EPFL

MGT-631	**Optimization Methods and Models**
	Kuhn Daniel

Cursus	Sem.	Type
Advanced Manufacturing		Obl.
Electrical Engineering		Obl.
Management of technology		Obl.

Language of teaching	English
Credits	4
Session	
Exam	Multiple
Workload	120h
Hours	**56**
Courses	56
Number of positions	

Remark

13, 20, 27 october, 3, 10, 17, 24 november, 1, 8, 15 december 2017 from 08:15-12:00

Summary

This course introduces the theory and application of modern optimization from an engineering perspective.

Content

The following topics will tentatively be covered in the course:
1. Introduction
2. Convex Sets
3. Convex Functions
4. Convex Optimization Problems
5. Separation Theorems
6. Duality
7. Optimality Conditions
8. Optimization in Statistics & Machine Learning
9. Convexifying Nonconvex Problems
10. Stochastic Programming
11. Robust Optimization

Learning Prerequisites

Important concepts to start the course

Students are assumed to have good knowledge of basic linear algebra and analysis. Some familiarity with linear programming or other optimization paradigms is useful but not necessary.

Learning Outcomes

• Formalize decision problems in management science and engineering as mathematical optimization models

• Solve the resulting models with commonly used optimization software and to interpret the results

• Assess / Evaluate the computational complexity of different classes of optimization problems and use modeling techniques to make specific optimization problems more tractable

• Model and solve decision problems affected by uncertainty

Teaching methods

Classical formal teaching interlaced with practical exercices.

Assessment methods

- Participation in class
- Final exam

Resources

Bibliography

- Stephen Boyd and Lieven Vandenberghe, Convex Optimization, Cambridge University Press, 2004
- Aharon Ben-Tal and Arkadi Nemirovski, Lectures on Modern Convex Optimization, SIAM, 2001
- Yurii Nesterov, Introductory Lectures on Convex Optimization: A Basic Course, Springer, 2004
- David Luenberger and Yinyu Ye, Linear and Nonlinear Programming, Springer, 2008
- R. Tyrrell Rockafellar, Conjugate Duality and Optimization, SIAM, 1974

Ressources en bibliothèque

- Conjugate Duality and Optimization / Rockafellar
- Linear and Nonlinear Programming / Luenberger
- Lectures on modern convex optimization : analysis, algorithms, and engineering applications / Ben-Tal
- Introductory lectures on convex optimization : a basic course / Nesterov
- Convex Optimization / Boyd