APM 505 Applied Linear Algebra

Instructor: Dr. R. A. Renaut

Time and Place : 10:30-11:45 M W, ASUSYNC **Linenumber:** 63327

Books of Relevance for the Course You can use any numerical linear algebra book that is online from the library. If you want to buy a book for your future reference, I strongly suggest the the Matrix Computations book. It is an essential resource for everything linear algebra, but I would not require anyone to buy something when they can access online resources.

1. Applied Numerical Linear Algebra, James W. Demmel, `http://dx.doi.org.ezproxy1.lib.asu.edu/10.1137/1.9781611971446`
2. Keywords: numerical linear algebra, eigenvalue, least squares problems, linear systems, singular value decomposition, iterative methods, LAPACK
3. Matrix computations, Golub, Gene H and Van Loan, Charles F 2013, Fourth edition., Johns Hopkins studies in the mathematical sciences, ISBN 1421407949, xxi, 756 pages Matrices.

Course Description: Fundamentals linear algebra and numerical linear algebra, including decompositions (LU, QR, SVD), Eigenvalues, spectral theory, least squares problems. MATLAB.

BACKGROUND It is expected that you have the background equivalent to the level of the MAT 342 or MAT 343 or MAE 501 courses at ASU. This course is not equivalent to MAE 501, it is beyond the level of MAE 501.

Syllabus - Course Objectives

Note: The instructor has the right to change this syllabus as she sees fit. Any changes will be announced in class. It is the student's responsibility to attend class and thus be aware of these changes. Students should see blackboard for course announcements. It is expected that at the completion of the course the students will have been introduced to all items in the syllabus. We will also address the concept of Randomized algorithms for Numerical Linear Algebra operations on large scale problems will be included, as well as the use of mixed precision computations, needed also for large scale problems.

- Introduction - Foundations of Matrix Analysis
- Stability, Floating Point Arithmetic
- Direct Methods for Solving Linear Systems
- Least Squares Systems - Orthogonal Transformations
- Singular Value Decomposition
- Eigenvalues and Eigenvectors - Algorithms
- Randomized Algorithms