HÖGSKOLAN I GÄVLE

Linear Algebra 7.5 cr

Linjär algebra 7,5 hp

Set by Faculty of Engineering and Sustainable Development

Version	**Set at**	**Valid from**
	3/10/17	**HT2017**

Level	G1N
Education level	First cycle
Course identifier	MAG051
Credits	7.5 cr
Main field of study	Mathematics
Subject group	Mathematics
Disciplinary domain	Natural sciences 100.0 %

Learning outcomes

After completion of the course the student shall be able to
1. account for basic concepts and theorems in linear algebra and be able to illustrate the concepts by describing basic applications within other fields, such as geometry, technology, physics and economics
2. demonstrate skills in working with equation systems, linear mapping, subspaces, vectors and matrices by solving problems formulated both from concrete and abstract starting points
3. use linear algebra and vector geometry to analyse and solve basic application problems within, for example, construction, electrical science and economics
4. model and solve larger application problems in linear algebra with mathematical computer programs
5. survey the theoretical structure of linear algebra.

Course content

Vector algebra in two and three dimensions
Linear equation systems: homogeneous and inhomogeneous equations
Linear dependence and independence
Gaussian elimination: coefficient matrix, total matrix, row echelon form, reduced row echelon form
Matrices, matrix algebra
Invertibilty

Eigenvalues, eigenvectors and diagonalisation
Vector spaces and subspaces of R^n
Row spaces, column spaces, kernels, rank
Linear mappings defined by matrices
Matrices defined by linear mappings, Invertibility, singularity
Bases and change of basis
Bases for subspaces and the concept of dimension
The dimension theorem
Orthogonal projection, orthogonal bases, the GramSchmidt process, the method of least squares
Orthogonal diagonalization
Diagonalization of quadradic forms

Teaching Lectures, calculation tutorials and seminar exercises

Prerequisites Ma D or Ma 4 (field-specific entry requirements A9/9, exceptions are given for Physics B (Physics 2) ,Chemistry A (Chemistry 1) and Mathematics E, or Algebra and Geometry 7.5 credits or equivalent

Examination Written examination and computer laboration

Grade A, B, C, D, E, Fx, F

Other regulations Grading criteria are provided by the course coordinator or examiner at the beginning of the course.

Sustainable environment Content with sustainable development is not relevant to this course.

Module

0010	Written examination	6 cr	Grade: AF
0020	Computer laboration	1.5 cr	Grade: UG