



The ILAS Education Committee

Report

on

Graduate Linear Algebra Courses

March/November 1993

Based on our survey of US graduate course offerings in Linear Algebra last fall, we have drawn up three separate course outlines for graduate year-long courses in

Theoretical Linear Algebra,
Numerical Linear Algebra, and
Applied Linear Algebra.

These outlines contain a large number of significant modern topics in our field combined with basic and more classical results. Several of the chosen topics occur in more than one course. Take the LU decomposition for example: a theoretical treatment of the LU decomposition would maybe emphasize the lower triangular – upper triangular group factorization of GL_n and could possibly give a short introduction into Della-Dora type group factorizations in a theoretical vein. The numerical course would instead emphasize explicit index manipulations and computations, as well as the operations count for LU , while the applied course might use it to establish rank, solvability and redundancy criteria for linear systems of equations and integrate the LU factorization thus with its applications.

We have chosen our outlined topics and their interconnectedness in order to reflect the importance of our subject to modern abstract and applied mathematics and to make graduate courses based on our syllabi highly valuable to any modern mathematics, science or engineering graduate program.

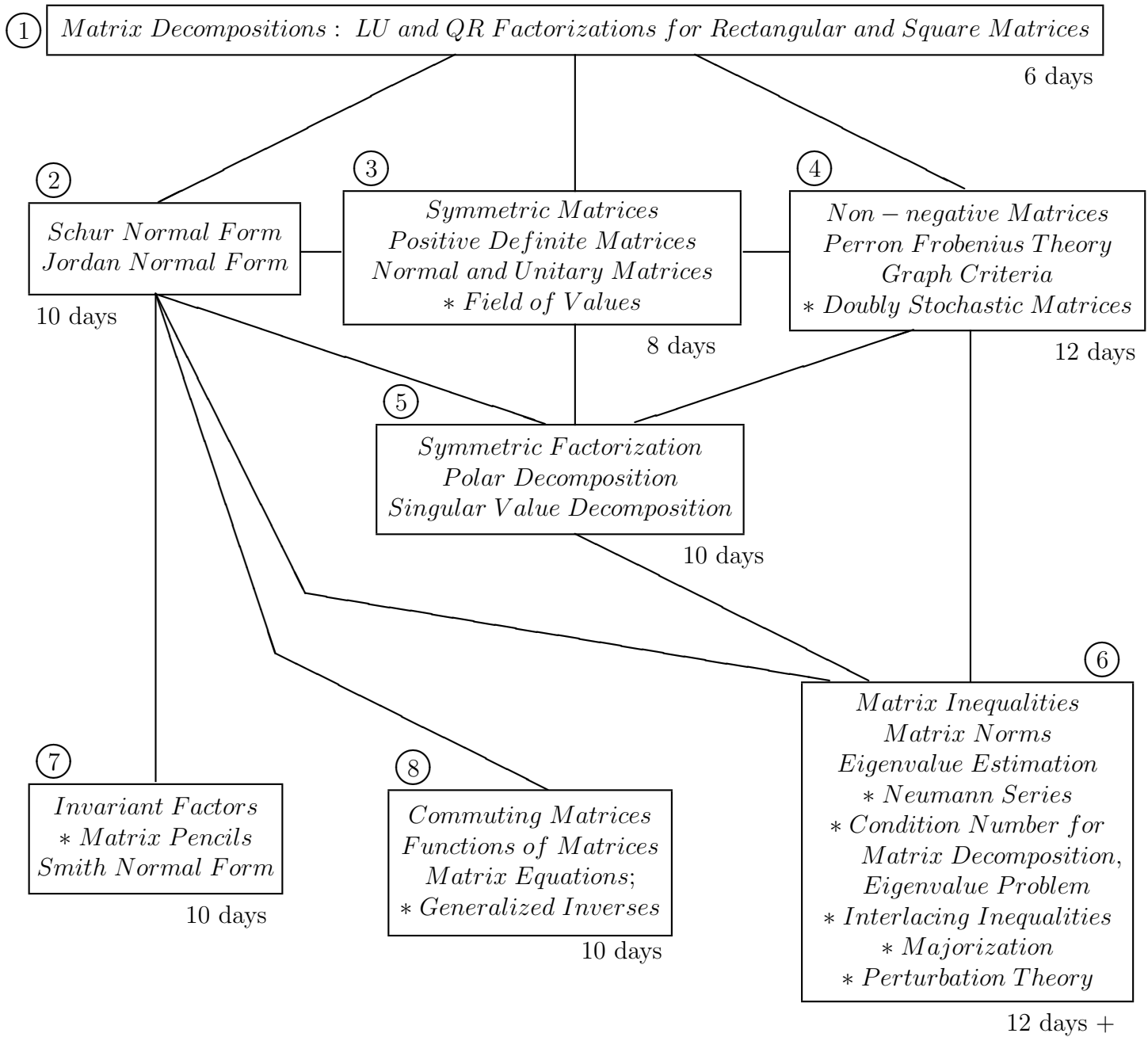
We shall refrain from specific textbook recommendations, but want to assert that there has recently been a renaissance of excellent texts in our field, well suited to achieve a higher level of awareness and usefulness for Linear Algebra throughout the scientific community.

