Syllabus for Math 104
Applied Matrix Algebra
Fall 2010

Course:
MWF 2:15-3:05 pm Rm. 380-380W

Lecturer:
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Course Website: The course website may be found at `http://math104.stanford.edu`.

Prerequisites: Math 51 (or equivalent) and either Math 52 or Math 53. Some familiarity with rigorous (i.e. proof-based) mathematics will be helpful.

Texts: These books are also on reserve at the Math/CS library:
Numerical Linear Algebra by Lloyd N. Trefethen and David Bau III, SIAM (required)
Introduction to Linear Algebra by Gilbert Strang, Wellesley-Cambridge Press, 4th edition (optional)

Homework: Weekly homework will be due each Wednesday in class. The homework will be posted to the course website. Late work will only be accepted in exceptional circumstances. There will be 7 sets assigned in total. Homework will count for 40% of the final grade with the lowest score dropped.

Exams: There will be one in class midterm exams. The midterm will each count for 20% of the final grade. Date of the midterm: **Wednesday, October 27.**

Final Exam: The final will count for 40% of the final grade. Date and time of the final: **Friday, December 10, 12:15pm-3:15pm.** Location: TBA

Working Together: Working together is permitted, however it is essential that each student write up his or her own solutions. Use of sources (i.e. other people, books, the internet) without proper attribution will

be considered plagarism.

Material to be Covered:

Matrices, vectors and their products (review)
Matrices as linear transformations
Rank of a matrix, linear independence and the four fundamental subspaces of a matrix
Orthogonality and isometries
The QR decomposition
Eigenvalues and the spectral decomposition of symmetric matrices
The singular value decomposition and its applications
The conditioning of a matrix
Least squares problems
Algorithms for solving systems of linear equations and least-squares problems
Iterative methods for solving linear systems: the method of conjugate gradients