

Introduction to Nonsmooth Optimization

Course title – Intitulé du cours	Introduction to nonsmooth optimization
Level / Semester – Niveau / semestre	M2
School – Composante	Ecole d'Economie de Toulouse
Teacher – Enseignant responsable	Edouard Pauwels
Other teacher(s) – Autre(s) enseignant(s)	
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Other teacher(s) – Autre(s) enseignant(s)	
Lecture Hours – Volume Horaire CM	15h
TA Hours – Volume horaire TD	
TP Hours – Volume horaire TP	
Course Language – Langue du cours	English
TA and/or TP Language – Langue des TD et/ou TP	

Teaching staff contacts – Coordonnées de l'équipe pédagogique :

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Course Objectives – Objectifs du cours :

The course will cover elements of convex analysis which allow to tackle the problem of minimizing convex functions which are not necessarily differentiable (nonsmooth). The absence of differentiability may arise from constraints or from non differentiability of the objective function. The first part of the course will be dedicated to optimization under constraints, with the notion of normal cone, KKT conditions and a complete characterization of linear programming duality. The second part of course will explore the notion of subdifferential and a few of its analytic properties: its relation to directed directional derivatives, Fenchel-Young's inequality and a few elements of calculus. The course will be concluded with a description and convergence analysis of the subgradient algorithm.

Prerequisites – Pré requis :

The M1 courses on Optimization and Advanced Analysis

Practical information about the sessions – Modalités pratiques de gestion du cours :

Grading system – Modalités d'évaluation : Final exam

Bibliography/references – Bibliographie/références :

Session planning – Planification des séances

Distance learning – Enseignement à distance :

Distance learning can be provided when necessary by implementing:

- *Interactive virtual classrooms*
- *Recorded lectures (videos)*
- *MCQ tests and other online exercises / assignments*
- *Remote (online) tutorials (classes)*
- *Chatrooms*

En cas de nécessité, un enseignement à distance sera assuré en mobilisant:

- *Classe en ligne interactive*
- *Vidéo enregistrée de la présentation du matériel pédagogique*
- *QCM et exercices en ligne*
- *TP/TD à distance*
- *Forum...*