Chair : Frank Uhlig (uhligfd@mail.auburn.edu)

David Carlson, Biswa N. Datta, Charlie Johnson, Steve Leon, Miki Neumann
Hans Schneider, President

The INTERNATIONAL LINEAR ALGEBRA SOCIETY

Suggested Topics for a year long graduate course in Theoretical Linear Algebra



Topics for a one semester course,
or the first semester of a year
long course:

① , ② , ③ , ④

Suggestions for quarter systems :

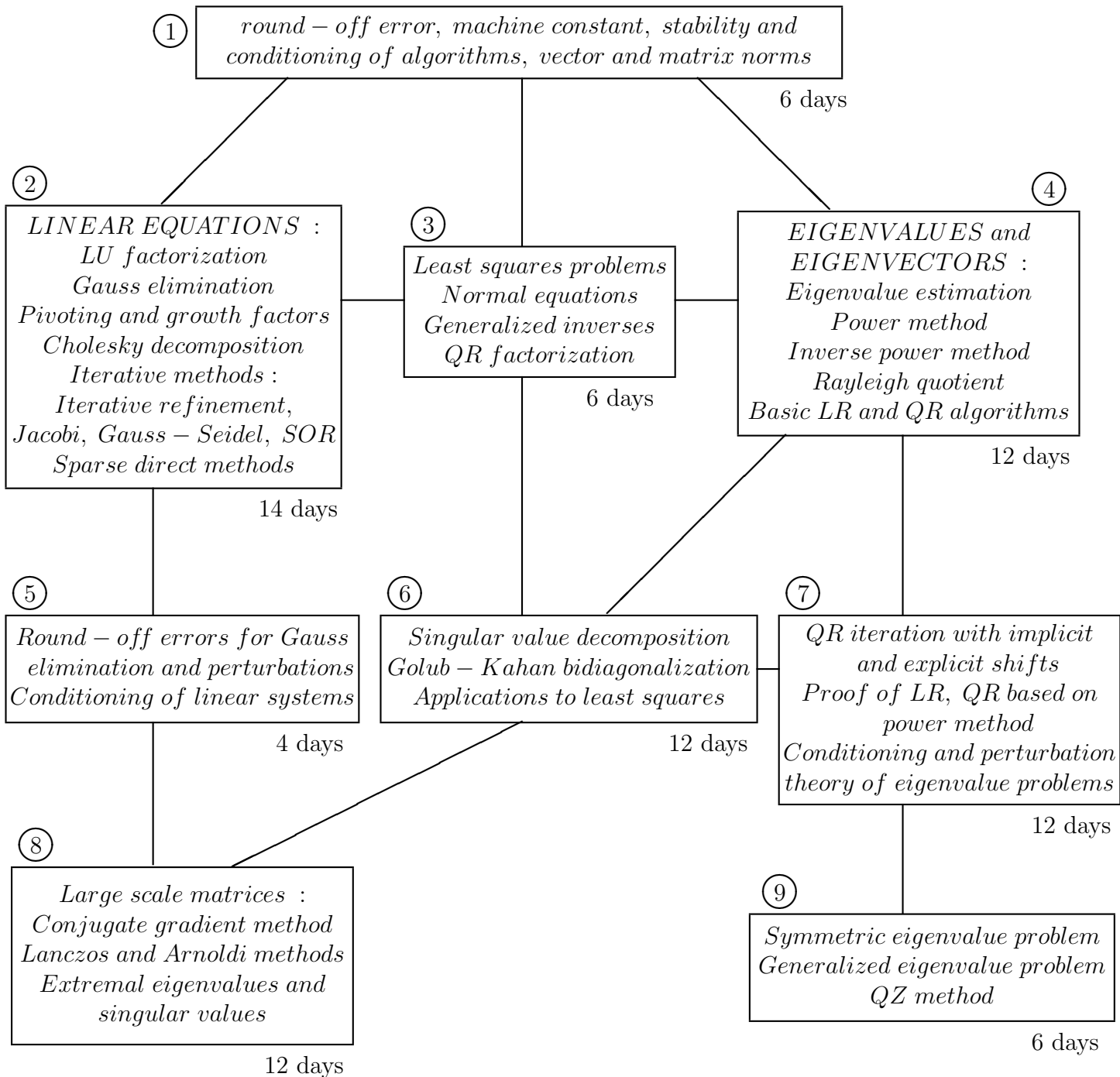
First quarter : ① , ② , ③

Second quarter : ④ , ⑤

Third quarter : ⑥ , ⑦ , ⑧

Topics preceded by an asterix *
are considered optional and
should be covered only if desired
and time permits.

