

# Computer Science 15-456

## Computational Geometry

Spring 2013

### Course Information

**Instructors.** Gary L. Miller, GHC 8109, g1miller@cs.cmu.edu, and Brittany Fasy, GHC 7125, bfasy@cs.cmu.edu. office hours: TBA

**Meetings.** MWF 3:30 p.m. - 4:20 p.m. in Ween Hall 5310.

**Course Description.** How do you sort points in space? What does it even mean? This course takes the ideas of a traditional algorithms course, sorting, searching, selecting, graphs, and optimization, and extends them to problems on geometric inputs. We will cover many classical geometric constructions and novel algorithmic methods. Some of the topics to be covered are convex hulls, Delaunay triangulations, graph drawing, point location, geometric medians, polytopes, configuration spaces, computational topology, approximation algorithms, and others. This course is a natural extension to 15-451, for those who want to learn about algorithmic problems in higher dimensions.

**Prerequisites.** Computer Science 15-451.

**Literature.** The main text for the course is:

DE BERG, CHEONG, VAN KREVELD, AND OVERMARS. *Computational Geometry: Algorithms and Applications*. Springer, 2008.

Selected topics may be chosen from:

DEVADOSS AND O'ROURKE. *Discrete and Computational Geometry*. Princeton U Press, 2011.

**Coursework.** Grades will be based on classroom participation (5%), homework (25%), project (20%), midterm exam (25%), and a final exam (25%).

**Collaboration Policy.** Collaboration on the homeworks and project is encouraged. However, please give credit where credit is due. All resources used (textbooks, websites, discussions with others) must be acknowledged on the homeworks and reports that you hand in. For each problem, you may collaborate with at most two other people (instructors excluded).

**Homework.** Homework must be handed in by the onset of class on the day that it is due. The written homework should be either neatly handwritten or typed, preferably using LaTeX (template provided). Each student is expected to write-up his or her own solutions to the homework problems. The homework grade will be based mostly on the in-class presentations. Grades for the presentations will be comprised of three equally weighted components: clarity, correctness, and completeness. Each student must write up and hand in his or her own answers.

**Project.** See handout on the project.

**Please see the course website for an updated version of this PDF.**