CS 255-S1 Design and Analysis of Algorithms

Class Meeting Dates: 08/21/2019 - 12/09/2019

Time: MW 16:30 - 17:45 PM

Room: SCI 311

Fall 2019

Dr. Chung-Wen (Albert) Tsao
Office: Duncan Hall room 282
E-mail: chung-wen.tsao@sjsu.edu
     (Once the class starts, use Canvas Inbox
     emails.)
Phone: 408-924-7171

Office Hours:
    M/W 15:00pm – 15:35pm
    Or appointments by 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 **Units: 3**

Prerequisites: CS 046B Introduction to Data Structures, CS146 Data Structures and Algorithms

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 Learning Outcomes (CLO) : Upon successful completion of this course, students should be able to:
1. CLO 1. Code an example of each of the following types of algorithms:
    a. Randomized
    b. Parallel
    c. Approximation
2. CLO 2. Conduct an amortized analysis.
3. CLO 3. Explain how above techniques are used in several applications and describe what benefits they have within those applications.

Required Text:
1. Kleinberg and Tardos, Algorithm Design, First edition, Addison Wesley, 2005.
2. Cormen, Leiserson, Rivest and Stein, Introduction to Algorithms, 3rd Edition
   MIT Press, 2009. You can find errata (bug reports) for the book http://www.cs.dartmouth.edu/~thc/clrs-bugs/bugs-3e.php.

Class attendance: Attendance is required. Exams and homework will be taken from material covered in lectures.

Assignments: There will be at least *eight* assignments in total. A randomly selected subset will be graded for each assignment.

- **Late assignments will NOT be accepted for any reason.**
- All homework must clearly indicate each student's name, course, and assignment number.
- Students are allowed (and actively encouraged) to form study groups.
- You may discuss solutions but you MUST write up the answers independently.
- If you use a website or reference book, you must cite it.

- If there are multiple similar submissions not exhibiting independent thought, or with words obviously lifted from a book or website, ALL such submissions will receive scores of 0.

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.

Exams: There will be two midterm examinations, and a cumulative final exam. Question types on the midterm and final exams may include multiple-choice, true/false, short-answer, and proof.

- **Exam may NOT be taken before or after the scheduled time for any reason.**
- No make-up exam for anyone with any reason.
- Books, notes, computers, translating devices, and cell phones will not be allowed during exams.
- All exams will remain with the instructor.

Grading:
- class participation/Pop Quizzes (5%)
- midterm exam 1   (20%),
- midterm exam 2   (20%),
- assignments   (25%),
- final exam   (30%)

No extra credit will be assigned. Grades will not be adjusted in any way - so an 89.9% is still a B+. No incomplete grades will be given. The grading scale is as follows:

A 92.5%   A- 90.0%   B+ 87.5%   B 82.5% B- 80.0%   C+ 77.5%
C 72.5%   C- 70.0%   D+ 67.5%   D 60.0% F lower than 60%

Academic Dishonesty: By enrolling in this class the student agrees to uphold the standards of academic integrity described at http://www20.csueastbay.edu/academic/academic-policies/academic-dishonesty.html.

- Although collaborate study and dialogue are encouraged within each study group, "high level" discussion of algorithms is acceptable, but detailed discussion is not. Students are expected to author solutions entirely on their own, and do not share solutions with other groups. Such sharing constitutes academic dishonesty, as described in the CSUEB catalog.
- Finding a solution to the program or assignment online is not allowed. Any essential code included from sample programs must be properly acknowledged in comments. Any work not your own, e.g., results obtained from reference sources or from other individuals, should receive appropriate bibliographic citations.
- Quizzes and exams are to be individual, not team efforts. Otherwise it is considered plagiarism. Plagiarism is the act of using someone else's words or programming code and claiming them as your own. (Please refer to the CSUEB catalog for a complete description). *Any evidence* of cheating will be pursued to the fullest extent of university policy.
- Any student who is found academically dishonest or plagiarized will receive a 0 on the program, lab, assignment, quiz, or exam, and an academic dishonesty report will be filed. This will occur on the first infraction and will become part of the student's permanent academic record.

Classroom Protocol and Other Notes
- Absences in attending the first two lectures will be dropped out from the class.
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- **No late assignments will be accepted. No incomplete grades will be given.**
- **No exam may be taken before or after the scheduled time for any reason**.
- **There is no make-up quiz, assignment, project, or midterm/final exam.**
- **No extra credit will be assigned. Grades will not be adjusted in any way.**
- Do not ask for special treatment. The rules for this course apply to everyone equally.
- Cheating will not be tolerable; a ZERO will be given to any cheated assignment/exams, and it will be reported to the Department and the University.
- Do NOT share/post online any course materials, PPT slides, or homework solutions.

- Audio or video recording of the lectures are NOT allowed.
- Use of electronic devices during exams is NOT allowed.
- You are required to check Canvas for reading/assignments.
- The information on this syllabus is subject to change; changes, if any, will be carefully explained in class, and it is your responsibility to become aware of them.
- Once the class starts, use Canvas Inbox to email me for a faster response. I check the Canvas Inbox emails much more often than my school emails.

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.

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

Week	Date	Topic	Assignments
1.	8/21	Introduction: Info & Algorithms, Examples	
2.	8/26,8/28	Examples, Growth of functions- O, Ω, Θ, o, ω	
3.	9/2 9/4	Labor Day Graphs	HW1 assigned
4.	9/9-9/11	Greedy technique	HW1 due, HW2 assigned
5.	9/16-9/18	Divide and Conquer technique.	HW2 due, HW3 assigned
6.	9/23,9/25	Dynamic Programming technique	
7.	9/30 10/2	Midterm 1, Network Flow	HW3 due, HW4 assigned

8.	10/7, 10/9	Network Flow, Heaps	
9.	10/14, 10/16	Hashing	HW4 due, HW5 assigned
10.	10/21,10/23	Amortized Analysis	
11.	10/28-10/30	Randomized Algorithms, Intractability	HW5 due, HW6 assigned
12.	11/4 (11/6	**Midterm 2,** Intractability	
13.	11/11 11/13	Veteran Day, Intractability, Approximation Algorithms	HW6 due, HW7 assigned
14.	11/18, 11/20	Approximation Algorithms,	
15.	11/25, 11/27	Distributed Algorithms Thanksgivings	HW7 due, HW8 assigned
16.	12/2,12/4	Review, Additional Topics	
17.	12/9	Review, Additional Topics	HW8 due
18.	12/16	**Final exam, Monday, 1445-1700 pm**	