Seminar: Cuts, Metrics, and Matroids

Sommersemester 2011
LV-Nr.: 3236 L 364

Prof. Dr. Dr. h.c. mult. Martin Grötschel

Allgemeine Hintergrundliteratur (relevante Bücher) zum Seminar:

M. M. Deza, M. Laurent (1997), *Geometry of Cuts and Metrics*, Algorithms and Combinatorics 15, Berlin, Springer. (elektronische Version auf M. Deza's Homepage verfügbar)

Martin Grötschel, László Lovász, Alexander Schrijver (1993), *Geometric algorithms and combinatorial optimization*. 2. corr. ed., Algorithms and Combinatorics 2, Berlin, Springer

James G.Oxley (2011), *Matroid theory,* Oxford Graduate Texts in Mathematics 21, Oxford, Oxford University Press (paperback).

Alexander Schrijver (1986), *Theory of linear and integer programming*, Chichester, Wiley.

Alexander Schrijver (2003), *Combinatorial optimization. Polyhedra and efficiency* (3 volumes), Algorithms and Combinatorics 24, Berlin, Springer. (CD-ROM- Version verfügbar)

Klaus Truemper (1992), *Matroid decomposition*, Academic Press, Boston, (revised electronic edition available from K. Truemper's homepage).

Alle Bücher/Artikel mit M. Grötschel als Co-Autor sind auf
http://www.zib.de/groetschel/research/Musterbiblio.html elektronisch verfügbar.

Seminarthemen:

Teil 1: Matroids, Matrices and Polyhedra

1. **Totale Unimodularität, Netzwerk-Matrizen und reguläre Matroide**
   2 Vorträge (in Absprache) gehalten von:
   Sonja Pins   sonja.pins@mailbox.tu-berlin.de
   Maurice Liebner   mauriceliebner@mailbox.tu-berlin.de
   Literatur:
   Schrijver (1986), Chapters 19, 20, 21
   Truemper (1992), Chapters: 9 und 11
   P. D. Seymour (1980), Decomposition of regular matroids, Journal of Combinatorial Theory (B) 28 (1980) 305–359.

2. **Matroid Polytopes**
   Iosif Levant   josef657@yahoo.de
   Grötschel, Lovász, Schrijver (1993), Abschnitt: 7.5
   Cunningham, William H. (1984), Testing membership in matroid polyhedra, J. Comb. Theory, Ser. B 36, 161-188 (1984).

3. **Max-Flow Min-Cut Matroide**
   Boris Grimm   Boris_G@web.de
   Literatur:
   P. D. Seymour (1977), The matroids with the max-flow min-cut property, Journal of
   Combinatorial Theory (B) 23 (1977) 189–222
   Truemper (1992), Chapter: 13

Teil 2: Polyhedral Aspects of the Bipartite Subgraph and the Max-Cut Problem (5 Vorträge)
Allgemeine Literatur hierzu: Deza, Laurent (1997), Part V

4. **Weakly and Strongly Bipartite Graphs and the Max-Cut Problem**
   Egor Seliverstov   Egor.Seliverstov@gmx.de
   Literatur:
   Martin Grötschel, William R. Pulleyblank (1981), Weakly bipartite graphs and the max-cut
   problem, Operations Research Letters, 1:1 (1981) 23-27
   Schrijver (2003), Chapter 75.1 – 75.5, insbesondere die hier zitierten Artikel von Guenin

5. **The Bipartite Subgraph Polytope**
   Laura Gellert   laura.gellert@fu-berlin.de
   Literatur:
   Francisco Barahona, Martin Grötschel, Ali Ridha Mahjoub (1985), Facets of the Bipartite
   Subgraph Polytope, Mathematics of Operations Research, 10 (1985) 340-358

6. **The Cut polytope**
   Julie Meißner   julie-m@gmx.de
   Literatur:
   Francisco Barahona, Ali Ridha Mahjoub (1986), On the cut polytope, Mathematical
   Programming 36, 157-173 (1986).

7. **Hypermetric Inequalities**
   Robert Oskamp   robert.oskamp@gmx.de
   Literatur:
   Deza, Laurent (1997), Chapter 28

8. **Unconstrained 0/1 Quadratic Programming**
   Henrik Pilz   henrik-pilz@web.de
   Literatur:
   Manfred Padberg (1989), The Boolean quadratic polytope: Some characteristics, facets and
   relatives, Mathematical Programing, Ser. B 45, No.1, 139-172 (1989).
   Bitte die Zitate dieses Artikels in Deza, Laurant (1997) verfolgen.

Teil 3: The Cycle Polytope of a Binary Matroid and Matroids with the Sum of Circuits Property

9. **Matroids with the Sum of Circuits Property**
   Agnes Cseh   csagnes@msn.com
   Literatur:
   P. D. Seymour (1981), Matroids and multicommodity flows, European Journal of Combinatorics 2 (1981) 257-290.

10. **The Cycle Polytope of a Binary Matroid**
    Arne Müller   arne.mueller@fu-berlin.de
    Literatur:
    Francisco Barahona, Martin Grötschel (1986), On the Cycle Polytope of a Binary Matroid, Journal of Combinatorial Theory, Series B, 40 (1986) 40-62.

Nicht vergebene Seminarthemen:

- **Graphische, co-graphische und binäre Matroide**
  Literatur:
  Truemper (1992), Chapters: 2 und 10
  Oxley (2011), Chapters:

- **Optimizing over Cycles in Binary Matroids**
  Literatur:
  Martin Grötschel, Klaus Truemper (1989a), Decomposition and Optimization over Cycles in Binary Matroids, Journal of Combinatorial Theory, Series B, 46:3 (1989) 306-337

- **Master Polytopes**
  Literatur:
  Martin Grötschel, Klaus Truemper, Master Polytopes for Cycles of Binary Matroids, Linear Algebra and its Applications, 114/115 (1989) 523-540

- **Einbettbarkeit von endlichen metrischen Räumen in L1- und L2-Räume** (≥2 Vorträge)
  Literatur:
  Deza, Laurent (1997), Chapter 6

Mögliche weitere Themen: T-cut and T-join polyhedra, multi-cut polyhedra,…