

## Course Descriptions Master 2018-2019

Course Title Algorithms and Optimisation  
 Course Code EBC4049  
 ECTS Credits 6,5  
 Assessment None

Period	Period	Start	End	Mon	Tue	Wed	Thu	Fri
2	29-10-2018	21-12-2018	X				X	

Level Advanced

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Language of instruction English

Goals Ability to analyse the complexity of optimization problems, and ability to design fast algorithms providing good-quality solutions for hard optimization problems.

Description This course is devoted to mathematical models and solution methods for hard optimization problems. First, we study the theory of computational complexity, including the concept of P versus NP. In particular, we prove that some problems are computationally intractable. Given the complexity insights, solving such problems is a challenge. Therefore, we study the design and analysis of approximation algorithms and approximation schemes, as well as the derivation of inapproximability results. We also discuss local search frameworks such as Simulated Annealing, Genetic Algorithms and Tabu Search. The course is open ended in the sense that some topics can be chosen according to student interests. Classical problems that will be covered are, among others, scheduling, colouring, set covering, and packing.

Literature "Algorithms" by Dasgupta, Papadimitriou and Vazirani (Mc Graw-Hill).  
 Selected chapters from several books on combinatorial optimization.  
 Research papers.

Prerequisites Students need to have obtained a Bachelor degree in Econometrics, Operations Research, Mathematics, or Computer Science. Knowledge in optimization (Linear Programming) and basic graph theory is highly recommended. Familiarity with basic algorithms and the analysis of algorithms (runtime complexity) is certainly helpful. C++ (or Java/Python/Basic) Programming skills are also prerequisites as there will be a practical programming case.  
 An advanced level of English.

Teaching methods PBL / Lecture / Assignment / Groupwork

Assessment methods Participation / Written Exam

Evaluation in previous academic year For the complete evaluation of this course please click <http://iwio-sbe.maastrichtuniversity.nl/rapporten.asp?referrer=codeUM>

This course belongs to the following programme / specialisation

Master Business Research	Methodology Electives
Master Business Research - Operations Research	Compulsory Courses
Master Business Research - Operations Research	Methodology Electives
Master Econometrics and Operations Research	Econometrics & OR Electives
Master Econometrics and Operations Research	Operations Research
SBE Non Degree Courses	Master Courses