

נושאים מתקדמים באלגוריתמים ה'ת' - 236621
Algorithms and Non-Linear Mathematical Programming
Spring Semester 2020/2021

Overview:

The use of mathematical programming is of paramount importance to the design and analysis of algorithms in general, and approximation algorithms in particular. While linear programming (LP) is the prototypical type of mathematical programming that is utilized, non-linear mathematical programming is also vastly used. This course will focus mainly on semi-definite programming (SDP) and survey its basic uses in the design and analysis of approximation algorithms as well as its applications to various topics such as: graph coloring, satisfiability, graph cuts, and clustering.

Topics:

1. Introduction to semi-definite programming
2. The Max Cut problem
3. Maximization of quadratic forms and Grothedieck's inequality
4. Correlation clustering
5. Satisfiability and Max-SAT
6. Graph coloring
7. Lovasz theta function
8. Dimension reduction
9. Metrics of negative type and random projections

Prerequisites:

- Algorithms 1 (234247).
- Computability Theory (236343).
- A course in probability.
- Highly recommended: Algorithms 2 (236359) or Approximation Algorithms (236521).

Time:

Lecture: Monday 15:30-17:30 (Roy Schwartz)

Tutorial: Monday 13:30-14:30 (Dor Katzelnick)

Grading Policy:

By Homework and (possibly) a project.