UCL Université catholique de Louvain

LLSMS2031

2013-2014

Tools for Supply Chain Management decisions (in English)

5.0 credits	30.0 h	1q

Teacher(s) :	Van Vyve Mathieu ;
Language :	Anglais
Place of the course	Louvain-la-Neuve
Main themes :	This course is aimed at providing an understanding of the structures behind supply chain optimization problems as well as an understanding of the methodological aspects of the corresponding solution techniques.
Aims :	At the end of the class, students should be able to - Set up supply chain optimization problems in a spreadsheet and in modelling language environment - Demonstrate a capability to cope with computational issues beyond straightforward use of off the shelf supply chain optimization software - Understand techniques allowing to cope with computationally challenging models in production management. - Develop a formal approach of organizational aspects of complex organizations or of complex planning problems through techniques based on large scale mathematical programming techniques. *The contribution of this Teaching Unit to the development and command of the skills and learning outcomes of the programme(s) can be accessed at the end of this sheet, in the section entitled "Programmes/courses offering this Teaching Unit".*
Content :	The course starts with an in depth revision of the revised simplex algorithm, because it provides the computational and modeling paradigm allowing one to model and solve (sometimes using so-called decomposition methods) large scale models involving many variables. In particular, the column generation approach, which is frequently used in solving large scale problems by decomposition, is illustrated on the cutting stock problem, a classical production planning problem. Production planning are approached from a practical computational perspective. Formulated as MIP problem, they can be very difficult to solve and thereby require to maintain a certain level of aggregation. Branch and bound improvement techniques such as constraint (Branch and cut) and column (Branch and price) generation are considered. Content STRUCTURAL ASPECTS AND METHODS. Convexity. Minkowski polyhedral representation. Duality. From linear programming to convex programming. The revised simplex algorithm as a computational paradigm. Complexity of algorithms. Mixed integer programming. CUTTING STOCK AND BIN PACKING PROBLEMS. Coping with the combinatorial explosion of patterns. Column generation techniques and the related knapsack problem. Extensions of the cutting stock problem. . DECOMPOSITION APPROACHES AND DECENTRALIZATION. Handling the multidivisional model by a decomposition approach : solving repeatedly a series of divisional problems and a coordination one (the decomposition approach). Getting insight from decomposition for decentralization purposes. SUPPLY CHAIN PLANNING. LP and MIP formulations for production planning and scheduling problems. Approximate solutions of MIP problems. Improvement of the Branch and Bound approach by cutting plane and column generation. Methods : In-class activities 1Lectures 1 Exercices/PT 1 Problem based learning At home activities : 1 Readings to prepare the lecture 1 Exercices to prepare the lecture

Other infos :	Prerequisites (ideally in terms of competencies) Introduction to operations management, production management and operations research. Basic knowledge of LP (simplex algorithm and duality), and MILP (branch and bound). Introduction to computer programming and algorithms. First course in linear algebra Evaluation : Homeworks (teams of two or three) and an oral exam in English with written preparation. Support Course slides and hand-outs. References : To be given during the classes. Corporate features : 1 case study Skills : 1 writing skills 1 team work 1 problem solving 1 decision making 1 critical thinking Techniques and tools for teaching and learning : 1 IT tools 1 modelling 1 quantitative methods 1 mathematics
Cycle and year of study :	> Master [120] in Business engineering > Master [120] in Business Engineering
Faculty or entity in charge:	CLSM