MATH-261

Discrete optimization

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Cursus	Sem.	Type
Chemistry	BA6	Opt.
Electrical and Electronical Engineering	MA2, MA4	Opt.
Energy Science and Technology	MA2, MA4	Opt.
Mathematics	BA4	Opt.

Language of teaching	English
Credits	5
Session	Summer
Semester	Spring
Exam	Written
Workload	150h
Weeks	14
Hours	**4 weekly**
Courses	2 weekly
Exercises	2 weekly
Number of positions	

Summary

This course is an introduction to linear and discrete optimization. Warning: This is a mathematics course! While much of the course will be algorithmic in nature, you will still need to be able to prove theorems.

Content

- Optimization techniques
- Algorithms and complexity
- Linear Programming
- Simplex Algorithm
- Duality Theory
- Integer Programming and relaxations
- Network flows

Keywords

Linear Programming, Algorithms, Complexity, Graphs, Optimization

Learning Prerequisites

Required courses

Linear Algebra

Recommended courses

Discrete Mathematics or Discrete Structures

Important concepts to start the course

The student needs to be comfortable reading and writing formal mathematical proofs.

Learning Outcomes

By the end of the course, the student must be able to:

- Choose appropriate method for solving basic discrete optimization problem
- Prove basic theorems in linear optimization
- Interpret computational results and relate to theory

- Implement basic algorithms in linear optmization
- Describe methods for solving linear optimization problems
- Create correctness and running time proofs of basic algorithms
- Solve basic linear and discrete optimization problems

Transversal skills

- Continue to work through difficulties or initial failure to find optimal solutions.
- Use both general and domain specific IT resources and tools

Teaching methods

Ex cathedra lecture, exercises in the classroom and with a computer

Expected student activities

- Attendance of lectures and exercises
- Completion of exercises
- Solving supplementary programs with the help of a computer

Assessment methods

Written exam during the exam session

Resources

Bibliography

Dimitris Bertsimas and John N. Tsitsiklis: Introduction to Linear Optimization, Athena Scientific

Ressources en bibliothèque

- Theory of Linear and Integer Programming / Schrijver
- Introduction to Linear Optimization / Bertsimas

Notes/Handbook

Lecture notes