

Course Syllabus

Course Information

CS 6319.001

Computational Geometry

Spring 2024

Monday, Wednesday 4:00pm–5:15pm

ECSW 4.325

Website: <https://personal.utdallas.edu/~emily.fox/courses/cs6319.001.24s/>

Professor Contact Information

Instructor: Emily Fox

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Office: ECSS 4.224

(Tentative) Office Hours: Wednesdays 2:00pm–3:00pm in ECSS 4.224 and Thursdays 10:00am–11:00am via MS Teams; additional and in-person office hours available upon request

Course Pre-requisites, Co-requisites, and/or Other Restrictions

Prerequisite: CS 5343.

Course Description

This course will cover basic computational geometry topics, such as computing convex hulls, computing Voronoi diagrams and Delaunay triangulations, motion planning, and the main methods for developing geometric algorithms. We will also discuss various geometric data structures for point location and range searching and additional topics at the discretion of the instructor, such as geometric approximation and high dimensional data analysis.

Student Learning Objectives/Outcomes

Knowledge of basic geometric data structures such as Voronoi diagrams, quad trees, and range trees

Knowledge of basic geometric algorithms, including line sweep, point location, and convex hull

Knowledge of useful techniques and geometric structures, including duality, arrangements, and Delaunay triangulation

Ability to design and implement a geometric algorithm

Ability to apply computational geometry techniques to real world problems

Required Textbooks and Materials

David M. Mount: **Computational Geometry**. Available at <https://www.cs.umd.edu/class/fall2021/cmsc754/Lects/cmsc754-fall-2021-lects.pdf>.

Suggested Course Materials

Mark de Berg, Otfried Cheong, Marc van Kreveld, Mark Overmars:
Computational Geometry—Algorithms and Applications—Third Edition.
Springer 2008

Links to additional lecture notes will be provided on the course website.

Assignments & Academic Calendar

Topics and deadlines will be added to the course website as the semester progresses. Homework will be assigned every couple weeks. There will be four or five homework assignments released, each consisting of two or three problems. Students will also participate in some sort of project involving a short survey, implementation, or research. Students will propose their project midway

through the semester via a two page paper. They will then submit a longer paper on their results at the end of the semester.

Course & Grading Policies

Each homework problem will be given equal weight. Grades are determined with a weighted sum of homework worth 50%, the project proposal worth 10%, and the final project report worth 40%.

Up to three students may work together and turn in homework, the project proposal, and/or the final project report as a single submission. Individual submissions are fine as well. All assignments should be turned in via eLearning. eLearning is not well designed for group submission, so each group should have exactly one of its members turn in the assignment. The grade for one submission will be given to all group members.

It is expected that each (group of) student(s) be able to solve homework problems using only course material and their own work. If necessary though, students are permitted to use any outside source or person as long as they cite the source and rewrite the solution in their own words. A full citation of an article or website should describe the specific work or webpage used. Students may also work with others outside their group, but again, they must cite all collaboration with other students. Properly cited and rewritten outside material is still worth full credit. Material not cited or not rewritten in students' own words will be considered an act of academic dishonesty and suspected incidents will be reported to the Office of Community Standards and Conduct. Students do not need to cite anything from this course or prerequisite courses, but when in doubt, they should cite anyway just to be safe.

Students must request extensions via email for any late work they plan to submit. Extensions of up to 24 hours for all assignments will be automatically approved, but the student must still make an explicit request. The instructor may not respond to every automatically approved request. Longer extensions may be approved at the instructor's discretion based on the circumstances involved.

Final grades for each student are determined either by their scores passing predetermined percentage thresholds or their performance relative to the class average, whichever results in a higher grade. In other words, if everybody performs well, then everybody gets a good grade. Please talk to the instructor about grades before considering dropping the course.

There may be a small amount of extra credit available through additional work during assignments. Outside sources cannot be used for extra credit work. The existence of extra credit points will not affect the percentage cutoffs for students' final grades.

Requests for a regrade must be made within one week of the homework assignment or exam being returned. The problem in question will be completely regraded, so the score may actually go down.

Class Attendance and Participation

Regular class attendance is expected, and students who fail to attend class regularly are inviting scholastic difficulty. Your attendance helps the instructor to gauge how well the lecture is going, and it gives you an opportunity to ask questions as the lecture is being delivered.

However, it is understood that you may not be able to attend all classes for any number of reasons. The instructor will upload a video of each lecture to be made available via MS Teams. If a student is unable to attend class in person or simply wants to review lectures after they are given, they are encouraged to watch these videos. **Students are not required to ask permission or offer an explanation for missing class.**

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.

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

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.