# Mathematical Optimization

Programme course

6 credits

Matematisk optimering

TAOP04

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
Second cycle

## Advancement level
A1N

## Course offered for
- Mathematics, Master's Programme
- Industrial Engineering and Management - International, M Sc in Engineering
- Industrial Engineering and Management, M Sc in Engineering
- Information Technology, M Sc in Engineering
- Applied Physics and Electrical Engineering - International, M Sc in Engineering
- Applied Physics and Electrical Engineering, M Sc in Engineering
- Mathematics, Master's programme

## Specific information
The course is offered every second year. It will not be available during 2017

## 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
Calculus, linear algebra, Matlab, and an introductory course in optimization.

## Intended learning outcomes
The course intends to give a deeper knowledge of mathematical optimization, with emphasis on solution methods for nonlinear optimization. After the course, the student shall be able to:

- reproduce and apply basic convergence theory for nonlinear optimization
- describe and apply some basic solution principles for nonlinear optimization, such as, for example, conjugate gradient methods
- understand the structure and function of commonly used computer software for nonlinear optimization.

# Course content

Algorithmic mappings, line-search methods, the simplex method for unconstrained optimization, conjugate gradient methods, quasi-Newton methods, sequential linear programming, sequential quadratic programming, model predictive control (MPC), Gauss-Newton methods.

# Teaching and working methods

The lectures develop the theory.

# Examination

| | | | |
|---|---|---|---|
| UPG1 | Project | 6 credits | U, 3, 4, 5 |

# Grades

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

# Department

Matematiska institutionen

# Director of Studies or equivalent

Ingegerd Skoglund

# Examiner

Torbjörn Larsson

# Course website and other links

# Education components

Preliminary scheduled hours: 36 h
Recommended self-study hours: 124 h

# Course literature

### Additional literature

#### Compendia

Handouts

# 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.