Numerical Analysis
(15-MATH-515-001)

Time and Place: MWF 12:00-12:50 PM, Old Chem 801 (Winter 2011).
Instructor: Donald A. French (611C Old Chemistry).
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Office Hours: MWF 1:30-2:30 PM and by appointment.

Prerequisites: Calculus I–IV, Differential Equations, Linear Algebra, experience in programming (preferably MATLAB), and maturity/skill in mathematics at an advanced level (It would be wise to have taken Analysis (e.g. 15-MATH-408/409), an advanced Linear Algebra course (e.g. 15-MATH-555), and, perhaps, be concurrently taking Graduate Analysis (e.g. 15-Math-504/505/506).

Text: Introduction to Numerical Analysis (2nd edition) by Kendall E. Atkinson.

Description: This is the second quarter of a year long sequence on numerical analysis at the graduate level in mathematics. We will cover chapters 7-9 in the text starting with a review of basic concepts in Linear Algebra. The main topics are Decompositions (Schur, Principle Axes, QR and SVD), Gaussian Elimination (Algorithms, Roundoff errors, and Conditioning), Iterative Methods (Jacobi, Gauss Seidel and SOR), Computation of Eigenvalues and Eigenvectors (Power, Jacobi and QR methods), and Least Squares (Solved by SVD and QR algorithms).

The analysis will be emphasized here instead of computation. We will typically examine carefully chosen model or prototype problems in order to furnish theorems and insight into the behavior of the approximation methods. Key concepts include convergence, accuracy, conditioning, and stability.

Grading: There will be two exams,

> Midterm: Wednesday, February 2 (In Class)
> Final: Wednesday, March 16 1:30-3:30 PM

which will count toward most of the course grade. Homework assignments will also count and will be given every 1-2 weeks. Late homework may not be accepted or be subject to point reductions.

Lectures: Class notes are the primary study source. Occasionally, sections in the book will be skipped and supplemented by topics from outside sources.

The information given here is subject to change. Any major changes will be announced in lecture.