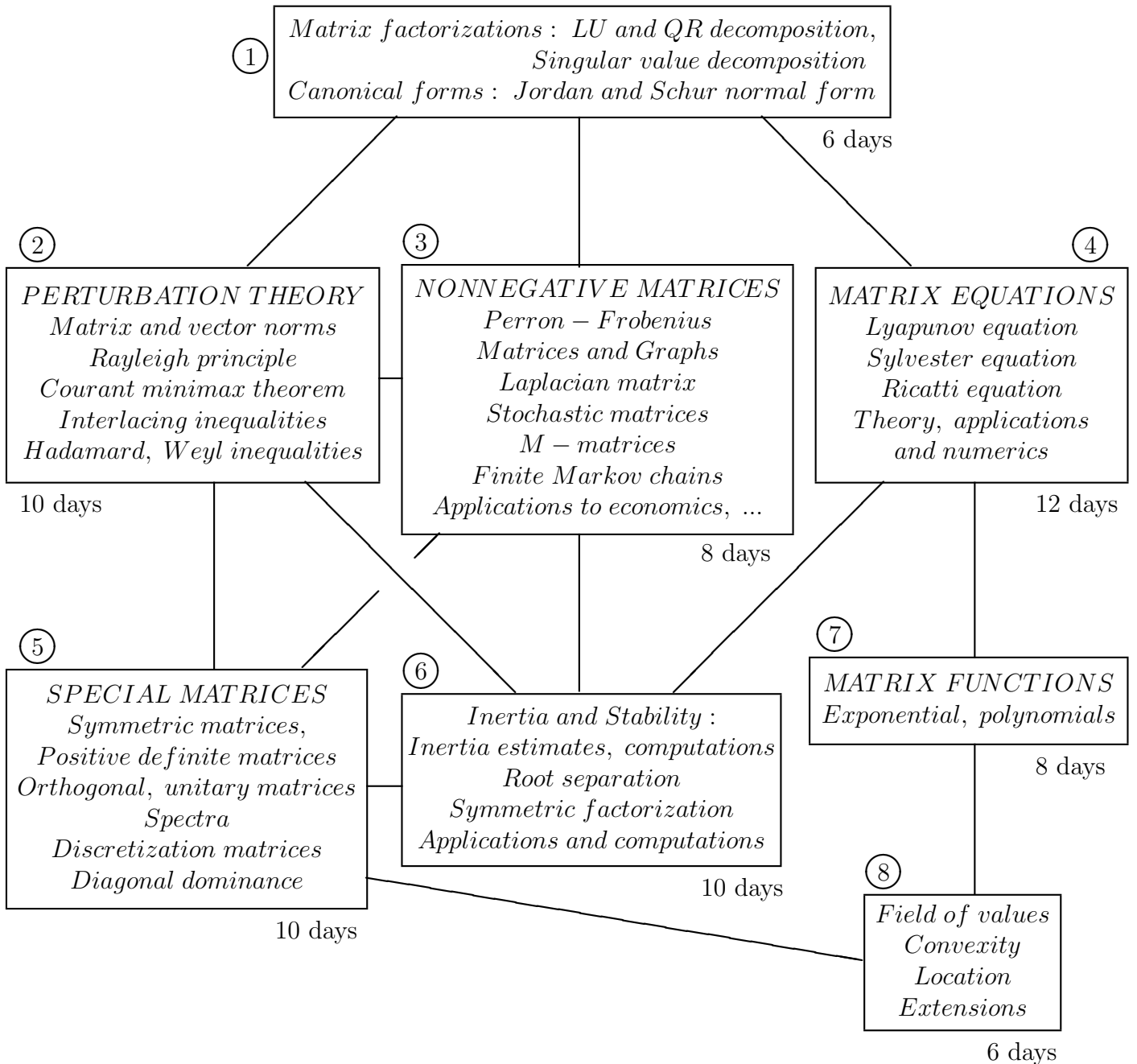
Suggested Topics for a year long graduate course in Numerical Linear Algebra



A one semester course or the first semester of a year long course should cover topics numbered 1, ... , 4, as well as actual numerical computations.

For a quarter system the first quarter would cover topics 1, 2, and 3 combined with actual numerical computations. The second quarter would cover topics 4, 5, and 6, with the remaining topics covered in the third quarter.

Suggested Topics for a year long graduate course in Applied Linear Algebra



A one semester course or the first semester of a year long course could be made of topics labelled 1, 2, 3, and 4, or alternately of topics 1, 2, 3, and 5.

For a quarter system, the first quarter could comprise topics 1, 2, 3, the second could cover topics 4 and 5, with the remainder left for the third quarter.