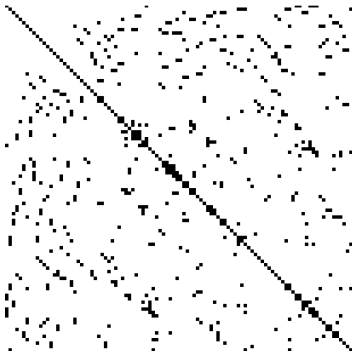
MATH 694 Numerical Linear Algebra

Spring 2009, UAF



Linear algebra is everywhere in the application of mathematics. Huge linear systems are solved routinely on computers. And almost everyone in the technical world depends on it.

This course will describe how actual matrices can be handled in a stable, fast, and accurate manner. We will place these topics in the correct abstract, finite-dimensional vector space framework.

We will address famous matrix decompositions, theorems, algorithms, and tools:

- singular value decomposition (SVD)
- spectral theorem
- solving over- and under-determined systems
- QR method for eigenvalues
- Krylov subspace methods, iterative linear algebra

Instructor and students will use MATLAB (or free tools OCTAVE or PYTHON/SCIPY) to see nontrivial examples in every lecture and every homework assignment. Many MATLAB examples will be given at the beginning so that students who have not already used it will gain rapid familiarity.

The course is for graduate students and advanced undergraduates. Students in all fields with a need for computation are encouraged: statistics, computer science, geophysics, engineering, biology. Students in mathematics will learn what is missing about matrices in mainstream courses. Yes there will be some proofs, making up about 30% of the homework.

Instructor:	Ed Bueler, `ffelb@uaf.edu`
Time and room:	MWF 2:15–3:15 pm, Chapman 107
Textbook:	Trefethen & Bau, NUMERICAL LINEAR ALGEBRA, SIAM Press 1997 (about $57)
Prerequisites:	Undergraduate linear algebra and mathematical maturity. Concretely, *MATH 314 Linear Algebra or equivalent.* *Recommended: MATH 421 Applied Analysis OR MATH 401 Introduction to Real Analysis OR equivalent post-calculus course in analysis.*
Details:	3.0 credits, CRN 50330