

Course Information

Course Number: CSCE 411
Course Title: Design and Analysis of Algorithms
Section: 500
Time: TR 5:30pm – 6:45pm
Location: ZACH 310
Credit Hours: 3

Instructor Details

Instructor: Samson Zhou
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Office: PETR 424
Office Hours: Tuesdays, 4-5 pm, or by appointment

Course Description

This course presents standard techniques for designing algorithms to solve computational problems, proving their correctness, and analyzing their space and runtime requirements. NP-completeness and hardness reductions will also be covered.

Course Prerequisites

CSCE 221 and CSCE 222

Course Learning Outcomes

- Students will learn about fundamental methods for designing and analyzing algorithms for computational problems.
- Students will be able to prove correctness and analyze the space and runtime requirements of an algorithm
- Students will be able to prove a problem is NP-complete using appropriate reductions

Textbook and/or Resource Materials

Required textbook: Cormen, Leiserson, Rivest, Stein: *Introduction to Algorithms*, 3rd or 4th edition, The MIT Press, 2009.

Other Resources: Check Canvas multiple times each week for updates.

Grading Policy

- *Participation* 3%
- *Homework assignments* 22%
- *Midterm 1* 24%
- *Midterm 2* 24%
- *Final exam* 27%

The grading scale will be: $A \geq 90\% > B \geq 80\% > C \geq 70\% > D \geq 60\% > F$.

If the course average is slow, a slight upward curve may be applied. A downward curve will not be applied (e.g., if a student has an 80% or above, this guarantees a grade of B or better).

Your lowest homework assignment will be dropped. It is possible for different homework sets to be worth different numbers of points (e.g., a homework graded out of 100 points would contribute twice as much to your grade as a homework out of 50 points). The homework that will be dropped at the end of the semester is the homework which, when dropped, leads to the highest possible homework grade among remaining homework sets.

Attendance and participation

Attendance will be taken only indirectly via in-class polls. The participation grade can be met by in-class participation (e.g., answering questions, presenting answers to in-class activities, answering polling questions while in class), and out-of-class engagement (e.g., coming to office hours, submitting intro video, completing the syllabus quiz). Students are guaranteed to receive full credit for participation if they satisfy one of the following two options:

(1) Passing the syllabus quiz assignment, uploading an intro video, plus participation in in-class polls on 8 different days

OR

(2) Passing the syllabus quiz assignment, and participating in in-class polls on 15 different days.

In order to participate in an in-class poll, a student needs to be physically present in the classroom and attending class on the day of the poll. Answering a poll while not in class, or answering a poll on behalf of another student, are strictly forbidden and will result in academic integrity violations.

Late Work and Makeup Work Policy

Homework. Homework assignments may be submitted up to 24 hours late with a penalty of 25%. If it is submitted within 5 hours of the deadline, it will be graded with a smaller penalty of $5\% \times (\text{number of hours since deadline})$. Work submitted more than 24 hours after the deadline will not be accepted. (Recall that your lowest homework assignment will be dropped.)

Tests. No make-up tests will be given. If a student needs to be absent from class on a test day due to an unavoidable and acceptable excused absence, that student needs to get approval from the instructor in advance. The absence must be acceptable as defined by TAMU's policy and will require formal verification (e.g., a doctor's note). If any tests are missed, the final grade will be computed using the weighted average of remaining assignments in the course (which includes other tests, homework assignments, and quizzes).

In-class polls. Polls are designed to be given frequently enough that it is easy to get full participation credit even if a student has many excused absences throughout the semester. If a student has so many excused absences that they are not able to attend 15 class periods during the duration of the semester, then they have the opportunity to try to achieve full credit for their participation grade by (a) providing documentation for all absences (e.g., doctor's notes) and (b) scheduling to take an oral content comprehension exam at the end of the semester. Students interested in trying to make up for missed polls by taking such an oral comprehension exam should reach out directly to the professor.

Exams

The midterm exams will be given in class. These are dates for the midterms:

Midterm 1: October 2 (Thursday)

Midterm 2: November 13 (Thursday)

The final exam will be held on Tuesday, Dec 16 from 3:30 pm-5:30 pm.

