



COURSE SYLLABUS

Linear Algebra and Optimization, 9 credits

Linjär algebra och optimering, 9 högskolepoäng

Course Code:	TAOG17	Education Cycle:	First-cycle level
Confirmed by:	Dean <MISSING VALUE>	Disciplinary domain:	Natural sciences
Valid From:	Jan 1, 2017	Subject group:	MA1
Version:	1	Specialised in:	G1N
Reg number:	JTH 2016/2672-313		

Intended Learning Outcomes (ILO)

After a successful course, the student shall

Knowledge and understanding

- display knowledge of vectors and matrices and the basic operations, defined for these objects
- display knowledge of systems of simultaneous linear equations, their possible sets of solution, and how they can be formulated as matrix equations
- display knowledge of what constitutes a linear programming problem

Skills and abilities

- demonstrate the ability to use Gauss elimination and basic matrix algebra to solve systems of linear equations
- demonstrate the ability to use vector operations to solve geometrical problems in two or three dimensions
- demonstrate the ability to calculate determinants and use them to draw conclusions on the solution set of a system of simultaneous linear equations, matrix singularity or linear dependency of vectors
- demonstrate the ability to mathematically formulate a real world problem as a linear programming problem
- demonstrate the ability to use graphs and the Simplex algorithm to solve limited-sized linear programming problems and to draw sensitivity conclusions from the solutions
- demonstrate the ability to formulate the dual of a linear programming problem and to draw conclusions from its solution
- demonstrate the ability to use computer software to solve optimization problems

Contents

The course introduces several elements from the linear algebra as well as techniques for linear optimization.

The course includes the following elements:

- Systems of simultaneous linear equations and Gauss elimination

- Vectors including the basic operations and some vector geometry
- Matrices and matrix algebra
- Eigenvectors and eigenvalues
- Linear programming
- Graphical solutions to two-dimensional linear programming problems
- The simplex method and sensitivity analysis
- Duality in linear programming
- Examples of computer software for optimization

Type of instruction

Lectures, seminars and computer exercises.

The teaching is conducted in English.

Prerequisites

General entry requirements and Physics 1, Chemistry 1, Mathematics 3c or Physics A, Chemistry A, Mathematics D and English 6 or English B in the Swedish upper secondary school system or international equivalent (or the equivalent).

Examination and grades

The course is graded 5,4,3 or Fail.

Registration of examination:

Name of the Test	Value	Grading
Written examination ¹	8 credits	5/4/3/U
Laboratory Work	1 credit	U/G

¹ Determines the final grade of the course, which is issued only when all course units have been passed.

Course literature

The literature list for the course will be provided one month before the course starts.

Hardy: Linear algebra for engineers and scientists using Matlab, Pearson, ISBN 0-13-010988-6