San José State University
College of Science/Department of Computer Science
CS255, Design and Analysis of Algorithms, Section 2, Fall, 2018

Course and Contact Information

Instructor:	Nada Attar
Office Location:	MH 218
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Email:	nada.attar@sjsu.edu
Office Hours:	T 2:00-3:00pm | Th 10:00-10:30am and 2:45-3:15pm | by appointment
Class Days/Time:	T/Th 12:00-1:15pm
Classroom:	SCI 311
Prerequisites:	CS 155 or instructor consent

Course Format

Faculty Web Page and MYSJSU Messaging

Course materials such as syllabus, handouts, notes, assignment instructions, etc. can be found on my faculty web page at http://www.sjsu.edu/people/firstname.lastname and/or on Canvas Learning Management System course login website at http://sjsu.instructure.com. You are responsible for regularly checking with the messaging system through MySJSU at http://my.sjsu.edu (or other communication system as indicated by the instructor) to learn of any updates.

Course Description

This is an introduction to the design and analysis of algorithms. Many topics could fit in such a course such as big-O notation (required for all sections below), Dynamic programming, Amortization, Graph basics, Minimum spanning trees, Single-source shortest paths, Hashing, and Indicator Random Variables.

Prerequisite

CS 155 or instructor consent.

Course Learning Outcomes (CLO)

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

1. Code an example of each of the following types of algorithms:
   - Randomized
   - Parallel
   - Approximation
2. Conduct an amortized analysis.

3. Explain how above techniques are used in several applications, and describe what benefits they have within those applications.

Required Texts/Readings

Textbook

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.
3. Dasgupta, Papadimitriou and Vazirani, Algorithms, McGraw-Hill, 2006.
4. Vazirani, Approximation Algorithms, Springer, 2003

Other Readings

- Research papers
- Handouts (through Canvas)

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

Homework assignments will be individual, regularly assigned, will include written problem assignments, and perhaps some online exercises. Solutions will be not posted. The homework is a tool for you to learn the material and prepare you for the exams.

Midterm exams: There will be two written Midterm exams during the semester.

Final Examination:
Day: Friday, December 14 Time: 09:45-12:00
One written final cumulative exam.
The exams will contain multiple choice questions, short answer questions and questions that require pseudocode and/or computations. Students must obtain >50% in each component of the course (homework, project, quizzes & written exams) in order to be eligible for a passing grade.

Grading Information

Your grade for the course will be based on the following components:

- Mid Term Exams - 30%
- Final Exam - 30 %
- Assignments 30%
- Quizzes - 5%
- Discretion - 5%

Discretion includes participation in classes and answering forum posts on Piazza.
Exams are closed book; final exam is comprehensive. No extra point options. No make-ups exams except incase of verifiable emergency circumstances

Determination of Grades

The following shows the grading scale to be used to determine the letter grade:

Percentage	Grade
94 and above	A
90 - 93	A-
87 - 89	B+
83 - 86	B
80 - 82	B-
77 - 79	C+
73 - 76	C
70 - 72	C-
67 - 69	D+
63-66	D
60-62	D-
59 and below	F

Classroom Protocol

Attendance is highly recommended. Please avoid disturbing the class: turn-off cell phones (or put them on vibrate mode), no text messaging in the class or the exams, no taking pictures and video, avoid coming late. You may not publicly share or upload material for this course such as exam questions, lecture notes, or solutions without my consent.

University Policies (Required)

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.

Course Number / Title, Semester, Course Schedule

Course Schedule

Week	Date	Topics, Readings, Assignments, Deadlines
1	Tu 8/21	Introduction: Info & Algorithms, Chapter 1
1	Th 8/23	Examples, Chapter 1
2	Tu 8/28	Growth of functions- O, Ω, Θ, o, ω, Chapter 2
2	Th 8/30	Graphs (graph search), Chapter 3
3	Tu 9/4	Graphs (graph search), Chapter 3
3	Th 9/6	Greedy Algorithms I (basic techniques), Chapter 4
4	Tu 9/11	Greedy Algorithms II (shortest paths and MSTs), Chapter 4
4	Th 9/13	Minimum Spanning Tree
5	Tu 9/18	Divide and Conquer I (sorting and selection), Chapter 5
5	Th 9/20	Divide and Conquer II (integer and polynomial multiplication), Chapter 5
6	Tu 9/25	Dynamic Programming I (basic techniques), Chapter 6
6	Th 9/27	Dynamic Programming II (sequence alignment), Chapter 6
7	Tu 10/2	**Midterm 1**
7	Th 10/4	Dynamic Programming II (Bellman–Ford), Chapter 6
8	Tu 10/9	Network Flow I (maximum flow theory), Chapter 7
8	Th 10/11	Network Flow II (maximum flow applications), Chapter 7
9	Tu 10/16	Network Flow III (assignment problem), Chapter 7
9	Th 10/18	Heaps
10	Tu 10/23	Heaps
10	Th 10/25	Hashing
11	Tu 10/30	Intractability I (polynomial-time reductions), Chapter 8
11	Th 11/1	**Midterm 2**
12	Tu 11/6	Intractability II (P, NP, and NP-complete), Chapter 8
12	Th 11/8	Approximation Algorithms (approximation algorithms), Chapter 11
13	Tu 11/13	Randomized Algorithms (randomized algorithms), Chapter 13
13	Th 11/15	Parallel Algorithms
14	Tu 11/20	Distributed Algorithms

Week	Date	Topics, Readings, Assignments, Deadlines
15	Tu 11/27	Amortized Analysis, Chapter 17
15	Th 11/29	Review
16	Tu 12/4	Final Project
Final Exam	Th 12/14	Time: 09:45-12:00