San José State University
College of Science/Department of Computer Science CS255, **Design and Analysis of Algorithms** , Spring, 2020

Course and Contact Information

Instructor:

Linsey Pang (Xiaolin Pang)
Office Location:

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Office Hours: M 7:30-8:15pm | W 7:30-8:15pm | by appointment

Class Days/Time: M 7-7:30pm | W 7-7:30pm

Classroom: Science Building 253

Course Description

Randomized algorithms. Parallel algorithms. Distributed algorithms. NP-completeness of particular problems. Approximation algorithms.

Prerequisite: CS 155 or instructor consent.

Course Learning Outcomes (CLO)

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

On successful completion of CS 255, the student will:

- know how to analyze algorithms using mathematical tools, such as asymptotic analysis, induction, recurrence relations, etc.
- have a full understanding of the four algorithmic techniques: greedy, divide-and-conquer, dynamic programming, and branch-and-bound
- have studied a range of probabilistic algorithms, such as genetic algorithms, and seen how they can be used to solve optimization problems

- understand the general notion of complexity classes, P and NP, completeness and hardness, and the relationships between classes by reduction
- know how to prove that certain problems are NP-complete
- know when to use and also how to analyze approximation algorithms
- understand the importance of randomized, parallel and distributed algorithms

Textbooks/Readings

- We will use chapters from various books, but will mainly use first recommended book (Introduction to Algorithms) and we will cover: cover topics from chapters 1, 2, 3, 4, 7, 15, 16, 30, 34, and 35 from this book.

- Cormen,Leiserson,RivestandStein,IntroductiontoAlgorithms,3rdEdition
- MIT Press, 2009. You can find errata (bug reports) for the book http://www.cs.dartmouth.edu/~thc/clrs-bugs/bugs-3e.php.
- KleinbergandTardos,AlgorithmDesign,Firstedition,AddisonWesley,2005.
- Dasgupta,PapadimitriouandVazirani,Algorithms,McGraw-Hill,2006.
- Vazirani,ApproximationAlgorithms,Springer,2003

Other material

- Maybe some research papers sharing on Canvas

- Software
  - Programming Language: Java Platform SE
    - Download at http://www.oracle.com/technetwork/java/javase/downloads/index.html
  - IDE:
    - Eclipse at http://eclipse.org/
  - Version control (for group projects)
    - Git at https://git-scm.com/
    - Git for Eclipse at https://www.eclipse.org/egit/

Course Requirements and Assignments

- University Policy S16-9: "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, including but not limited to internships, labs, and clinical

practical. Other course structures will have equivalent workload expectations as described in the syllabus."

Grading Information Determination of Grades

- Total points for the course will be weighted by:

    - Mid term Exams: 20%
    - Final Exam: 30%
    - In Class Presentation: 5%
    - Assignments 25%
    - Project 20%

- Letter grades will be assigned according to the following policy:

100 -97-----A+ 90 – 96 ---- A 87 -- 89---- A- 85 -- 86--- B+. 80 -- 84 ---- B

77-- 79---- B- 75 -- 76 ---- C+ 70 -- 74 ---- C 65 -- 69---- C- 56 -- 64 ---- D+ 53 -- 55 ---- D 50--52 ---- D- 0 -- 49---- F

- No late work accepted or make-ups.

- Classroom Attendance

    - Arrival: students are highly encouraged.

    - Behavior: eating, personal loud discussions, cell phones, laptops are not allowed in the classroom. Skateboards are not allowed inside or outside the classroom.

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/.

- Policy on Academic Integrity

"Your commitment, as a student, to learning is evidenced by your enrollment at San Jose State University. The University Academic Integrity Policy F15-7 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. Visit the Student Conduct and Ethical Development website for more information."

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 see me after/before class. Presidential Directive 97-03 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 (AEC) at http://www.sjsu.edu/aec to establish a record of their disability.
In 2013, the Disability Resource Center changed its name to be known as the Accessible Education Center, to incorporate a philosophy of accessible education for students with disabilities. The new name change reflects the broad scope of attention and support to SJSU students with disabilities and the University's continued advocacy and commitment to increasing accessibility and inclusivity on campus.

The schedule is subject to change with fair notice.

Week	Lecture#	Date	Topics
1	1	01/27/20	The Role of Algorithms in Computing
2	2	01/29/20	Examples
2	3	02/03/20	Growth of functions
3	4	02/05/20	Graphs
3	5	02/10/20	Graphs
4	6	02/12/20	Greedy technique
4	7	02/17/20	Greedy technique
5	8	02/19/20	Divide and Conquer
5	9	02/24/20	Divide and Conquer
6	10	02/26/20	Dynamic Programming
6	11	03/02/20	Dynamic Programming
7	12	03/04/20	MidTerm1
7	13	03/09/20	Network Flow
8	14	03/11/20	Network Flow
8	15	03/16/20	Heaps
9	16	03/18/20	Hashing
9	17	03/23/20	Amortized Analysis
10	18	03/25/20	Amortized Analysis
		03/30-04/03	Spring Recess
10	19	04/06/20	Randomized Algorithms
11	20	04/08/20	Intractability
11	21	04/13/20	MidTerm2
12	22	04/15/20	Intractability
12	23	04/20/20	Intractability
13	24	04/22/20	Approximation Algorithms
13	25	04/27/20	Approximation Algorithms
14	26	04/29/20	Approximation Algorithms
14	27	05/04/20	Distributed Algorithm

15	28	05/06/20	Class Presentation
15	29	05/11/20	Class Presentation
16	30	05/13/20	Class Presentation
18	31	05/18/20	Final Exam