



# SF1841 Optimization 6.0 credits

## Optimization

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

## Establishment

Course syllabus for SF1841 valid from Spring 2011

## Grading scale

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

## Education cycle

First cycle

## Main field of study

Mathematics, Technology

## Specific prerequisites

In general:

Completed upper secondary education including documented proficiency in English corresponding to English B. And 28 university credits (hp) in mathematics.

More precisely for KTH students:

Passed courses in calculus, linear algebra, differential equations, mathematical statistics, numerical analysis.

## Language of instruction

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

## Intended learning outcomes

The overall purpose of the course is that the student should get well acquainted with basic concepts, theory, models and solution methods for optimization. Further, the student should get basic skills in modelling and computer based solving of various applied optimization problems.

## Course contents

Examples of applications and modelling training. Basic concepts and theory for optimization, in particular theory for convex problems. Some linear algebra in  $\mathbb{R}^n$ , in particular bases for the four fundamental subspaces corresponding to a given matrix, and LDLT-factorization of a symmetric definite matrix. Linear optimization, including duality theory. Optimization of flows in networks. Quadratic optimization with linear 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.

## Course literature

Linear and Nonlinear Programming by Nash and Sofer, McGraw-Hill, and some lecture notes.

## Examination

- TEN1 - Examination, 6.0 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.

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

## Other requirements for final grade

A written examination (TEN1; 6 hp). Optional homeworks give credit points on the 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.