Topics in TCS: Lecture Topics # 2

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I strongly encourage you to look into the sources before you decide on what topic to present! We will have the first student presentations on April 2nd.

Semidefinite Programming

- **Approximation Algorithms I: MAXCUT** (Ariel, 4/2)

  Source: Section 10.1 in `http://www.cs.cmu.edu/afs/cs.cmu.edu/academic/class/15859-f11/www/notes/lpsdp.pdf`

- **Approximation Algorithms II: Correlation Clustering** (Jiaming, 4/7)

  Source: Section 1.3-4 in `http://theory.epfl.ch/osven/courses/Approx13/Notes/lecture14.pdf`

- **Perfect Graphs I: Lovasz Theta Function** (Eben, 4/9)

  Source: Section 11.2-3 in `http://www.cs.cmu.edu/afs/cs.cmu.edu/academic/class/15859-f11/www/notes/lpsdp.pdf`, but be sure to introduce perfect graphs (the definitions are given in 11.1). See also Barvinok Chapter *IV*.11

- **Perfect Graphs II: Finding Independent Sets** (Michael, 4/9)

  Source: Section 11.4-5 in `http://www.cs.cmu.edu/afs/cs.cmu.edu/academic/class/15859-f11/www/notes/lpsdp.pdf`

- **Approximation Algorithms III: Graph Coloring** (Tyler, 4/14)

  Source: Section 2 in `http://www.cs.toronto.edu/~avner/teaching/S5-2411/ln/lecture13.pdf`

- **Weak Duality and General Cone Programs** (Bryan, 4/14)

  Source: Section 12.1 (just Lemma 12.4) and 12.2 (skip the subsections related to MAXCUT) in `http://www.cs.cmu.edu/afs/cs.cmu.edu/academic/class/15859-f11/www/notes/lpsdp.pdf`

- **Strong Duality**

  Source: Section 12.3 in `http://www.cs.cmu.edu/afs/cs.cmu.edu/academic/class/15859-f11/www/notes/lpsdp.pdf`

- **Grothendieck's Inequality** (Lars, 4/16)

  Source: Section 4.3 in `http://cs.tau.ac.il/~kempe/TEACHING/SEMINAR-SPRING09/alon-naor.pdf`

Metric Emeddings

- **Maximum Concurrent Flow and Sparsest Cut** (Allen, 4/16)

  Source: Sections 2-4 in `http://www.cs.cornell.edu/Courses/cs683/2001SP/lec04.ps`

- **Metric Embeddings I: Basics and Relations to MCF** (Cesar, 4/23)

  Source: Sections 1-3 in `http://www.cs.cornell.edu/Courses/cs683/2001SP/lec09.ps`, but only give the proof of Lemma 2.8 if time permits.

- **Metric Embeddings II: Bourgain's Embedding Theorem** (Nicolas, 4/23)

  Source: `http://www.cs.cornell.edu/Courses/cs683/2001SP/lec10.ps`, see also Section 15.7 in Matousek

- **Lower Bounds I: Enflo's Theorem**

  Source: Section 15.4 in Matousek

- **Lower Bounds II: Expanders**

  Source: Section 15.5 in Matousek