Graduate Seminar on Discrete Optimization
Graph Partitioning

1. **Approximating fractional multicommodity flow**
   L. Fleischer [2000]: *Approximating fractional multicommodity flow independent of the number of commodities.*
   SIAM Journal on Discrete Mathematics, 2000, 13, 505–520 (preliminary version: FOCS 1999)

2. **Multicommodity max-flow min-cut theorems and sparsest cuts**
   T. Leighton and S. Rao [1999]: *Multicommodity Max-Flow Min-Cut Theorems and Their Use in Designing Approximation Algorithms*: section 1, 2, 3.1: as far as needed for sparsest cuts.
   Journal of the ACM, 1999, 46, 787–832 (FOCS 1988)

3. **Approximation algorithms based on sparsest cuts**
   T. Leighton and S. Rao [1999]: *Multicommodity Max-Flow Min-Cut Theorems and Their Use in Designing Approximation Algorithms*: rest of the paper

4. **Metric embedding and sparsest cuts**
   D. Shmoys [1997]: *Cut Problems and Their Application to Divide-and-Conquer*: section 5.3.3, 5.3.4: $O(\log n)$-approximation for sparsest cut.
   In: *Approximation Algorithms for NP-hard Problems*, (D.S. Hochbaum, ed.), 1997, 192-235
   Based on: Y. Aumann and Y. Rabani: *An $O(\log k)$ approximate min-cut max-flow theorem and approximation algorithm.* SIAM Journal on Computing, 1998, 7, 291–301 and N. Linial, E. London, and Y. Rabinovich: *The geometry of graphs and some of its algorithmic applications.* Combinatorica, 1995, 15, 215–246

5. **Applications to feedback arc sets and balanced cuts**
   D. Shmoys [1997]: *Cut Problems and Their Application to Divide-and-Conquer*: section 5.4, 5.5
   Based on: P. Seymour: *Packing directed circuits fracionally.* Combinatorica, 1995, 15, 281–288 and
   G. Even, J. Naor, S. Rao, and B. Schieber: *Divide-and conquer approximation algorithms via spreading metrics.* Proceedings of the Symposium on Foundations of Computer Science, 1995, 62–71

6. **$O(\sqrt{\log n})$-approximation for sparsest cut**
   S. Arora, S. Rao, and U. Vazirani [2009]: *Expander Flows, Geometric Embeddings and Graph Partitioning*: section 2, 6
   Journal of the ACM, 2009, 56, article 5 (STOC 2004)

7. **Finding well-represented sets in ℓ_2^2-representations**
   S. Arora, S. Rao, and U. Vazirani [2009]: *Expander Flows, Geometric Embeddings and Graph Partitioning*: Proof of Theorem 1

8. **Expander Flows**
   S. Arora, S. Rao, and U. Vazirani [2009]: *Expander Flows, Geometric Embeddings and Graph Partitioning*: section 7: Expander Flows

9. $O(\sqrt{\log n})$ **approximation to sparsest cut in** $\tilde{O}(n^2)$ **time**
   S. Arora, E. Hazan, and S. Kale [2004]: $O(\sqrt{\log n})$ *approximation to SPARSEST CUT in* $\tilde{O}(n^2)$ *time*
   Proceddings of the Symposium on Foundations of Computer Science, 2004, 238–247

10. **Graph partitioning using single commodity flows**
    R. Khandekar, S. Rao, and U. Vazirani [2009]: *Graph partitioning using single commodity flows*
    Journal of the ACM, 2009, 56, article 19 (STOC 2006)

11. **Fast approximate graph partitioning algorithms**
    G. Even, J. Naor, S. Rao, and B. Schieber [1999]: *Fast approximate graph partitioning algorithms*: section 2, 3, 4
    SIAM Journal on Computing, 1999, 28, 2187–2214 (SODA 1999)

12. **Partitioning graphs into balanced components**
    R. Krauthgamer, J. Naor, and R. Schwartz [2009]: *Partitioning graphs into balanced components*
    Proceedings of the Symposium on Discrete Algorithms, 2009, 942–949

13. $O(\log n)$**-approximation of the graph bisection problem**
    H. Räcke [2008]: *Optimal Hierarchical Decompositions for Congestion Minimization in Networks*
    Proceedings of the Symposium on Theory of Computing, 2008, 385–390 and
    J. Fakcharoenpol, S. Rao, and K. Talwar [2003]: *A tight bound on approximating arbitrary metrics by tree metrics*,
    Journal of Computer and System Sciences, 2004, 69, 485–497 (STOC 2003)