

## STAT 307, General Information

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### Course Home Page

<http://galton.uchicago.edu/~amit/numer>

You will see three directories:

**Software** - The source of the programs to start you up is in Software.

**Homework** - Current homework and handouts can be found in in Homework.

**Solutions** - Solutions to homeworks.

### Homework and Exams

HOMEWORK: Assigned Wednesday, due the following Wednesday.

**MIDTERM: Monday, October 30<sup>th</sup>, In class.**

FINAL: TBA

### Topics

1. Review of linear algebra and inner product.
2. Singular value decomposition (Theory).
3. Gaussian elimination and forward backward substitution.
4. LU decomposition. (General/Symmetric)
5. Householder orthogonalization and QR factorization. (General/Symmetric).
6. Sensitivity analysis.
7. Applications to least squares problems.
8. Eigenvalue computation.
  - The QR algorithm + shifting.
  - Implicit QR algorithm.
  - Implementations in the symmetric case.
  - Eigenvalue methods for sparse matrices.
9. Iterative methods for solving linear systems.
  - Gauss Seidel and Jacobi.
  - Conjugate Gradient.
10. Special orthogonal transforms:
  - Fast fourier transform.
  - Fast wavelet transform

### Text Book

Watkins, *Fundamentals of Matrix Computations, 2nd Ed.*