UCLouvain

linma2491

2022

Operational Research

5.00 credits	30.0 h + 22.5 h	Q2

Teacher(s)	Madani Mehdi (compensates Papavasiliou Anthony) ;Papavasiliou Anthony ;
Language :	English > French-friendly
Place of the course	Louvain-la-Neuve
Prerequisites	· A course in linear, non-linear, and integer programming. · An introductory course to probability theory: probability space, probability, random variable, mathematical expectation, independence, law of large numbers, '. · Knowledge of a mathematical programming language (AMPL, Matlab, OPL-Studio, ...)
Main themes	How to formulate an optimization problem in which data are prone to uncertainty? How to take into account disclosed information and revealed values of the parameters during the stages of the optimization process? How to solve the optimization models thus obtained? Stochastic optimization is the ideal framework for dealing with such issues. Various solution techniques for large-scale problems will also be discussed: Benders decomposition, Nested Bendersdecomposition, Lagrangian methods, ... Applications: Production, logistics, finance, ...
Learning outcomes	**At the end of this learning unit, the student is able to :** · Formulate problems of decision-making under uncertainty as mathematical programs, 1 • Identify mathematical structures in large-scale mathematical programs that enable their decomposition, • Design algorithms for solving large-scale optimization problems under uncertainty, • Implement algorithms for solving large-scale stochastic optimization problems, • Evaluate the quality of alternative policies for problems of decision-making under uncertainty
Evaluation methods	• Written and/or oral exam • Regular homework assignments
Teaching methods	2 hours of magistral courses per week, and 2 hours of training sessions per week. Homeworks will be evaluated by the instructor and/or the teaching assistant.
Content	• Mathematical background (duality, probability theory) • Stochastic programming models • Value of perfect information and the value of the stochastic solution • Cutting plane algorithms • Dynamic programming • Stochastic dual dynamic programming • Lagrange relaxation
Inline resources	https://moodleucl.uclouvain.be/course/view.php?id=4983
Bibliography	• Notes de cours • Impressions de manuels ou articles fournies au cours. Le livre suivant servira de support pour la plupart du cours : John Birge, Francois Louveaux, "Introduction to Stochastic Programming"
Faculty or entity in charge	MAP

Programmes containing this learning unit (UE)

Program title	Acronym	Credits	Prerequisite	Learning outcomes
Master [120] in Mathematical Engineering	MAP2M	5		
Master [120] in Data Science Engineering	DATE2M	5		
Master [120] in Data Science: Information Technology	DATI2M	5		