

CO 759 - Optimization under uncertainty

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T/Th 1-2:20 PM

RCH 209

Instructor: Ricardo Fukasawa
Office hours: By appointment
Email: rfukasawa@uwaterloo.ca
Phone: 519-888-4567, ext. 32696
Office: MC 5036

1 Course description and objectives

A typical underlying assumption in many mathematical optimization problems is that all the data is known in advance, that is, the model data is deterministic. However, in several applications such assumption does not apply, since we do not know all the data beforehand. Several examples of such non-deterministic data can be made:

- Future prices of stocks
- Future yield of some crop
- Demand of a certain product in the coming week
- Number of customers that will appear in a store today
- Actual travel time of a given road tomorrow
- etc.

A topic of intense research in the past decades has been how to handle such uncertain data inside our optimization models to obtain good quality solutions within a reasonable amount of time.

The purpose of this course is to give an overview of several definitions of what a “good quality solution” is, and several algorithms proposed to obtain such solutions in short computational time.

A list of topics that will be (hopefully) covered is:

- Two-stage stochastic programs
- Robust optimization

- Chance-constrained programs
- Distributionally robust optimization
- Multi-stage stochastic programs
- Scenario decomposition and generation
- Different risk measures

The ultimate goal is that, by the end of the course, students will know the main paradigms and techniques to deal with mathematical optimization problems where at least some of the data is uncertain.