UCLouvain

lingi2266

2020

Advanced Algorithms for Optimization

Due to the COVID-19 crisis, the information below is subject to change, in particular that concerning the teaching mode (presential, distance or in a comodal or hybrid format).

5 credits	30.0 h + 15.0 h	Q1

This learning unit is not being organized during this academic year.

Teacher(s)	Schaus Pierre ;
Language :	English
Place of the course	Louvain-la-Neuve
Main themes	• tree research exploration • branch and bound • relaxation (Lagrangian) and calculation of terminals • local search • mathematical programming • constraint programming • graph algorithms • wide neighborhood research • dynamic programming • greedy algorithms and approximation algorithms • multi-criteria optimization • optimization without derivative • comparisons of algorithms These methods will be applied to real problems like vehicle routing, scheduling and rostering confection, network design, scheduling and scheduling, etc..
Aims	Given the learning outcomes of the "Master in Computer Science and Engineering" program, this course contributes to the development, acquisition and evaluation of the following learning outcomes: • INFO1.1-3 • INFO2.3-5 • INFO5.3-5 • INFO6.1, INFO6.4 Given the learning outcomes of the "Master [120] in Computer Science" program, this course contributes to the development, acquisition and evaluation of the following learning outcomes: 1 • SINF1.M4 • SINF2.3-5 • SINF5.3-5 • SINF6.1, SINF6.4 Students completing this course successfully will be able to • explain the algorithms for solving discrete optimization problems by describing precisely specifying the problems they solve, indicating their advantages, disadvantages and limitations (computing time, accuracy, problems of scaling , etc.), • identify the algorithms that apply to a discrete optimization problem they are facing and make an arguedchoice among them , • implement algorithms for solving discrete optimization problems. - - - - *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".*
Evaluation methods	**Due to the COVID-19 crisis, the information in this section is particularly likely to change.** Much of the evaluation is associated to pratical work (30% of points across three assignments). The remaining 70% will be assessed in a conventional manner with a written or oral examination. Projects can not be redone in the second session.

Teaching methods	**Due to the COVID-19 crisis, the information in this section is particularly likely to change.** The presentation of the algorithms in the lecture will be accompanied by practical work (assignments / micro-projects) requesting the implementation of an algorithm to solve a practical optimization problem. The evaluation work will be partially automated on the basis of the quality of the solutions found by the algorithms.
Content	• dynamic programming • branch and bound • linear programming • Lagrangian relaxation • column generation • local search • constraint programming and sat • graph algorithms: flows • comparisons of optimization algorithms These methods will be applied to real problems like vehicle routing, scheduling and rostering confection, network design, scheduling and scheduling, etc..
Inline resources	https://moodleucl.uclouvain.be/course/view.php?id=9158 www.minicp.org
Other infos	Background: • LSINF1121
Faculty or entity in charge	INFO

Programmes containing this learning unit (UE)

Program title	Acronym	Credits	Prerequisite	Aims
Master [120] in Data Science : Statistic	DATS2M	5		
Master [120] in Computer Science and Engineering	INFO2M	5		
Master [120] in Computer Science	SINF2M	5		
Master [120] in Data Science Engineering	DATE2M	5		
Master [120] in Data Science: Information Technology	DATI2M	5		