UCL Faculté des sciences appliquées

FSA

INMA2471 OPTIMIZATION MODELS AND METHODS

[30h+22.5h exercises] 5 credits

This course is taught in the 2nd semester

Teacher(s):   François Glineur
Language: french
Level: 2nd cycle course

Aims

Learn how to formulate, analyze and solve optimization problems.

Main themes

1. Basic concepts and classification of optimization problems.
2. Introduction to three categories of problems : linear optimization, convex optimization and nonlinear optimization ; for each of them :
a.What problems can we formulate ?
(presentation of the class of problems that can be modelled)
b.How can we solve them ?
(description and analysis of relevant solving techniques)
3.Modelling and practical resolution of real-world problems using a modelling language and/or specialized software.

Content and teaching methods

Course
1. Optimization models
Linear optimization and duality.
Convex optimization, duality and conic formulation.
Nonlinear optimization and optimality conditions.
2. Optimization methods
Interior-point methods for linear optimization, conic optimization (quadratic and semidefinite) and convex optimization ; algorithmic complexity.
Trust-region methods and Nelder-Mead method for nonlinear optimization.
Exercises and projects
Formulation and resolution of concrete problems.
AMPL modelling language.

Other information (prerequisite, evaluation (assessment methods), course materials recommended readings, ...)

Prerequisites :
Basic notions of real calculus, linear algebra and matrix theory (course INMA2702 is not a prerequisite).
Evaluation :
Group projects during the semester and final written exam ; course material available on the icampus web site.

Other credits in programs

FSA3DA	Diplôme d'études approfondies en sciences appliquées	(5 credits)	
MAP21	Première année du programme conduisant au grade d'ingénieur civil en mathématiques appliquées	(5 credits)	Mandatory
MAP23	Troisième année du programme conduisant au grade d'ingénieur civil en mathématiques appliquées	(5 credits)	
MATH21/G	Première licence en sciences mathématiques (Général)	(5.5 credits)	
MATH21/S	Première licence en sciences mathématiques (Statistique)	(5.5 credits)	Mandatory
STAT2MS	Master en statistique, orientation générale, à finalité spécialisée	(7 credits)	