Course level: Master  
ECTS Credits: 3.00

Course instructors: Ievgen Redko (UJM, Saint-Etienne)

Education period (Dates): 2nd semester  
Language of instruction: English

Expected prior-knowledge: Data analysis, Advanced Algorithmics and Programming

Aim and learning outcomes:  
This course presents an overview of optimization from its principles to the main algorithms.

Topics to be taught (subject to changes)~20h:
- Introduction to operational research and optimization (2h)
- Linear Programming and Simplex Method (6h)
- Convex sets and functions, Convex optimization problems, Constraints, Norms, Lagrange functions, Duality, optimality constraints, KKT conditions (3h)
- Gradient methods, Line-search methods, Newton’s method (3h)
- Barrier functions, Interior point methods (3h)
- Non convex optimization methods, formulation of practical cases. (3h)

Practical Laboratory Sessions~10h: Practice of optimization softwares on study cases.

Teaching methods: Lectures and lab classes.
Form(s) of Assessment: written exam (2/3), practical work (1/3)
Examination support: None

Literature and study materials:

Basic textbooks:
- Convex optimization: Stephen Boyd, Lieven Vandenberghe
- Practical optimization: Philip E. Gill, Walter Murray, Margaret H. Wright

Additional information:
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