UCLouvain

linma1702

2023

Optimization models and methods I

5.00 credits	30.0 h + 22.5 h	Q2

Teacher(s)	Glineur François ;
Language :	French
Place of the course	Louvain-la-Neuve
Learning outcomes	
Evaluation methods	Students are assessed individually with a written exam organized during the session, based on the learning outcomes listed above. In addition, students complete a project in small groups during the second term. The grade of the project is acquired for all the sessions of the academic year (it is not possible to redo the project in the second session). The final grade is awarded on the basis of the project (6 points out of 20) and the exam (14 points out of 20). All external sources of information used in the writing of assignments must be cited in accordance with bibliographic referencing standards. The use of generative artificial intelligence is permitted, but must be clearly indicated (specify concerned passages and usage, e.g. information retrieval, text drafting, text correction). Authors remain responsible for the content of their work.
Teaching methods	This course is comprised of lectures, exercise sessions and computer labs, as well as a project to be carried out in small groups. Consulting is available for help with the project.
Content	**Linear optimization:** Introduction, canonical formulations, polyhedral geometry, simplex algorithm, duality et sensitivity analysis, introduction to discrete optimization (branch & bound). **Nonlinear optimization:** *Models :* definitions and terminology, optimality conditions for unconstrained and constrained problems ; recognize and exploit convexity of a problem. *Methods :* line-search methods for unconstrained problems (gradient, Newton and quasi-Newton methods) ; convergence properties (local and global) ; implementation details ; introduction to other types of methods.
Inline resources	https://moodle.uclouvain.be/course/view.php?id=2039
Bibliography	• Introduction to Linear Optimization, Dimitri Bertsimas and John Tsitsiklis, Athena Scientific, 1997. • Linear Programming. Foundation and Extensions, Robert Vanderbei, Kluwer Academic Publishers, 1996. • Integer Programming, Laurence Wolsey, Wiley, 1998. • Numerical Optimization, Jorge Nocedal et Stephen J. Wright, Springer, 2006. • Convex Optimization, Stephen Boyd et Lieven Vandenberghe, Cambridge University Press, 2004.
Faculty or entity in charge	MAP

Programmes containing this learning unit (UE)

Program title	Acronym	Credits	Prerequisite	Learning outcomes
Additionnal module in Mathematics	APPMATH	5		
Minor in Applied Mathematics	LMINOMAP	5		
Master [120] in Chemical and Materials Engineering	KIMA2M	5		
Additional module in computer science	APPSINF	5		
Specialization track in Applied Mathematics	FILMAP	5		
Master [120] in Electrical Engineering	ELEC2M	5		
Bachelor in Mathematics	MATH1BA	5		
Master [120] in Computer Science and Engineering	INFO2M	5		
Master [120] in Computer Science	SINF2M	5		
Approfondissement en statistique et sciences des données	APPSTAT	5		
Mineure Polytechnique	MINPOLY	5		