

Syllabus for 18.318: Geometric Graph Theory

Spring 2013

- Instructor: Jacob Fox, fox@math.mit.edu, Room 2-363c
- Time: Mondays and Wednesdays 1:00-2:30
- Location: Room 2-147
- Office hours: Fridays 3:00-4:00 or by appointment
- Prerequisites: Permission by instructor. Some knowledge of combinatorics, graph theory, geometry, and computer science.
- Textbooks:
(recommended) Combinatorial Geometry by J. Pach, P. K. Agarwal
- Grades: No exams; grades will be based on 3 problem sets and a research paper
- Objective: To learn and appreciate the problems and methods in geometric graph theory
- Suggestions: Class participation and discussion are highly encouraged. Please feel free to ask me questions before, during, or after class.
- Class website: <http://math.mit.edu/~fox/18318/>

Rough Outline

- 2/6 Planarity
- 2/11 Beyond Planarity
- 2/13 Drawing method
- 2/19 Poset method
- 2/20 Separator lemmas
- 2/25 Separator applications
- 2/27 Turan's brick factory problem
- 3/4 Crossing patterns in geometric graphs
- 3/6 Which crossing number is it anyways?
- 3/11 Erdos-Hajnal conjecture
- 3/13 Structure for semi-algebraic relations
- 3/18 Coloring conjectures of Erdos and Scott
- 3/20 Discharging method
- 3/25 Spring Vacation
- 3/27 Spring Vacation
- 4/1 Davenport-Schinzel sequences
- 4/3 Applications of Davenport-Schinzel sequences
- 4/8 Odds and ends
- 4/10 String graphs
- 4/15 VC dimension
- 4/17 VC dimension applications
- 4/22 Enumeration bounds from algebra and VC dimension
- 4/24 The chromatic number of the plane and the axioms for set theory
- 5/1 Conway's thrackle conjecture
- 5/6 Grid drawings of planar graphs
- 5/8 Erdos-Szekeres theorem and its generalizations
- 5/13 Intersection patterns of curves
- 5/15 Graph Minor Theory