Course Schedule

This schedule is tentative and may change slightly during the semester. There are roughly three units:

- (1) High-level paradigms for design and analysis of algorithms
- (2) Graph algorithms
- (3) Complexity theory and optimization

Week	Date	Topic	Reading from CLRS textbook
1	Aug 25	<i>Unit 1: Divide and Conquer</i>	Chapters 1-3; Chapter 4
2	Sept 1	<i>Unit 1: Dynamic Programming</i>	Chapter 15 (especially 15.1-15.3)
3	Sept 8	<i>Unit 1: Dynamic Programming</i>	Chapter 15 (especially 15.2-15.4)
4	Sept 15	<i>Unit 1: Greedy Algorithms</i>	Chapter 16 (especially 16.1-16.3)
5	Sept 22	<i>Unit 1: Amortized Analysis</i>	Chapter 17 (especially 17.1-17.3)
6	Sept 29	<i>Unit 2: Intro to Graph Algorithms</i> Test 1: October 2 (Thursday)	Chapter 22 (especially 22.1, 22.2)
7	Oct 6	<i>Unit 2: BFS, DFS</i>	Chapter 22 (especially 22.2-22.4)
8	Oct 13	<i>Unit 2: More DFS</i> Fall break on Tuesday	Chapter 22 (especially 22.3-22.5)
9	Oct 20	<i>Unit 2: Minimum Spanning Trees</i>	Chapter 23
10	Oct 27	<i>Unit 2: Shortest Paths</i>	Chapter 24
11	Nov 3	<i>Unit 2: Maximum s-t flow</i>	Chapter 26 (especially 26.1-26.3)
12	Nov 10	<i>Unit 3: Intro to P and NP</i> Test 2: November 13 (Thursday)	Chapter 34 (especially 34.1-34.2)
13	Nov 17	<i>Unit 3: NP-completeness</i>	Chapter 34 (especially 34.3-34.5)
14	Nov 24	<i>Unit 3: NP-completeness</i> Reading Day & Thanksgiving Wed-Fri	Chapter 34 (especially 34.3-34.5)
15	Dec 1	<i>Unit 3: NP-completeness</i>	Chapter 34 (especially 34.3-34.5)
16	Dec 8	<i>Unit 3: Undecidability</i>	<i>No specific textbook reading</i>
<i>Finals</i>	Dec 16	Final Exam (Tuesday, December 16, 3:30-5:30 pm)	

Additional Course Policies

Policy on Collaboration and Outside Resources

Students are allowed, under the following guidelines, to consult outside sources and discuss homework problems with other students.

- (1) *Writing. The write-up must be drafted by the student and in the student's own words. Students should not have another person/entity do the writing of any substantive portion of an assignment for them, which includes hiring a person or a company to write assignments and using artificial intelligence tools like ChatGPT.*
- (2) *Attribution. Students are required to list all resources and collaborators. This includes any webpages, textbooks, discussions with other students in the course or people outside the course, and any type of AI tool used (which should only be used subject to the AI guidelines below). Discussing problems includes both receiving help or giving help of any kind.*

(3) Not soliciting answers online. Posting homework questions or soliciting help in online sites or forums is strictly prohibited. While reading an existing post or article about a similar problem is allowed, creating a new post asking for the answer to your question is not allowed.

Policy on Generative AI

Students are allowed Generative AI tools (which includes but is not limited to ChatGPT) as long as they are used to gain knowledge about a topic or problem and not used to simply generate answers which are turned in as the student's own work. AI tools are considered outside resources and their use should follow the Policy on Collaboration and Outside Resources. Additionally, use of AI tools is subject to the following requirements:

- Students are not allowed to directly copy-paste or otherwise directly upload any portion of the class lecture notes or homework questions as a prompt to an AI tool. Note that the lecture notes and homework sets are copyrighted material.
- The student is responsible for writing up all solutions to their homework. Directly turning in text generated by an AI tool, even if it is slightly modified, is a violation of academic integrity. Using AI tools to spell-check, grammar-check, or slightly refine text written by the student (e.g., for better clarity or conciseness) is permitted.
- The student must acknowledge at the top of every homework whether AI tools were used, and if so which ones.

The above guidelines specify what is allowed, but this is neither an encouragement nor an endorsement of using AI tools in any way.

University Policies

Attendance Policy

The university views class attendance and participation as an individual student responsibility. Students are expected to attend class and to complete all assignments.

Please refer to [Student Rule 7](#) in its entirety for information about excused absences, including definitions, and related documentation and timelines.

Makeup Work Policy

Students will be excused from attending class on the day of a graded activity or when attendance contributes to a student's grade, for the reasons stated in Student Rule 7, or other reason deemed appropriate by the instructor.

Please refer to [Student Rule 7](#) in its entirety for information about makeup work, including definitions, and related documentation and timelines.

Absences related to Title IX of the Education Amendments of 1972 may necessitate a period of more than 30 days for make-up work, and the timeframe for make-up work should be agreed upon by the student and instructor” ([Student Rule 7, Section 7.4.1](#)).

“The instructor is under no obligation to provide an opportunity for the student to make up work missed because of an unexcused absence” ([Student Rule 7, Section 7.4.2](#)).

Students who request an excused absence are expected to uphold the Aggie Honor Code and Student Conduct Code. (See [Student Rule 24](#).)

Academic Integrity Statement and Policy

“An Aggie does not lie, cheat or steal, or tolerate those who do.”

