Optimization

Introduction

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Optimization

- Part of the module: **Aspects of Mathematical Modeling** - AR-214
- Summer Semester 2021 (April - July 2021)
- Lecture hours: Monday, 2 pm
- On-line, live course
- Info at [Moodle](#)
- Registration at [LSF](#)
Mathematical Optimization is an important technique of Operations Research.

**Operations Research** is the science of **Decision-making:**
It helps people **to select the best decision** in complex situations.

**Essential characteristics**
- Mathematical models:
- Find the “best solution” according to a criterion (minimizing or maximizing a function)
- under some restrictions (constraints).
Sketch of the program

Main blocks

1. Linear Optimization:
   - Polyhedral theory
   - *Simplex method*
   - *Duality theory*

2. Integer Optimization

3. Nonlinear Optimization

4. Optimization on graphs.

Preliminary knowledge

- Linear algebra: vector spaces, matrix notations, matrix multiplications, linear independence...
- Basics of calculus; notions of derivative, gradient.
Some references

- Introduction to Linear Optimization, Bertsimas, Tsitsiklis, 1997
- Integer Programming, Conforti, Cornuéjols, Zambelli, 2014