Math 581D, Autumn 2016

MWF 10:30-11:20

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Course description. This Advanced Linear Algebra course will provide a foundation in this area. The topics below will be approached theoretically, with a brief implementation discussion.

1. Basics (vector spaces and their bases, norms and norm equivalence in $\mathbb{R}^K$, linear transformations, simple factorizations like Gramm-Schmidt (QR) and Gaussian elimination (LU), determinants and traces)
2. Spectrum (eigenvalue decomposition, characteristic/minimal polynomial, Jordan, Schur, and Hessenberg forms)
3. Beyond the Spectrum (singular value decomposition, minimax principle and matrix approximation, pseudoinverses, polar decomposition)
4. Matrix types (Hermitian/symmetric with tridiagnoal form and revisiting of the eigenvalue and singular value decompositions, Unitary/orthogonal with revisiting of the polar decomposition, positive definite matrices with the Cholesky factorization, nonnegative matrices and the Perron-Frobenius theorem)

Prerequisites. Undergraduate linear algebra.