

Course Information

Course Number: CSCE 411
Course Title: Design and Analysis of Algorithms
Section: 501
Time: TR 3:55pm – 5:10pm
Location: EABB 106
Credit Hours: 3

Instructor Details

Instructor: Samson Zhou
E-Mail: samsonzhou@tamu.edu
Office: PETR 424
Office Hours: Tuesdays, 2:30-3:30 pm, or by appointment

TA: TBA
TA Office Hours: TBA

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 edition, The MIT Press, 2009.

Resources: Check Canvas multiple times each week for updates.

Grading Policy

- | | |
|-------------------------------|-----|
| • <i>Participation</i> | 3% |
| • <i>Homework assignments</i> | 30% |
| • <i>Midterm 1</i> | 21% |
| • <i>Midterm 2</i> | 21% |
| • <i>Final exam</i> | 25% |

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

If the course average is low, 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% x (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.

Homework policy

Although it is not required, you are *encouraged* to work on and complete all homework assignments on your own without consulting peers or outside sources.

You are allowed, under a very specific set of guidelines, to consult outside sources and discuss homework problems with other students. However, the write-up must be entirely in your own words—copying is strictly prohibited and will result in academic integrity violations. Additionally, if you receive any type of help from outside resources or discuss problems with others, you are required to list all resources and collaborators in your homework write-up (e.g., existing webpages, textbooks, discussion with other students in the course or students outside the course, etc.). Discussing problems includes both receiving help or giving help of any kind. Posting homework questions or soliciting help in online sites or forums is strictly prohibited. E.g., while reading an existing post about a similar problem is okay, creating a new post asking for the answer to your question is not okay.

Most homework assignments will be submitted via Gradescope as a pdf. There will be a link to access Gradescope via the Canvas course webpage. For assignments submitted in Gradescope, it is very important to assign specific problem answers to pages on Gradescope. *If pages are not properly assigned, the graders may not see the solution and student will not receive credit for the problem.*

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 |
|-------------|-----------------|------------------------------------|
| 1 | Jan 13 – Jan 17 | Divide and Conquer |
| 2 | Jan 20 – Jan 24 | Dynamic Programming |
| 3 | Jan 27 – Jan 31 | Greedy Algorithms |
| 4 | Feb 3 – Feb 7 | Amortized Analysis |
| 5 | Feb 10 – Feb 14 | Review & Test 1 |
| 6 | Feb 17 – Feb 21 | Intro to Graph Algorithms |
| 7 | Feb 24 – Feb 28 | Graph Algs: BFS, DFS |
| 8 | Mar 3 – Mar 7 | Graph Algs: Minimum Spanning Trees |
| 9 | Mar 10 – Mar 14 | Spring Break |
| 10 | Mar 17 – Mar 21 | Graph Algs: Shortest Paths |
| 11 | Mar 24 – Mar 28 | Graph Algs: Maximum s-t Flow |
| 12 | Mar 31 - Apr 4 | Review & Test 2 |
| 13 | Apr 7 - Apr 11 | Intro to P and NP |
| 14 | Apr 14 - Apr 18 | NP-Completeness |
| 15 | Apr 21 - Apr 25 | Linear Programming |

Exams

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

Midterm 1: February 13 (Thursday)

Midterm 2: April 3 (Thursday)

The final exam will be held on May 5 from 1:00 pm-3:00 pm.

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](#)).

Restrictive:

This course assumes that all work submitted by students will be generated by the students themselves. 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.

(adapted from University of Massachusetts Amherst, https://cte.tamu.edu/getmedia/1d5e4ef6-97f1-4065-987f-3c9dfecbb7bd/TAMU-CTE_GenAI-SyllabusStatementConsiderations.pdf)

Permissive:

Writing: Use of AI tools, including ChatGPT, is permitted in this course for students who wish to use them. To adhere to our scholarly values, students must cite any AI-generated material that informed their work (this includes in-text citations and/or use of quotations, and in your reference list). Using an AI tool to generate content without proper attribution qualifies as academic dishonesty. See

<https://www.chicagomanualofstyle.org/qanda/data/faq/topics/Documentation/faq0422.html>

[Links to an external site.](#) for information how to properly cite AI tools.

(adapted from University of Massachusetts Amherst, https://cte.tamu.edu/getmedia/1d5e4ef6-97f1-4065-987f-3c9dfecbb7bd/TAMU-CTE_GenAI-SyllabusStatementConsiderations.pdf)

Computer Code. In principle you may submit AI-generated code, or code that is based on or derived from AI-generated code, as long as this use is properly documented in the comments: you need to include the prompt and the significant parts of the response. AI tools may help you avoid syntax errors, but there is no guarantee that the generated code is correct. It is your responsibility to identify errors in program logic through comprehensive, documented testing. Moreover, generated code, even if

syntactically correct, may have significant scope for improvement, in particular regarding separation of concerns and avoiding repetitions. The submission itself must meet our standards of attribution and validation.

(from Boris Steipe (2023) "Syllabus Resources". The Sentient Syllabus Project <http://sentientsyllabus.org> [Links to an external site.](#))

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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.

Americans with Disabilities Act (ADA) Policy

If you have a disability registered with the Disability Resources office and you require accommodations for the course, please reach out to Dr. Veldt as early as possible and he will be happy to set up a time to discuss proper accommodations for you in the course.

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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Disability Resources is located in the Student Services Building or at (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.