

Lectures in Optimization Under Uncertainty



In November this year we organize a PhD-level course on **Optimization Under Uncertainty** at the department of Industrial Economics and Technology Management at NTNU. As part of this course, we have invited three international researchers from the field (see below) to come visit us on **23 – 25 November** to give guest lectures. Our aim is to connect our students with researchers in the field and let them learn from their expertise. We will organize:

- **lectures**, aimed at introducing the students to the fields of expertise of our guest lecturers, and
- **research seminars**, in which the guest lecturers, NTNU researchers and possibly interested students present their research.

We invite interested students from other universities to participate during these three days, too. We hope it will be a good opportunity to learn about specific topics from experts in the field, to learn about ongoing research, and to get to know people in the field.

Participation is **free of charge**; just send an email to Ruben van Beesten (see email address below) if you wish to participate. Let us know if you wish to present during the seminars; depending on the number of participants, we might be able to facilitate student presentations. We will not be able to give official ECTS credits for participation, but we can arrange a certificate of participation.

Ward Romeijnders, University of Groningen

STOCHASTIC MIXED-INTEGER PROGRAMMING

Stochastic mixed-integer programs are a class of optimization problems under uncertainty involving integer or binary variables. Such decision variables are required to realistically model many practical applications under uncertainty. In this lecture we will consider mathematical properties of stochastic mixed-integer programs, and we will see that these are fundamentally different from those of their continuous counterparts. This calls for fundamentally different solution methods for solving stochastic mixed-integer programs. We will discuss the main exact and approximate solution approaches for these problems.

Miloš Kopa, Charles University in Prague

RISK MODELLING IN DECISION MAKING UNDER UNCERTAINTY

The lectures will introduce various types of risk measures (static, dynamic, spectral, distortion,...) with a special focus to coherent ones. Their possible applications to optimization under uncertainty will be analysed. Stochastic dominance approach will be considered and explained as an alternative tool for risk management. Robustness and stress testing extensions will be discussed. Examples from financial industry will be presented.

Krzysztof Postek, TU Delft

OPTIMIZATION UNDER UNCERTAINTY: A PRACTICAL VIEW WITH RESEARCH LINKS

In this mini course we will start from the basic need to accounting for uncertainty in solutions to optimization problems. Next, we will see where in all this stand three fundamental methodologies: simple tricks, robust optimization, and stochastic optimization. In such a "map" of the available methods, we will point to the key research outcomes and open questions.