CS 6363.003: **Advanced Algorithm Design and Analysis**, Fall 2020

Website: [http://utdallas.edu/~bar150630/courses/cs6363fa20.html](http://utdallas.edu/~bar150630/courses/cs6363fa20.html)

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**Professor Contact Information**
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Office: ECSS 4.226  
Office hours time: TBD.  
Office hours will be held online through MS Teams.

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**Course Pre-requisites, Co-requisites, and/or Other Restrictions**  
CS 5333 and CS 5343

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**Course Description**  
The study of efficient algorithms for various computational problems. Algorithm design techniques. Sorting, manipulation of data structures, graphs, matrix multiplication, and pattern matching. Complexity of algorithms, lower bounds, NP completeness.

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**Student Learning Objectives/Outcomes**

<table>
<thead>
<tr>
<th>Class learning objectives</th>
<th>CS outcome</th>
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<tbody>
<tr>
<td>Asymptotic notations, recurrences, algorithm analysis</td>
<td>a,b,c</td>
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<tr>
<td>Divide and conquer algorithms</td>
<td>a,b,c</td>
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<tr>
<td>Greedy algorithms</td>
<td>a,b,c</td>
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<tr>
<td>Dynamic programming algorithms</td>
<td>a,b,c</td>
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<tr>
<td>Graph algorithms, flow networks</td>
<td>a,b,c</td>
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<tr>
<td>NP-Completeness</td>
<td>a,b,c</td>
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**CS Outcomes**

- a. an ability to understand advanced concepts in theory of computer science;
- b. an ability to understand advanced concepts in applications of computer science;
- c. an ability to apply knowledge of advanced computer science to formulate and analyze problems in computing and solve them;
- d. an ability to learn emerging concepts in theory and applications of computer science; and,
- e. an ability to design and conduct experiments as well as to analyze and interpret data
- f. an ability to function in teams and to communicate effectively
Course Modality

This course will be taught in the online course modality. Video lectures will be posted each week to MS Stream. Office hours will be held through MS Teams. Assignments, exams, and quizzes will be through elearning. We may use Piazza as a discussion board.

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.

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.

- 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, a coding assignment, and will cover roughly half of the above topics.

Grading Policy

- Homeworks 45%: There will be around 6 homeworks spaced evenly throughout the semester. The lowest homework score will be dropped.
- Exams 30%: 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 during finals week and will cover the second half of the course (i.e. the second exam is not cumulative).
- Coding assignments 15%: There will be two coding assignments, one in the first half and one in the second half of the semester.
- Quizzes 10%: There will be a short quiz posted for every lecture. The intent of the quizzes is to make sure students stay up to date on watching the lectures. Half the points in this category will be based just on the fraction of quizzes that are submitted on time, and the other half based on the fraction of correct answers.

Note that when determining your final letter grade the numerical value of your score in 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, he/she 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 discuss homework problems together, however, students are not to work together when writing down their solutions. Each homework submission must be in the student's own words. If you discuss problems with other students, please limit you discussion to groups of size no more than 4, and please write the names of those students on your assignment.
--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.

COVID-19 Guidelines and Resources

The information contained in the following link lists the University’s COVID-19 resources for students and instructors of record: http://go.utdallas.edu/syllabus-policies.

Class Participation

Regular class participation is expected regardless of course modality. 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.
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.

Technical Requirements

In addition to a confident level of computer and Internet literacy, certain minimum technical requirements must be met to enable a successful learning experience. Please review the important technical requirements on the Getting Started with eLearning webpage.

Course Access and Navigation

This course can be accessed using your UT Dallas NetID account on the eLearning website. Please see the course access and navigation section of the Getting Started with eLearning webpage. To become familiar with the eLearning tool, please see the Student eLearning Tutorials webpage. UT Dallas provides eLearning technical support 24 hours a day, 7 days a week. The eLearning Support Center includes a toll-free telephone number for immediate assistance (1-866-588-3192), email request service, and an online chat service.

Communication

This course utilizes online tools for interaction and communication. Some external communication tools such as regular email and a web conferencing tool may also be used during the semester. For more details, please visit the Student eLearning Tutorials webpage for video demonstrations on eLearning tools.

Distance Learning Student Resources

Online students have access to resources including the McDermott Library, Academic Advising, The Office of Student AccessAbility, and many others. Please see the eLearning Current Students webpage for more information.

Server Unavailability or Other Technical Difficulties

The University is committed to providing a reliable learning management system to all users. However, in the event of any unexpected server outage or any unusual technical difficulty which prevents students from completing a time sensitive assessment activity, the instructor will provide an appropriate accommodation based on the situation. Students should immediately report any problems to the instructor and also contact the online eLearning Help Desk. The instructor and the eLearning Help Desk will work with the student to resolve any issues at the earliest possible time.

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 [Academic Support Resources](#) webpage for these policies.

**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 go to [UT Dallas Syllabus Policies](#) webpage for these policies.

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