



GÖTEBORG UNIVERSITY

Faculty Board of Science

MMA600 Numerical Linear Algebra

7.5 higher education credits

Second Cycle

This syllabus is the binding document.

1. Confirmation

The syllabus was confirmed by the Department of Mathematical Sciences on June 20, 2007 to be valid from July 1, 2007.

Field of education: Science. Responsible department: Mathematical Sciences.

2. Position in the educational system

The course Numerical Linear Algebra, 7.5 higher education credits, is one of several single subject courses included in the two-year Masters Program in Mathematical Sciences. The course is also open for eligible students outside the program.

3. Entrance qualifications

The prerequisites for the course Numerical Linear Algebra are the equivalent of the courses MMG400 Linear Algebra II and MMG410 Numerical Analysis.

4. Course content

Numerical linear algebra problems arise in many different fields of science like solid mechanics, electrical networks, signal analysis and optimization. In this course we study basic linear algebra concepts like matrix algebra, vector- and matrix norms, error analysis and condition numbers. For solving linear systems of equations we consider Gaussian elimination with different pivoting strategies. For least-squares problems we study QR-factorization and singular value decomposition. The methods for eigenvalue problems are based on transformation techniques for symmetric and non-symmetric matrices.

We discuss the numerical algorithms with respect to computing time and memory requirements. By homework assignments and project work the students get experiences in implementation and evaluation of numerical algorithms for linear algebra problems.

5. Learning outcomes

After completing the course, the student will be able to

- use numerical linear algebra as building bricks in computation
- make a linear algebra model of a problem from the 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.

6. Required reading

List of required reading enclosed.

7. Assessment

The examination consists of computer based assignments and a written exam. A student who has failed a test twice has the right to change examiner, unless weighty arguments can be invoked. For this, the student must send a written request to the board of the department.

8. Grading scale

The grades are Fail (U), Pass (G), and High Pass (VG).

Students who are contractually entitled to ECTS grades should inform the examiner about this no later than one week after the start of the course.

Students without such entitlement will not be awarded ECTS grades. Grades will be converted into ECTS terminology according to a standard model approved by the University President.

9. Course evaluation

Oral and/or written course evaluation will be performed. The results of the evaluation will be communicated to the students and will serve as a guide for the development of the course.

10. Additional information

The language of instruction is English unless all involved are Swedish speakers.