

Math 464: Numerical Analysis I (Autumn 2006)

Lectures: MWF 9:30–10:20, EEB 054
Professor: A. Greenbaum, C-434 Padelford, 543-1175
Office Hours: M,W 1:00–2:00, Th 10:00–11:00
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Course materials: Click on “Math 464”.

Text: We will use course notes which can be downloaded from the course web page.

Some other good references (available in the Math Library) are: *Elementary Numerical Analysis* by Kendall Atkinson and Weimin Han; *Numerical Analysis: Mathematics of Scientific Computing* by D. Kincaid and W. Cheney; *Afternotes on Numerical Analysis* by G. W. Stewart; *Numerical Analysis* by R. L. Burden and J. D. Faires; *Numerical Linear Algebra* by L. N. Trefethen and D. Bau.

Course Description: This course will cover the following:

1. Brief introduction to MATLAB programming. (A good additional reference is: *MATLAB Guide*, by D. J. Higham and N. J. Higham, SIAM, 2000.)
2. Solving a nonlinear equation in one unknown: Bisection, Newton’s method, the secant method, fixed points and functional iteration, rates of convergence.
3. Floating point arithmetic: Computer representation of numbers, IEEE floating point standard, rounding, perturbation analysis, backward error analysis. (A good additional reference is: *Numerical Computing with IEEE Floating Point Arithmetic*, by Michael L. Overton, SIAM, 2001.)
4. Numerical solution of linear equations: Theory of linear systems, triangular systems, Gaussian elimination, operation counts, conditioning and sensitivity of linear systems. Least squares.
5. Polynomial interpolation: Lagrange and Newton forms of the interpolant. Divided differences.
6. Piecewise polynomial interpolation: Piecewise linear interpolation, cubic Hermite interpolation, cubic splines.

There will be **homework assignments** (with MATLAB programming), a **midterm** (tentatively scheduled for Wed., Nov. 1), and a **final** (on Wed., Dec. 13, from 8:30–10:20). (You may use ordinary calculators but NO graphing or programmable features on the exams.) You will need to use the MSCC (or other) computers. You can find information about the Mathematical Sciences Computing Center by typing: <http://www.ms.washington.edu>.

Grading: Homework will count 50%, the midterm will count 15–20%, and the final will count 30–35%. Late homework will be marked down by 10% for each day (or portion of a day) late; solutions to homework problems that have already been gone over in class will not be accepted.