



## KURSPLAN

# Linjär algebra och optimering, 9 högskolepoäng

*Linear Algebra and Optimization, 9 credits*

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<b>Kurskod:</b>	TAOG17	<b>Utbildningsnivå:</b>	Grundnivå
<b>Fastställd av:</b>	VD <VÄRDE SAKNAS>	<b>Utbildningsområde:</b>	Naturvetenskapliga området
<b>Gäller fr.o.m.:</b>	2017-01-01	<b>Ämnesgrupp:</b>	MA1
<b>Version:</b>	1	<b>Fördjupning:</b>	G1N
<b>Diarienummer:</b>	JTH 2016/2672-313		

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### Lärandemål

After a successful course, the student shall

Kunskap och förståelse

- 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

Färdighet och förmåga

- 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

### Innehåll

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

### Undervisningsformer

Lectures, seminars and computer exercises.

Undervisningen bedrivs på engelska.

### Förkunskapskrav

Grundläggande behörighet samt Engelska 6, Fysik 1, Kemi 1, Matematik 3c. Eller: Engelska B, Fysik A, Kemi A, Matematik D (eller motsvarande kunskaper).

### Examination och betyg

Kursen bedöms med betygen 5, 4, 3 eller Underkänd.

Poängregistrering av examinationen för kursen sker enligt följande system:

Examinationsmoment	Omfattning	Betyg
Skriftlig tentamen <sup>1</sup>	8 hp	5/4/3/U
Laborationer	1 hp	U/G

<sup>1</sup> Bestämmer kursens slutbetyg vilket utfärdas först när samtliga moment godkänts.

### Kurslitteratur

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