The University of Texas at Dallas CS 4349.005: Advanced Algorithm Design and Analysis Fall 2024

Lectures:

TR 8:30 am - 9:45 am, FN 2.102

Instructor:

Jason Jue Office: ECS 4.408 Office Hours: TuTh 11:30 am – 12:30 pm, or by appointment E-mail: jjue@utdallas.edu Phone: (972) 883-4429

Prerequisite:

CS/CE 2305 with a grade of C or better, and CS/CE/SE 3345.

Required Text:

T. H. Cormen, C. E. Leiserson, R. L. Rivest, and C. Stein, Introduction to Algorithms, 3rd Edition, MIT Press, 2009.

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 Objectives:

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

Assignments & Academic Calendar

| Week 1 | Introduction, (Ch. 1-2), Growth of Functions, Asymptotic Analysis (Ch. 3) |
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| Week 2-3 | Divide and Conquer, Recursion (Ch. 4) |
| Week 4-5 | Dynamic Programming (Ch. 15) |
| Week 6 | Review, Exam 1 – Thursday, September 26 |
| Week 7 | Greedy Algorithms (Ch. 16) |
| Week 8 | Graph Algorithms (Ch. 22) |
| Week 9 | Minimum Spanning Tree, Single Source Shortest Path (Ch. 23-24) |
| Week 10 | All-Pairs Shortest Path, Maximum Flow (Ch. 25-26) |
| Week 11 | Review, Exam 2 – Thursday, October 31 |
| Week 12-13 | NP-Completeness (Ch. 34) |
| Week 14 | Additional Topics |
| | Fall Break – November 25-29 |
| Week 15 | Review |
| Week 16 | Exam 3 – Thursday, December 12 |
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Grading:

| Homework: | 25% |
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| Exam 1: | 25% |
| Exam 2: | 25% |
| Exam 3: | 25% |

Course Policies:

Homework is to be submitted online through eLearning by the due date. No credit will be given for homework submitted past the due date.

Exams must be taken at the scheduled dates and times. Makeup exams will not be given except for documented emergencies or other extreme circumstances. Exams will be administered at the UTD Testing Center. You must reserve a seat in advance for each exam at least 48 hours prior to the exam time. Failure to reserve a seat at the Testing Center will result in a score of zero for the exam. Students are strongly encouraged to make Testing Center reservations within the first two weeks of the semester.

Homework and exams are to be individual efforts. You may discuss homework problems with other students; however, all submitted work should be your own work. Exams are not to be discussed with other students during the exam period. Copying homework or exam solutions from other students, from solution manuals, or from any other sources is not allowed and will be considered a violation of the Student Code of Conduct. No credit will be given for copied homework or exams, and suspected cases of copying will be referred to the Office of Community Standards and Conduct.

Attendance is required, and class participation is strongly encouraged. Students who miss lectures will be responsible for making up the material on their own.

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 AccessAbility Resource Center accommodation. Failure to comply with these University requirements is a violation of the <u>Student Code of Conduct</u>.

UT Dallas Syllabus Policies and Procedures

The information contained in the following link lists the University's policies and procedures segment of course syllabi: <u>http://go.utdallas.edu/syllabus-policies</u>.

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."

Academic Support Resources

The information contained in the following link lists the University's academic support resources for all students. Please go to <u>http://go.utdallas.edu/academic-support-resources</u> for these policies.

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