

Optimization methods for large-scale problems

Dott. Marco Di Summa¹, Dott. Francesco Rinaldi²

¹Università degli Studi di Padova
Dipartimento di Matematica
Email: disumma@math.unipd.it

²Università degli Studi di Padova
Dipartimento di Matematica
Email: rinaldi@math.unipd.it

Timetable: 20 hrs. First lecture on April 13, 2014, 11:00 (dates already fixed, see the calendar), Torre Archimede, Room 2BC/30.

Course requirements: Basic knowledge in linear and integer programming.

Examination and grading: Written exam.

SSD:MAT/09.

Aim: Presenting the most common methods used to deal with optimization problems involving a large number of variables and/or constraints.

Course contents:

We discuss optimization techniques for large-scale problems, i.e., problems with a huge number of variables and/or constraints. Both discrete and continuous problems are considered. Most of the techniques that we present are based on decomposition approaches. We focus on theoretical, algorithmic, and practical aspects. The following topics will be covered (but changes are possible depending on the interests of the audience):

- row- and column-generation techniques;
- decomposition techniques, including Dantzig-Wolfe and Benders decomposition;
- serial and parallel algorithms for nonlinear optimization problems (e.g., block-coordinate decomposition methods);
- applications to machine-learning and image analysis.