

Topics*Lecturer: Daniel A. Spielman***0.1 Menu of Topics**

Here is a list of topics that we could cover in the class. Please point out those you are interested in, excited about, or antagonistic towards. Hand you comments back to me, or slip them under my door (207a).

1. Spectra of random graphs, 2-4 lectures.
2. Algorithms on semi-random graphs. For example, finding cliques hidden in random graphs, or partitioning semi-random graphs. 1-2 lectures.
3. Spectral techniques for testing isomorphism of graphs. 2 lectures.
4. Properties of expander graphs. 1-2 lectures.
5. Building error-correcting codes from expanders. 1-2 lectures.
6. Diameter of graphs: random graphs, spectral connections, explicit extremal graphs. 1 lecture.
7. Algebraic constructions of special graphs, including expanders. 2-4 lectures.
8. Preconditioning, approximating graphs, and solving linear systems. 2-4 lectures.
9. Quantum computation. 4 lectures.
10. Tutte's theorem: rubber band embeddings of planar graphs. 1 lecture.
11. Colin de Verdiere number of graphs, and related embeddings. 2 lectures.
12. Applications in control theory (no promises!). 2 lectures.