CS 533 — Computational Geometry
Syllabus version 1.1
Final except for unforseable events and correcting typos

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1 Course Summary

Welcome to CS 533 – Computational Geometry. This is a theoretical computer science graduate course. CS 533 can be seen as a counter-part to CS 535 (Design and Analysis of Algorithms). The purpose is to introduce a variety of algorithmic techniques that apply to geometric problems. We will aim for diversity at the expense of getting the fastest known algorithms, which are typically obtained with amortized analysis, a CS 535 topic that we do not require nor intend to study in detail. There will be rigorous analysis of the algorithms as well.

Geometric algorithms are used in Computer Graphics, Databases, Wireless Networks (and the combined GIS systems), and Natural Sciences.

2 Textbook

The required textbook is *Computational Geometry: Algorithms and Applications* by Mark de Berg, Otfried Cheong, Marc van Kreveld, and Mark Overmars, 3rd edition. ISBN-10: 3540779736, ISBN-13: 978-3540779735. Our library allows access to a pdf version (for personal use only).

3 Prerequisites

CS 430 is listed as prerequisite. Familiarity (or a desire and ability to learn) mathematical proofs is also necessary.

4 Getting Help

Office hours are Tuesday 12:45-1:45 and Thursday 3:20-4:20, in room SB 228D, or by appointment. For an appointment send e-mail to `calinescu@iit.edu`. You can also call me at 312-567-5273. Please spend a little time trying to understand yourself a homework problem before asking for help.

Handouts (including this syllabus, homeworks, the project, and some solutions) will be available at `http:// www.cs.iit.edu/~cs533`.

Students are expected to check email every week day of the semester. Clarifications on assignments or other important announcements might be sent by email - and will also be posted on the web page.

5 Grading

The grading allocation is given below.

Homework	40%
Grading homework/project	20%
Midterm	15%
Final exam	25%

The midterm will be on March 24, in class. The final exam will be in the May 4-9 week, but due to class conflicts may not be held as scheduled by the registrar. A decision will be made on the day of the midterm. Five homeworks will be assigned to be solved individually. Seek help from me if you are having difficulties with the homework. Except for extraordinary circumstances, homeworks will be accepted at latest one week late. The penalty for late submission is 10% for one lecture late and 20% for one week late.

The midterms and the final exam are closed books and closed notes - except for my handouts which I will provide to you on the day of the exam.

The two exams may contain modified homework problems or ask for proofs from the class.

I will ask some "trusted students" (typically, who earned an A in one of my classes) to peer-grade homeworks, and then review the graded homeworks myself (it is unlikely a TA will be assigned to this class). The others will do the project, which will include both reading and understanding new material, and team programming.

The final grades will be assigned using standards similar to ones I used in other classes. For example, in four senesters of CS 538, there were 13 A's, 29 B's and three C's (there would have been another two A's had three students correctly solved the project without sharing code). As a guideline, about 80% will be needed for an A, and 60% for a B.

Standard departmental policy regarding academic (dis)honesty applies. This includes

`http://www.iit.edu/student_affairs/handbook/information_and_regulations/code_of_academic_honesty.shtml`

In particular, homework solutions copied from the Internet are not allowed. If I have evidence that the work submitted is not your own, I will assign a score of zero on that particular assignment at the first occurence. It may also be reported to `academichonesty@iit.edu`. The second occurence will be reported and an appropiate sanction will be applied after consultation with the office of the Associate Provost for Academic Affairs. Whenever in doubt, ask first if some action is allowed or not. Moreover, the students must submit the signed College of Science Academic Integrity Pledge together with the first homework.

Electronic devices must be off during the class. Reasonable accommodations will be made for students with documented disabilities. In order to receive accommodations, students must obtain a letter of accommodation from the Center for Disability Resources and make an appointment to speak with me [the instructor] as soon as possible. The Center for Disability Resources (CDR) is located in 3424 S. State St., room 1C3-2 (on the first floor), telephone 312-567-5744 or `disabilities@iit.edu`.

6 Topics to be covered

1. Convex hulls

2. Voronoi diagrams, Delauney triangulation, and Euclidean spanning trees
3. Point location
4. Range searching
5. Binary Space Partitioning Tree
6. Discrepancy theory
7. Fixed dimensional linear programming
8. Geometric shortest paths