

COT5520: COMPUTATIONAL GEOMETRY

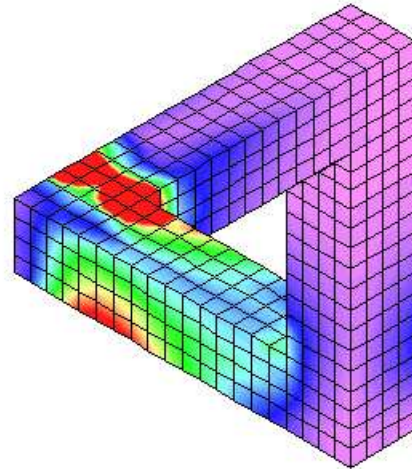
SYLLABUS

"Geometry is the science of correct reasoning on incorrect figures."

George Polya (1887 to 1985)

BASIC INFO

- **Course number:** COT5520 or CIS4930
- **Semester:** Fall 2009
- **Schedule:** Tue 10:40am-11:30am
Thu 10:40am-12:35pm
- **Location:** CSE 222
- **Catalog number:** 7317 or 4018
- **Credit hours:** 3
- **Professor:** Alper Üngör
CSE 534
ungor@cise.ufl.edu
<http://www.cise.ufl.edu/~ungor>
- **Office hours:** Tue 11:30am-1:30pm
- **Web-page:** <http://www.cise.ufl.edu/class/cot5520fa09>



MAIN THEME

Computational geometry is the field of theoretical computer science devoted to design, analysis, and implementation of algorithms and data structures to solve geometric problems. It has numerous application domains including computer graphics, visualization, robotics, computational biology, data mining, parallel computing, and scientific computing. This course will survey the fundamental concepts in geometric algorithms and data structures. Topics that will be covered include:

Convex hulls

Triangulations

Range searching

Voronoi diagrams

Randomized algorithms

Nearest neighbors

Morse theory

Protein modeling

Plane-sweep algorithms

Geometric data structures

Point location

Delaunay triangulations

Arrangements

Surface simplification

Robot motion planning

Visibility graphs

COURSEWORK

Grades will be based on homeworks (20%), a semester project (30%), a midterm exam (20%) and a final exam (30%).

- **Homework:** There will be about 4 homework assignments, each consisting of 4-6 problems.
- **Project:** It could be a survey paper, a programming project, or a research on an open problem. A one-page project proposal should be submitted by mid-semester. Final project reports are due to the last week of the semester.
- **Exam:** There is one mid-term exam (Oct 8 Th) and one final exam (Dec 3 Th). Both will be two-hour in class exams.
- **Attendance:** Class attendance and participation is essential.

COURSE MATERIAL

- **Textbook:** *Computational Geometry: Algorithms and Applications*. Mark de Berg, Marc van Kreveld, Mark Overmars, and Otfried Schwarzkopf, (Springer-Verlag, 3rd edition, 2008).
- **Other recommended books:**
 1. *Algorithms in Combinatorial Geometry*. H. Edelsbrunner, (Springer-Verlag, 1987).
 2. *Geometry and Topology for Mesh Generation*. H. Edelsbrunner, (Cambridge Univ. Press, 2001).
 3. *Computational Geometry: An Introduction Through Randomized Algorithms*. K. Mulmuley, (Prentice-Hall, 1994).
 4. *Computational Geometry: An Introduction*. F. Preparata and M. Shamos, (Springer-Verlag, 1985).
 5. *Computational Geometry in C*. J. O'Rourke, (Cambridge Univ. Press, 1994).
 6. *Introduction to Algorithms (2nd ed)*. T.H. Cormen, C.E. Leiserson, R.L. Rivest, and C. Stein, (MIT Press and McGraw-Hill, 2001).
- **Conferences:** SoCG, CCCG, JCD CG, WCG, SODA, STOC, ISAAC, LATIN, ...
- **Journals:**
 1. *CGTA: Computational Geometry: Theory and Applications*
 2. *DCG: Discrete & Computational Geometry*
 3. *IJCGA: Int. Journal of Computational Geometry and Applications*
- Also watch the class web page for other survey and research papers, links, etc.

OTHER ISSUES

- **Announcements:** Students are responsible following the announcements on the course web-page (<http://www.cise.ufl.edu/class/cot5520fa09>). Schedule updates regarding the homeworks, exams and office hours will appear on the web-page.
- **Accommodations for Students with Disabilities:** Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation.
- **The University's Honesty Policy:** All students admitted to the University of Florida have signed a statement of academic honesty committing themselves to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action. This statement is a reminder to uphold your obligation as a student at the University of Florida and to be honest in all work submitted and exams taken in this class and all others.

The following links contain additional information relating to academic honesty:

- <http://lss.at.ufl.edu/services/turnitin/resources.html>

- <http://www.dso.ufl.edu/judicial>

