UNIVERSITY OF DELAWARE
Mathematical Sciences Department
Math 428/Cisc 411 Algorithmic & Numerical Solution of Differential Equations
Spring 2008 – Honors Sections

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

Text: "Numerical Analysis: An Introduction with Matlab" by Driscoll and Braun; this will be supplied by me at a cost of $10 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:* Finite difference methods; collocation 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)	35%
Computer projects (≤ 5)	40%
1 75-minute exam	25%

There will be up to two extra assignments for homework and up to one extra project. There will likely be substitution of different projects or homework as well.
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 for one of the composer machines 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: 10-11 T, 9-10 R, 2-3 W, or by appointment.