“Texas A&M University students are responsible for authenticating all work submitted to an instructor. If asked, students must be able to produce proof that the item submitted is indeed the work of that student. Students must keep appropriate records at all times. The inability to authenticate one’s work, should the instructor request it, may be sufficient grounds to initiate an academic misconduct case” ([Section 20.1.2.3, Student Rule 20](#)).

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You can learn more about the Aggie Honor System Office Rules and Procedures, academic integrity, and your rights and responsibilities at aggiehonor.tamu.edu.

Notice of Nondiscrimination

Texas A&M University is committed to providing safe and non-discriminatory learning, living, and work environments for all members of the University community. The University provides equal opportunity to all employees, students, applicants for employment or admission, and the public regardless of race, color, sex (including pregnancy and related conditions), religion, national origin, age, disability, genetic information, or veteran status. Texas A&M University will promptly, thoroughly, and fairly investigate and resolve all complaints of discrimination, harassment (including sexual harassment), complicity and related retaliation based on a protected class in accordance with System Regulation 08.01.01, University Rule 08.01.01.M1, Standard Administrative Procedure (SAP) 08.01.01.M1.01, and applicable federal and state laws. In accordance with Title IX and its implementing regulations, Texas A&M does not discriminate on the basis of sex in any educational program or activity, including admissions and employment. The following person has been designated to handle inquiries and complaints regarding the non-discrimination policies: Jennifer M. Smith, TAMU Associate VP & Title IX Coordinator at YMCA Ste 108, College Station, TX 77843, 979-458-8407, or email

civilrights@tamu.edu. For other reporting options, visit <https://ocrcas.ed.gov/contact-ocr> to locate the address and phone number of the office that serves your area, or call 1-800-421-3481.

Civil Rights, Free Speech, and Title IX Policies

Texas A&M University is committed to fostering a learning environment that is safe and productive for all. University policies and federal and state laws prohibit discrimination and harassment based on an individual's race, color, sex, (including pregnancy and related conditions), religion, national origin, age, disability, genetic information, veteran status, or any other legally protected characteristic. This includes forms of sex-based violence, such as sexual assault, sexual harassment, sexual exploitation, dating/domestic violence, and stalking.

Students can report discrimination/harassment, access supportive resources, or learn more about their options for resolving complaints on the University's Civil Rights & Title IX webpage.

Students should be aware that all university employees (except medical or mental health providers) are mandatory reporters, which means that if they observe, experience or become aware of an incident that they reasonably believe to be discrimination/harassment alleged to have been committed by or against a person who was a student or employee at the time of the incident, the employee must report the incident to the university.

Americans with Disabilities Act (ADA) Policy

Texas A&M University is committed to providing equitable access to learning opportunities for all students. If you experience barriers to your education due to a disability or think you may have a disability, please contact the Disability Resources office on your campus (resources listed below) Disabilities may include, but are not limited to attentional, learning, mental health, sensory, physical, or chronic health conditions. All students are encouraged to discuss their disability related needs with Disability Resources and their instructors as soon as possible.

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To request academic accommodation, contact (979) 845-1637 or visit disability.tamu.edu.

Title IX and Statement on Limits to Confidentiality

Texas A&M University is committed to fostering a learning environment that is safe and productive for all. University policies and federal and state laws prohibit gender-based discrimination and sexual harassment, including sexual assault, sexual exploitation, domestic violence, dating violence, and stalking.

With the exception of some medical and mental health providers, all university employees (including full and part-time faculty, staff, paid graduate assistants, student workers, etc.) are Mandatory Reporters and must report to the Title IX Office if the employee experiences, observes, or becomes aware of an incident that meets the following conditions (see [University Rule 08.01.01.M1](#)):

- The incident is reasonably believed to be discrimination or harassment.
- The incident is alleged to have been committed by or against a person who, at the time of the incident, was (1) a student enrolled at the University or (2) an employee of the University.

Mandatory Reporters must file a report regardless of how the information comes to their attention – including but not limited to face-to-face conversations, a written class assignment or paper, class discussion, email, text, or social media post. Although Mandatory Reporters must file a report, in most instances, a person who is subjected to the alleged conduct will be able to control how the report is handled, including whether or not to pursue a formal investigation. The University's goal is to make sure you are aware of the range of options available to you and to ensure access to the resources you need.

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Students wishing to discuss concerns in a confidential setting are encouraged to make an appointment with [Counseling and Psychological Services](#) (CAPS).

Students can learn more about filing a report, accessing supportive resources, and navigating the Title IX investigation and resolution process on the University's [Title IX webpage](#).

Statement on Mental Health and Wellness

Texas A&M University recognizes that mental health and wellness are critical factors that influence a student's academic success and overall wellbeing. Students are encouraged to engage in healthy self-care by utilizing available resources and services on campus.

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Students who need someone to talk to can contact Counseling & Psychological Services (CAPS). 24-hour emergency help is also available through the National Suicide Prevention Hotline (800-273-8255) or at suicidepreventionlifeline.org.