Instructor: Dr. Richard J. Braun, Ewing 509, (302) 831-1869, braun@math.udel.edu.

Text: (1) “Introduction to Scientific Computing” by C. Van Loan, 2nd ed. (2) Selected parts of “Numerical Analysis: An Introduction with Matlab” by Driscoll and Braun; this will be supplied by me at a cost of $20 for the semester (this will be less $ than printing it yourself). The interpolation chapter will come out at the start of class; and the others will be supplied before we start those topics.

Topics covered: Parentheses indicate that the topic will be covered if time permits.

- Interpolation: Piecewise polynomials and splines, polynomial interpolation, barycentric formulas, Chebyshev points, (parametric and trigonometric interpolation, Bézier curves).

- Calculus: Numerical differentiation using finite differences; numerical integration using Newton-Cotes, Gaussian and Clenshaw-Curtis quadrature rules; adaptive quadrature; improper integrals.

- ODE initial value problems: Euler’s method; single step methods; multi-step methods; systems and stiff systems.

- ODE boundary value problems: Shooting and finite difference methods; (finite element method).

- Partial differential equations: finite difference methods for the heat, wave and Poisson equations; (method of lines).

Grading: A subset of the homework will be graded. No make-up exams unless mandated by University policy. No late assignments, projects or exams will be accepted.

- Homework (at least bi-weekly) 34%
- Computer projects (≤ 4) 36%
- 1 75-minute exam 15%
- 1 take-home final exam 15%

Computer projects: Up to four computer projects to be done in MATLAB (or OCTAVE). The course will involve MATLAB in the lectures; use of another language for the course requires my prior approval. The projects will involve writing a code, generating and interpreting results, and presenting the results in a report. X-terminals or PCs for these projects may be found at several locations around campus; accounts for this class are available and the group account number is 2120. Use this account number for computing results in this class.

Homework: The homework will include MATLAB programming.

Web page: Check the course web page regularly for announcements, assignments, etc.: http://www.math.udel.edu/~braun/M428/M428.html.

Tentative Office hours: 9-10 TR, 2-3 (M)W in Ewing 207, or by appointment.