UNIVERSITY OF GOTHENBURG

DEPARTMENT OF MATHEMATICAL SCIENCES

MMA600 Numerical Linear Algebra, 7.5 credits

Numerisk linjär algebra, 7,5 högskolepoäng

Second Cycle

Confirmation

This course syllabus was confirmed by Department of Mathematical Sciences on 2017-12-01 to be valid from 2018-07-01, autumn semester of 2018.

Field of education: Science 100%
Department: Department of Mathematical Sciences

Position in the educational system

The course can be part of the following programmes: 1) Mathematical Sciences, Master's Programme (N2MAT) and 2) Bachelor's Programme in Mathematics (N1MAT)

Main field of studies	*Specialization*
Mathematics	A1N, Second cycle, has only first-cycle course/s as entry requirements

Entry requirements

The equivalent of the courses *MMG400 Linear Algebra II* and *MMG410 Numerical Analysis*.

Learning outcomes

On successful completion of the course the student will be able to:

- use numerical linear algebra as a tool in computations,
- make a linear algebra model of a problem from physical reality,
- derive and use the numerical techniques needed for a professional solution of a given linear algebra problem,
- use computer algorithms, programs and software packages to compute solutions to current problems,

- critically analyze and give advice regarding different choices of models, algorithms, and software with respect to efficiency and reliability,
- critically analyze the accuracy of the obtained numerical result and to present it in a visualized way.

Course content

Numerical linear algebra problems arise in many different fields of science like solid mechanics, electrical networks, signal analysis and optimization. This course covers basic numerical linear algebra concepts like matrix algebra, vector and matrix norms, error analysis and condition numbers. Linear systems of equations are solved by Gaussian elimination with different pivoting strategies. Least-squares problems are solved with QR-factorization and singular value decomposition. The methods for eigenvalue problems are based on transformation techniques for symmetric and non-symmetric matrices. Numerical algorithms are discussed with respect to computing time and memory requirements. In homework assignments and project work the students will implement and evaluate numerical algorithms for linear algebra problems.

Form of teaching

Language of instruction: English

Assessment

The examination consists of computer-based assignments, written assignments, and a written exam at the end. During the course, there may be optional assignments that give bonus points on the exam. Examples of such assignments are small written tests, labs, and oral or written presentations. Information about this is found on the course home page.

If a student, who has failed the same examined component twice, wishes to change examiner before the next examination, a written application shall be sent to the department responsible for the course and shall be granted unless there are special reasons to the contrary (Chapter 6, Section 22 of Higher Education Ordinance).

Grades

The grading scale comprises: Pass with Distinction (VG), Pass (G) and Fail (U).

Course evaluation

The course is evaluated with an anonymous questionnaire and/or a discussion with the student representatives. The results of and possible changes to the course will be shared with students who participated in the evaluation and students who are starting the course.

Additional information

For a list of course literature, see:
https://www.chalmers.se/sv/institutioner/math/utbildning/grundutbildning-goteborgs-universitet/kurslitteratur/Sidor/Kurslitteratur-i-matematik.aspx

The syllabus for MMA600 was originally established to take effect from 2007-07-01, when it replaced INN700.