



# SF1675 Applied Linear Algebra

## 13.5 credits

Tillämpad linjär algebra

This is a translation of the Swedish, legally binding, course syllabus.

If the course is discontinued, students may request to be examined during the following two academic years

### Establishment

The Head of School at the SCI School has decided on 2020-06-22 to establish this syllabus as from HT 2020 (file number S-2020-0892).

### Decision to discontinue this course

The decommissioning period commences during HT 2020, the last examination period is VT 2022 and after the last completed examination opportunity in VT 2022, the course is discontinued.

### Grading scale

A, B, C, D, E, FX, F

### Education cycle

First cycle

### Main field of study

Technology

### Specific prerequisites

Basic requirements.

## Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

## Intended learning outcomes

After the course the student should be able to

- use concepts, theorems and methods to solve and present solutions to problems within the parts of linear algebra described by the course content,
- use Matlab to solve problems within the parts of linear algebra and numerical analysis described by the course content,
- read and comprehend mathematical text.
- use basic control and data structures in Matlab for problem solving

in order to

- develop a good understanding for basic mathematical concepts within linear algebra and to use these for mathematical modeling of engineering and scientific problems,
- develop a skill, with the help of computers, to illustrate key concepts and solve applied problems with Matlab as well as to visualize and present the results in a clear manner.

## Course contents

Basic ideas and concepts in linear algebra: vectors, matrices, systems of linear equations, Gaussian elimination, matrix factorization, complexity, vector geometry with scalar product and vector product, determinants, vector spaces, linear independence, bases, change of basis, linear mappings, eigenvalue, eigenvector, the least squares methods, orthogonality, Gram-Schmidt's method.

Calculation and programming technical aspects: MATLAB programming with control and data structures, file management, functions, visualization, numerical solution of systems of linear equations with Gaussian elimination and LU factorization, experimental determination of complexity in solving linear equation systems, numerical calculation of condition numbers, assessment of accuracy, graphical illustration of results.

## Examination

- LAB1 - Laboratory Sessions, 1.5 credits, grading scale: P, F
- LAB2 - Laboratory Sessions, 2.0 credits, grading scale: P, F
- PRO1 - Project, 1.0 credits, grading scale: P, F
- TEN1 - Examination, 1.5 credits, grading scale: P, F
- TEN2 - Examination, 7.5 credits, grading scale: A, B, C, D, E, FX, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

In this course, the code of honour of the school is applied,  
see: <http://www.sci.kth.se/institutioner/math/avd/na/utbildning/hederskodex-for-studenter-och-larare-vid-kurser-pa-avdelningen-for-numerisk-analys-1.357185>

## Transitional regulations

### Written examination:

Four re-exams for both TEN1 and TEN2 are offered for two years after the last course edition was given.

TEN1 will be given at two opportunities during the corresponding autumn semester and TEN2 will be written together with TEN1 of the new course SF1694 Applied Linear Algebra that replaces the course SF1675.

### Approved oral and/or written presentation of homeworks

**Lab2** of the course SF1675 can be finalized within the new course SF1694. The deadlines for submission and presentation of lab work in SF1694 apply also for students who intend to finalize their lab work in the course SF1675.

For other lab work of SF1675 that cannot be finalized within the course SF1694, the examiner will provide one opportunity per academic year that will be scheduled immediately after an edition of SF1694 has been given.

**PRO1** can be finalized within the new course SFSF1694. Possible deadlines of SF1694 apply also for students who will finalize their project work of SF1675.

## Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.