SF1831 Optimization and Markov Processes 9.0 credits

Optimeringslära och markovprocesser

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

Establishment

Course syllabus for SF1831 valid from Autumn 2008

Grading scale

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

Education cycle

First cycle

Main field of study

Mathematics, Technology

Specific prerequisites

SF1603 Linear algebra,
SF1602+03 Calculus,
SF1901 Probability theory and statistics.

Language of instruction

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

Intended learning outcomes

After the course, the student should be well acquainted with the following:

Basic theory and applications of Markov processes,

Basic concepts and results in optimization theory,

Some important models and methods for optimization.

Further, the student should have got training in formulating and solving optimization problems.

Course contents

Part 1, Markov processes:

Markov chains. Stationarity. Asymptotic distributions. Poisson processes. Birth and death processes. Queuing processes.

Part 2, Optimization:

Examples of applications and modelling training. Basic concepts and theory for optimization, in particular theory for convex problems. Some linear algebra in 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 in Swedish.

Examination

- TENB - Examination, 6.0 credits, grading scale: A, B, C, D, E, FX, F
- TENA - Examination, 3.0 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

Two written examinations.
Home assignments.

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.