

# Optimization

Programme course

6 credits

Optimization

TNK053

Valid from: 2017 Spring semester

**Determined by**

Board of Studies for Industrial  
Engineering and Logistics

**Date determined**

2017-01-25

**Offered for the last time**

Autumn semester 2022

**Replaced by**

TNK127

## Main field of study

Mathematics, Applied Mathematics

## Course level

First cycle

## Advancement level

G2X

## Course offered for

- Intelligent Transport Systems and Logistics, Master's Programme

## 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

Linear Algebra and Multivariable Calculus

## Intended learning outcomes

The course will provide basic insight in optimization, especially optimization of linear, nonlinear, and integer problems and problems with a network structure. The students can, after completing the course, formulate and analyze optimization models in the area of economic and technical applications; comprehend the basic mathematical theory on which the model and algorithms are based on; and be able to solve optimization problem both manually and with the help of a computer.

## Course content

Linear programming: Modelling, basic mathematical theory and geometry, the simplex method, sensitivity analysis, duality, optimality conditions.

Nonlinear optimization: Modelling, convexity, unconstrained optimization, optimization under constraints, optimality conditions.

Network optimization: Modelling, shortest paths.

Integer optimization: Modelling, cutting plane and branch and bound.

## Teaching and working methods

Lectures, exercises and laborations

## Examination

LAB1	Laboratory work	1.5 credits	U, G
TEN1	Written examination	4.5 credits	U, 3, 4, 5

## Grades

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

## Department

Institutionen för teknik och naturvetenskap

## Director of Studies or equivalent

George Baravdish

## Examiner

Zhuangwei Liu

## Course website and other links

<http://www2.itn.liu.se/utbildning/kurs/index.html?coursecode=TNK053>

## Education components

Preliminary scheduled hours: 48 h

Recommended self-study hours: 112 h

## Course literature

### Additional literature

#### Books

Winston, Wayne L., Venkataramanan, Munirpallam, Goldberg, Jeffrey B., (2003)

*Introduction to mathematical programming : operations research*

ISBN: 0534359647, 9780534359645

Pacific Grove, CA : Thomson/Brooks/Cole Duxbury, c2003.

## 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://stydokument.liu.se/Regelsamling/Innehall/Utbildning\\_pa\\_grund-\\_och\\_avancerad\\_niva](http://stydokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva).