Faculty of Technology and Science
Mathematics

Syllabus

Course Approval
The syllabus was approved by the Faculty Board of Technology and Science on 11 June 2007, and is valid from the Autumn semester of 2007 at Karlstad University.

Course Code: MAGA04
Linear Algebra, 7.5 ECTS Credits
(Linjär algebra, 7.5 Swedish credit points)
Degree Level: Bachelor
Progression Level: A

Language of Instruction
Swedish

Prerequisites
Elementary Algebra (MAGA03)

Major Field of Study
Mathematics

Learning Outcomes

The aim of the course is that the student upon completion of the course should be able to

- solve systems of linear equations by using elementary row operations
- to a given matrix
* compute its determinant
* determine its null space, column space and its rank
* determine if its rows and/or columns are linearly dependent
* express it in a different basis when considered as a linear map
* compute its eigenvalues, eigenvectors and, if possible, diagonalize it
* apply the "Invertible matrix theorem" to reformulate the problem in question to a more suitable problem
- determine if a given map is linear. Determine bases for linear spaces and perform change of bases. Apply orthogonal projections and the least square method and use the Gram-Schmidt algorithm
- classify quadratic forms. Classify quadratic curves and surfaces in the plane and in space. Rewrite quadratic forms on canonical form.
- use inner products on finite dimensional vector spaces
- model basic applied problems
- show understanding of the subject by being able to combine new concepts, theorems and examples and by being able to discover analogies and make generalizations
- prove a pre-specified selection of the most important theorems in the course

Content and Form of Instruction

- Systems of linear equations with real coefficients;

- Matrix algebra and real vector spaces;

- Determinants;

- Eigenvalues and eigenvectors. General real vector spaces and linear mappings;

- Vector spaces with inner product and the Gramm-Schmidt process with applications;

- Symmetric matrices and real quadratic forms. The classification of the curves and surfaces of degree two.

Reading List

See separate document.

Examination

Examination is in the form of a written exam. The number of examination opportunities for earning a Pass grade is limited to three per academic year.

Grades

One of the grades U (Fail), G (Pass), or VG (Distinction) or one of the grades U (Fail), 3 (Pass), 4 (Pass not without distinction), or 5 (Pass with distinction) is awarded in the examination of the course.

Quality Assurance

Follow-up relating to learning conditions and goal-fulfilment takes place both during and upon completion of the course in order to ensure continuous improvement. Course assessment is based on student views and experiences as reported in written course evaluations and/or group discussions. Students will be informed of the result of the evaluation and of the measures to be taken.

Course Certificate

A course certificate will be provided upon request.

Additional Information

Students who enrolled before 1 July 2007 will complete their studies in accordance with the requirements of the earlier admission. Upon completion students may request degree and course certificates to be issued under the current ordinance if they meet its requirements.

The local regulations for studies at the Bachelor's and Master's levels at Karlstad University, ref. C2007/368, stipulate the obligations and rights of students and staff.

Karlstads universitet 651 88 Karlstad, Sweden
Tel +46-54-700 10 00 Fax +46-54-700 14 60
information@kau.se www.kau.se