Combinatorial Optimization II (DM209)) — Ugeseddel 1

Welcome to the course Combinatorial Optimization II!

Litterature

- PS= Papadimitriou and Steiglitz, Combinatorial Optimization – Algorithms and complexity, Dover 1998. Available in the bookstore. We will not use very much from the book but it is good and cheap.

- SCH = Schrijver: A course in Combinatorial Optimization, Lecture Notes CWI 2009. Available for download from the course page.

- KHU = Khuller : Design and Aanalysis of algorithms, course notes University of maryland. Available for download from the course page.

- BJG = Bang-Jensen and Gutin, Digraphs: Theory, Algorithms and Applications, Springer Verlag 2001. Available for download from the course page.

Evaluation   Oral exam on March 19, 2013. Graded after the Danish 7 point scale with external examination.

Location of classes

- Monday 14-16 in IMADAs seminarroom

- Tuesday 12-14 in IMADAs seminarroom

- Thursday 12-14 in U49 (U49C in week 5)

Format: As there are only between 2 and 4 participants (!!) we need to find a suitable format for the classes. We will discuss this at the first lecture so please show up if you want to have influence on the format.

Generally I will expect you to have read the material to be covered at the lecture before showing up. That way we can concentrate more on the difficult parts.

A sample of the problems and topics we will be looking at in the course is:

- Modelling graph problems as linear integer programs.

- Integer programming and total unimodularity

- IP formulations of important (optimization) problems (TSP, QAP, Steiner tree, ...).

- Disjoint paths in (di)graphs

- Finding subdivisions of a given (di)graph in larger (di)graphs.

- Multicommodity flows

- NP-complete problems beyond DM508: Steiner tree, 2-linkage problem,disjoint branchings and spanning tree ..)

- Approximation algorithms Christofides algorithm for euclidian TSP

- Tree-width (definition, cops and robbers game)

- Using tree-width to design algorithms for problems that are NP-hard in general graphs.

- Chordal graphs and perfect graphs.

- Lagrange relaxation and its use in approximation algorithms.

Week 5:

- Integer linear programming and total unimodularity. PS Sections 13.1-13.2 and Schrijver Chapter 8

- The directed subgraph homeomorphism problem (based on the hand out paper by Fortune Hopcroft and Wyllie and BJG pages 476-482, 484-486.