

Course Information

Course Number: CSCE-629
Course Title: Analysis of Algorithms
Section: 601
Time: MWF 3:00 pm – 3:50 pm
Location: ZACH 350
Credit Hours: 3

Instructor Details

Instructor: Jianer Chen
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Office Hours: MWF 3:50 pm – 5:00 pm

Course Description

Study of algorithms and their complexity that are important to know and have wide applications in practice. The topics that will be discussed in this course include: advanced data structures, advanced design and analysis techniques, advanced graph algorithms, NP-completeness theory, approximation algorithms, randomized algorithms, and parameterized algorithms.

Course Prerequisites

Undergraduate data structures and algorithms, and discrete mathematics, or approval of instructor.

Course Learning Outcomes

This course will teach you how to:

- understand fundamental techniques for algorithm development,
- analyze complexity and correctness of algorithms,
- judge which algorithmic technique is best for a given problem,
- apply known algorithms and learned algorithmic techniques to new problems,
- use NP-completeness theory to study difficult computational problems, and
- get familiar with advanced techniques for solving NP-hard problems.

Textbook and/or Resource Materials

- T. Cormen, C. Leiserson, R. Rivest, and C. Stein (2009), *Introduction to Algorithms*, 3rd Edition, The MIT Press.
- M. R. Garey and D. S. Johnson (1979), *A Guide to the Theory of NP-Completeness*, W. H. Freeman and Company.
- Supplementary reading materials to be handed out in class.

Grading Policy

- Grading Scale: A = 90-100%, B = 70-89%, C = 60-70%, F = 0-59%
- The course has 6 homework assignments, a course project, a midterm exam, and a final exam.
- Homework assignment: 30%, Course project: 15%, Midterm exam: 20%, Final exam 35%.

Late Work Policy

The assignments are due on the designated due dates at the **beginning** of class. No late submissions will be accepted. Discuss unusual circumstances in advance with the instructor.

Course Schedule

- Week 1: Data structures for fast searching: 2-3 trees and B+ trees
- Week 2: Data structures for fast searching: hashing
- Week 3: Graph algorithms, DFS and BFS and simple applications, homework #1 due
- Week 4: Topological sorting, strongly connected components
- Week 5: Greedy algorithms: shortest path and minimum spanning tree, homework #2 due
- Week 6: Advanced data structures for greedy algorithms
- Week 7: Advanced path algorithms: Bellman-Ford, Floyd-Warshall, and Johnson, homework #3 due
- Week 8: Maximum flow and matching, midterm exam
- Week 9: Dynamic programming
- Week 10: Randomized algorithms, homework #4 due
- Week 11: The classes P and NP, polynomial-time reductions
- Week 12: Proving NP-completeness, homework #5 due
- Week 13: Proving NP-completeness (continued)
- Week 14: Dealing with NP-hardness: approximation algorithms, homework #6 due
- Week 15: Dealing with NP-hardness: parameterized algorithms
- December 13, 10:30 am – 12:30 pm: Final exam

Optional Course Information Items

- The course webpage can be accessed by the following link:

<https://people.engr.tamu.edu/j-chen3/courses/629/2022/courseweb.html>, or

You can go to the instructor's home page then click the course link. The course webpage publishes course syllabus, lecture notes, homework assignments, exams, and other course handouts.

- This course is using Canvas learning management system. Students submit their homework and projects via Canvas.

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](#)).

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

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 Disability Resources in the Student Services Building or at (979) 845-1637 or visit disability.tamu.edu. 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.

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, you 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.

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 proper self-care by utilizing the resources and services available from Counseling & Psychological Services (CAPS). Students who need someone to talk to can call the TAMU Helpline (979-845-2700) from 4:00 p.m. to 8:00 a.m. weekdays and 24 hours on weekends. 24-hour emergency help is also available through the National Suicide Prevention Hotline (800-273-8255) or at suicidepreventionlifeline.org.