

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
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Teacher(s)	Catanzaro Daniele ;
Language :	English
Place of the course	Mons
Prerequisites	<i>The prerequisite(s) for this Teaching Unit (Unité d'enseignement – UE) for the programmes/courses that offer this Teaching Unit are specified at the end of this sheet.</i>
Main themes	This course provides an introduction to mathematical modeling of computational problems. It covers the common algorithms, algorithmic paradigms, and data structures used to solve these problems. The course emphasizes the relationship between algorithms and programming. It pays particular attention on the practical importance of specific classes of optimization problems in management science and motivate the students to develop algorithms to solve them.
Aims	<p>This course contributes to develop the following competencies.</p> <ul style="list-style-type: none"> • Knowledge • Scientific reasoning and systematic approach • Project management • Leadership <p>1</p> <p>At the end of this course, students will:</p> <ul style="list-style-type: none"> • Improve their strategical thinking skills • Acquire fundamental knowledge on the modeling and the resolution of practical problems • Apply the appropriate techniques to propose a useful solution. <p>-----</p> <p><i>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".</i></p>
Evaluation methods	<p>Due to the COVID-19 crisis, the information in this section is particularly likely to change.</p> <p>Continuous evaluation, with quizzes in itinere and a final project. The topic of the project may change from year to year; its statement as well as the specific modalities of its discussion will be defined during the very first lecture of the course.</p>
Teaching methods	<p>Due to the COVID-19 crisis, the information in this section is particularly likely to change.</p> <p>Standard blackboard lectures. Attending the course is strongly advised and mandatory for the very first lecture.</p>
Content	<p>This course provides an introduction to algorithmic problem solving. Its main goal is to learn how to implement solution approaches for different type of problems involving search and optimization features. It covers the introduction to graph theory, classical algorithms on graphs, algorithmic paradigms, and data structures used to solve these problems. The course emphasizes the relationship between algorithms and programming. It pays attention on the practical importance of specific classes of optimization problems in management science and motivate the students to develop algorithms to solve them.</p> <p>The course includes in particular the following topics:</p> <ol style="list-style-type: none"> 1. Recursion 2. Foundation of data structures: Graphes 3. Basic algorithms on graphs 4. Well Solved Optimization Problems in Management Science - Part I: Spanning Trees 5. Well Solved Optimization Problems in Management Science - Part II: Shortest Paths 6. Hard Optimization Problems in Management Science - Part I - Spanning Trees with constraints 7. Hard Optimization Problems in Management Science - Part I - Shortest Paths with constraints 8. Finding the optimum via Branch-&-Bound 9. Introduction to Heuristics, Local Searches and Metaheuristics
Inline resources	Please, refer to the slides of the course.

Bibliography	Please, refer to the slides of the course.
Other infos	The main language of this course is English.
Faculty or entity in charge	CLSM

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Teaching methods	Remote teaching
Evaluation methods	Remote orals

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Aims
Bachelor : Business Engineering	INGM1BA	5	MINFO1201 AND MQANT1227	