M581 Numerical Analysis

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Note that organizational meeting will be on October 7 at 3 pm. The link can be found here.
I have already set up **schedule** for this course as Tuesday 9:40-12:30. (might change after the meeting)

The classes will be done online via Zoom platform. Before each class, the Zoom link will be sent to your METU email address.

Content:

1. Review for Matrices
2. Perturbation Analysis of the linear systems: Conditioning.
3. Solution of Linear Systems of Equations: Gaussian elimination, LU-decomposition, pivoting and scaling in Gaussian elimination, Cholesky Decomposition
4. Linear Least Square Problems: Matrix factorizations that solve the linear least-squares problems, normal equations, QR decomposition and solving least square problems using QR decomposition, orthogonal matrices, Householder transformation, Givens Rotation, SVD.
5. The Algebraic Eigenvalue Problem: The power method, the inverse power method, localization of eigenvalues, Householder transformation, QR algorithm for eigenvalue problems, estimation of eigenvalues
6. Basic iterative methods (Jacobi, Gauss-Seidel and Successive over relaxation methods), convergence of Jacobi, Gauss-Seidel and successive over relation methods.

Goals: The objective of this course is an introduction to the mathematical and computational aspects of Numerical Linear Algebra

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References: 1. James W. Demmel, 'Applied Numerical Linear Algebra' SIAM, 1997
2. Datta B.N, Numerical Linear Algebra and Applications
3. Atkinson, K., An introduction to Numerical Analysis
4. J. Stoer and R. Bulirsh, 'Introduction to Numerical Analysis', Springer-Verlag, 1980.
5. Johnson and Riess, Numerical Analysis

Grading:
Homework assignments – including MATLAB programming assignment (30 %).
Midterm (30 %)
Final –Oral Exam (40 %)
