FSF3846 Combinatorial Optimization 7.5 credits

Kombinatorisk optimering

This is a translation of the Swedish, legally binding, course syllabus.

If the course is discontinued, students may request to be examined during the following two academic years

Establishment

Course syllabus for FSF3846 valid from Spring 2019

Grading scale

P, F

Education cycle

Third cycle

Specific prerequisites

A Master degree including at least 30 university credits (hp) in in Mathematics (Calculus, Linear algebra, Differential equations and transform method), and further at least 6 hp in Mathematical Statistics, 6 hp in Numerical analysis and 6 hp in Optimization.

Suitable prerequisites is the courses SF2812 Applied Linear Optimization or similar knowledge.

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

That the student should obtain a deep understanding of the mathematical theory and some practical algorithms for combinatorial optimization.

After completed course, the student should be able to

- Explain basic concepts of computational complexity.
- Explain methods for fundamental network flow problems.
- Explain methods for matching.
- Explain fundamental concepts of integer programming.
- Explain some important heuristic methods.

Course contents

Study of some fundamental combinatorial optimization problems: algorithms, complexity and applications.

Algorithms: Maxflow-mincut-theorem. Primal-dual method for linear programming, with applications to network flows. Efficient algorithms for maxflow problems. Matching. Minimal spanning trees. Matroids.

Complexity: NP-completeness, foundations and relevant examples.

Applications: Heuristic methods for some interesting problem classes.

Disposition

Lectures.

Course literature

Announced when the course is offered.

Examination

- INL1 - Assignment, 7.5 credits, grading scale: P, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

The examination is by homework assignments and a final oral exam.

Other requirements for final grade

Homework assignments and a final oral exam.

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.