	Date	Topics, Readings, Assignments, Deadlines
		Topological sort (Ch 22.4)
12	11/07	**Midterm 2**
12	11/12	Veterans Day - Campus Closed
13	11/14	Midterm solutions, Dynamic Programming technique (Ch 15)
13	11/19	Dynamic Programming technique (Ch 15)
14	11/21	Greedy technique (Ch 16) Programming Assignment 3 (Out)
14	11/26	Minimum Spanning Tree(Ch23)
15	11/28	Single Source Shortest Paths: Dijkstra's Algorithm (Ch 24.3) Programming Assignment 3 (Due) HW Assignment 3 (Out)
15	12/03	All-Pairs Shortest Paths: Floyd-Warshall (Ch 25.1-2)
16	12/05	NP-completeness, Reductions (Ch. 34.1-4) HW Assignment 3 (Due)
16	12/10	NP-complete problems (Ch. 34.5)
Final Exam	**12/13**	Thursday 14:45 ~17:00 PM