# SF1861 Optimization 6.0 credits

## Optimeringslära

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 SF1861 valid from Autumn 2019

## Grading scale

A, B, C, D, E, FX, F

## Education cycle

First cycle

## Main field of study

Mathematics,Technology

## Language of instruction

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

## Intended learning outcomes

After completing the course students should for a passing grade be able to

- Apply basic theory, concepts and methods, within the parts of optimization theory described by the course content, to solve problems

- Formulate simplified application problems as optimization problems and solve using software.
- Read and understand mathematical texts about for example, linear algebra, calculus and optimization and their applications, communicate mathematical reasoning and calculations in this area, orally and in writing in such a way that they are easy to follow.

For higher grades the student should also be able to

- Explain, combine and analyze basic theory, concepts and methods within the parts of optimization theory described by the course content.

## Course contents

- Examples of applications of optimization and modelling training.
- Basic concepts and theory for optimization, in particular theory for convex problems.
- Linear algebra in Rn, in particular bases for the four fundamental subspaces corresponding to a given matrix, and LDLT-factorization of a symmetric positive semidefinite matrix.
- Linear optimization, including duality theory.
- Optimization of flows in networks.
- Quadratic optimization with linear equality constraints.
- Linear least squares problems, in particular minimum norm solutions.
- Unconstrained nonlinear optimization, in particular nonlinear least squares problems.
- Optimality conditions for constrained nonlinear optimization, in particular for convex problems.
- Lagrangian relaxation.

## Specific prerequisites

Completed course in Linear Algebra, SF1624, SF1672 or SF1675.
Completed course in Multivariable Calculus, SF1626 or SF1674.

Completed course SF1668 Mathematical and numerical methods I or a course in Numerical methods corresponding to SF1668, SF1511, SF1519, SF1546 or SF1547.

## Course literature

The literature is published on the course webpage no later than four weeks before the course starts.

## Examination

- HEM1 - Assignments, 1.5 credits, grading scale: P, F
- TEN1 - Examination, 4.5 credits, grading scale: A, B, C, D, E, FX, 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 examiner decides, in consultation with KTHs Coordinator of students with disabilities (Funka), about any customized examination for students with documented,lastingdisability. The examiner may allow another form of examination for reexamination of individual students.

## 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.