Course Syllabus

CS 4349: **Advanced Algorithm Design and Analysis**, Spring 2024

Professor Contact Information
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Course Pre-requisites, Co-requisites, and/or Other Restrictions
Prerequisites: CS 3305 with a grade of C or better, and (CE 3345 or CS 3345 or SE 3345)

Course Description
Asymptomatic analysis, recurrences, and graph algorithms. Algorithm design techniques such as greedy method, dynamic programming, and divide-and-conquer. Issues from computational complexity. Course emphasizes a theoretical approach

Course Learning Outcomes

1. Ability to use asymptotic notations, solve recurrences, perform algorithm analysis.
2. Ability to design, analyze, and prove correctness of algorithms based on Divide-and-Conquer techniques.
3. Ability to design, analyze, and prove correctness of algorithms based on Greedy techniques.
4. Ability to design, analyze, and prove correctness of algorithms based on Dynamic Programming techniques.
5. Ability to design, analyze and prove correctness of graph algorithms.

Course Content
All content for this course (lecture videos, assignments, exams, etc.) are for registered students of this course only. Do not share or publicly post any of these materials.

Course Mode
The course mode is face-to-face. Lectures and exams will be in our assigned classroom on campus. Homeworks and quizzes are online.

Textbooks
The course is mainly based off of the CLRS book and Jeff Erickson's notes. The latter is free online, and you are not required to buy CLRS.

- Introduction to Algorithms, T.H. Cormen, C.E. Leiserson and R.L. Rivest, Third Edition, McGraw Hill.
- Algorithms by Jeff Erickson: http://jeffe.cs.illinois.edu/teaching/algorithms/

Course Topics
   The main course topics will be covered in the following order:
1. Introduction, asymptotic notation, recurrences
2. Iterative, Recursive, and Divide-and-Conquer algorithms
3. Dynamic Programming
4. Greedy algorithms
5. Graph algorithms, network flow
6. NP-Completeness

The course will consist of two halves, each culminating with an exam. Each half of the class will also have 3 homeworks and will cover roughly half of the above topics.

Grading Policy
- Homeworks 37%: There will be around 6 homeworks spaced evenly throughout the semester. The lowest homework score will be dropped.
- Exams 48%: There will be two exams. The first will occur midway through the semester and will cover the first half of the course, the second will occur at the end of the semester and will cover the second half of the course (i.e. the second exam is not cumulative).
- Quizzes 15%: There will be a short online quiz posted after most lectures. Your lowest two quiz scores will be dropped.

The above grade distribution may be subject to change.

When determining your final letter grade the numerical value of your score is less important than your score relative to the class average. That said, there is no fixed curve, i.e. if everyone performs well in the class then everyone can get top grades. I encourage students to talk with me about their grade before considering dropping the course.

Course & Instructor Policies
--No late homeworks will be accepted, unless the student provides a valid documented reason, i.e. medical or family emergencies. I intend to enforce this strict late homework policy, which is partly the reason for allowing the lowest homework score to be dropped.
--If a student is unable to take the examinations on their scheduled dates, they should inform the instructor well in advance. Makeup examinations will be scheduled only if the student has a valid medical excuse.

--Any request for a regrade needs to be made within one week of the assignment or exam being returned. Note that a regrade request means "regrade", i.e. your score could go down. Homework regrade requests should be made directly to the TA.

--Students may submit homeworks individually, or in groups of up to size three. It is your choice, but your group size cannot exceed three. If you discuss problems with students outside your group, please limit you discussion to no more than 3 students outside your group, and please write the names of those students on your assignment. Each group should work individually when writing the solutions, and solutions must be in their own words.

--Students are required to solve problems without the help of outside sources (i.e. "googling the solution"). If for any reason the student does use outside sources, they must cite them clearly, and their solution must still be put in their own words. Failure to cite sources is considered cheating and plagiarism.

Class Materials

The instructor may provide class materials that will be made available to all students registered for this class as they are intended to supplement the classroom experience. These materials may be downloaded during the course, however, these materials are for registered students' use only. Classroom materials may not be reproduced or shared with those not in class, or uploaded to other online environments except to implement an approved Office of Student AccessAbility accommodation. Failure to comply with these University requirements is a violation of the [Student Code of Conduct](#).

Class Attendance

The University's attendance policy requirement is that individual faculty set their course attendance requirements. Regular and punctual class attendance is expected. Students who fail to attend class regularly are inviting scholastic difficulty. In some courses, instructors may have special attendance requirements; these should be made known to students during the first week of classes.

Class Participation

Regular class participation is expected. Students who fail to participate in class regularly are inviting scholastic difficulty. A portion of the grade for this course is directly tied to your participation in this class. It also includes engaging in group or other activities during class that solicit your feedback on homework assignments, readings, or materials covered in the lectures (and/or labs). Class participation is documented by faculty. Successful participation is defined as consistently adhering to University requirements, as presented in this syllabus. Failure to comply with these University requirements is a violation of the [Student Code of Conduct](#).

Class Recordings

Students are expected to follow appropriate University policies and maintain the security of passwords used to access recorded lectures. Unless the Office of Student AccessAbility has approved the student to record the instruction, students are expressly prohibited from recording any part of this course. Recordings may not be published, reproduced, or shared with those not in the class, or uploaded to other online environments except to implement an approved Office of Student AccessAbility accommodation. Failure to comply with these University requirements is a violation of the Student Code of Conduct.

The instructor may record meetings of this course. These recordings will be made available to all students registered for this class if the intent is to supplement the classroom experience. If the instructor or a UTD school/department/office plans any other uses for the recordings, consent of the students identifiable in the recordings is required prior to such use unless an exception is allowed by law.

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Comet Creed
This creed was voted on by the UT Dallas student body in 2014. It is a standard that Comets choose to live by and encourage others to do the same:

"As a Comet, I pledge honesty, integrity, and service in all that I do."

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Academic Support Resources

The information contained in the following link lists the University's academic support resources for all students.

Please see http://go.utdallas.edu/academic-support-resources.

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UT Dallas Syllabus Policies and Procedures

The information contained in the following link constitutes the University's policies and procedures segment of the course syllabus. Please review the catalog sections regarding the credit/no credit or pass/fail grading option and withdrawal from class.

Please go to http://go.utdallas.edu/syllabus-policies for these policies.

The descriptions and timelines contained in this syllabus are subject to change at the discretion of the Professor.