Optimization, Advanced Course

Programme course

6 credits

Optimeringslära fortsättningskurs

TAOP24

Valid from: 2017 Spring semester

Determined by
Board of Studies for Electrical
Engineering, Physics and Mathematics

Date determined
2017-01-25

Main field of study
Mathematics, Applied Mathematics

Course level
First cycle

Advancement level
G2X

Course offered for
- Mathematics
- Applied Physics and Electrical Engineering, M Sc in Engineering
- Computer Science, Master's programme
- Applied Physics and Electrical Engineering - International, M Sc in Engineering

Entry requirements
Note: Admission requirements for non-programme students usually also include admission requirements for the programme and threshold requirements for progression within the programme, or corresponding.

Prerequisites
Introduction to optimization.

Intended learning outcomes

Optimization deals with mathematical theory and methods aiming at analyzing and solving decision problems that arise in technology, economy, medicine, etc. The course gives, together with the introductory course, a broad orientation of the field of optimization. After the course, the student shall:

- be able to identify optimization problems and classify them according to their properties, into, for example, network problems or discrete problems
- construct mathematical models of more complex optimization problems
- have knowledge about and be able to apply basic solution principles for some classes of commonly appearing optimization problems, such as, for example, the simplex method for network flows
- be able to use commonly available software for solving optimization problems that appear regularly in applications
- be able to use relaxations to approximate optimization problems and heuristic methods for finding feasible solutions, and be able to estimate the optimal objective value through lower and upper bounds
- have good knowledge about practical applications of optimization methodologies

Course content

A continuation of the material presented in the introductory course. The course includes more advanced topics within mathematical modelling, network optimization, sensitivity analysis in linear programming, discrete optimization, nonlinear optimization, and Lagrangian relaxation. Some new topics are also included, such as dynamic programming and heuristics.

Teaching and working methods

Lectures which include theory, problem solving and applications. Exercises which are intended to give individual training in problem solving. A laboratory course with emphasis on modelling and the use of optimization software.

Examination

LAB1	Laboratory course	2 credits	U, G
TEN1	Written examination	4 credits	U, 3, 4, 5

Grades

Four-grade scale, LiU, U, 3, 4, 5

Other information

Supplementary courses: Mathematical optimization.

Department
Matematiska institutionen

Director of Studies or equivalent
Ingegerd Skoglund

Examiner
Oleg Burdakov

Course website and other links
http://courses.mai.liu.se/GU/TAOP24

Education components
Preliminary scheduled hours: 38 h
Recommended self-study hours: 122 h

Course literature
Jan Lundgren, Mikael Rönnqvist & Peter Värbrand - Optimeringslära (Studentlitteratur, 2008). Jan Lundgren, Mathias Henningsson & Mikael Rönnqvist -Optimeringslära övningsbok (Studentlitteratur, 2008)

Common rules

Regulations (apply to LiU in its entirety)

The university is a government agency whose operations are regulated by legislation and ordinances, which include the Higher Education Act and the Higher Education Ordinance. In addition to legislation and ordinances, operations are subject to several policy documents. The Linköping University rule book collects currently valid decisions of a regulatory nature taken by the university board, the vice-chancellor and faculty/department boards.

LiU's rule book for education at first-cycle and second-cycle levels is available at http://styrdokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.