

## Course Syllabus

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CS 6363: **Advanced Algorithm Design and Analysis**, Spring 2022

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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

Class learning objectives	CS outcome
Asymptotic notations, recurrences, algorithm analysis	a,b,c
Divide and conquer algorithms	a,b,c
Greedy algorithms	a,b,c
Dynamic programming algorithms	a,b,c
Graph algorithms, flow networks	a,b,c
NP-Completeness	a,b,c

### 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
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## 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.

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## Course Mode

The course mode is face-to-face. Lectures and exams will be in our assigned classroom on campus. Homeworks, quizzes, and office hours are online. UTD has announced that classes will be online the first several weeks this semester, with the intent of resuming in person classes afterwards. I will announce more class logistic details through elearning.

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## 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, Mc Graw Hill.
  - Algorithms by Jeff Erickson: <http://jeffe.cs.illinois.edu/teaching/algorithms/>
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## 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.

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## Grading Policy

- Homeworks 45%: There will be around 6 homeworks spaced evenly throughout the semester. The lowest homework score will be dropped.
- Exams 40%: 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 around finals week 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. Tentatively quizzes are worth 15%, though this may decrease if I do not give quizzes for all lectures.

The above grade distribution is subject to small changes, for example moving 5% from quizzes or homework to exams.

Note that 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.

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## **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 submit homeworks individually, or in groups of size two. It is your choice, but your group size cannot exceed two. If you discuss problems with other students outside your group, please limit your discussion to no more than 4 students, 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.

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## **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>.

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## **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](#).

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## **Classroom Conduct Requirements Related to Public Health Measures**

UT Dallas will follow the public health and safety guidelines put forth by the Centers for Disease Control and Prevention (CDC), the Texas Department of State Health Services (DSHS), and local public health agencies that are in effect at that time during the Spring 2022 semester to the extent allowed by state governance. Texas Gov. Greg Abbott’s Executive Order [GA-38](#) prohibits us from mandating vaccines and face coverings for UT Dallas employees, students, and members of the public on campus. However, we strongly encourage all Comets to get vaccinated and wear face coverings as recommended by the CDC. Check the [Comets United: Latest Updates](#).

[webpage](#) for the latest guidance on the University’s public health measures. Comets are expected to carry out [Student Safety](#) protocols in adherence to the Comet Commitment. Unvaccinated Comets will be expected to complete the [Required Daily Health Screening](#). Those students who do not comply will be referred to the Office of Community Standards and Conduct for disciplinary action under the [Student Code of Conduct – UTSP5003](#).

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### **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. Faculty have the discretion to set an attendance policy for their in-person meetings, but the absences due to COVID-19 cannot be counted against a quarantined student.

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### **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](#).

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### **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.

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