Scientific Computing (Spring 1997)

This course will cover:

- Sources of error in scientific computing — rounding error and truncation error. *Conditioning* of a problem and *stability* of an algorithm. Backward error analysis.
- Interpolation, computation of integrals and some special functions.
- Numerical solution of systems of linear equations. Condition number, accuracy, and stability. Gaussian elimination. Least squares and QR decomposition.
- Numerical solution of nonlinear equations and optimization. Newton's method.
- The fast Fourier transform.
- Numerical solution of initial value problems for ordinary differential equations.
- Basic ideas of Monte Carlo methods.

A recommended text is *Numerical Recipes*, by Press, et. al. You can use the version in C, Fortran, or Pascal.
There will be homework assignments about once every two weeks. These will be partly theoretical and partly programming. You can program in whatever language you like, but I recommend MATLAB for the assignments. If you have programmed at all before, you will probably find it easy to learn MATLAB and I will explain the basics of its use. Instead of a final exam, there will be a final project, in which you apply some of the numerical techniques to solve a problem of interest in your field.

Lectures:	Tu 7:30–9:20pm, Room 1302 WWH
Professor:	Anne Greenbaum, Room 1103 WWH, 998-3145
Off. Hours:	M 3:00–6:00, or by appointment, or just drop by.
e-mail:	greenbau@phantom2.nyu.edu
Web Address:	http://www.cs.nyu.edu/faculty/greenbau
	Course materials: Click on "Scientific Computing".