CS321-002 Introduction To Numerical Methods
Fall 2004 (MWF 12:00 - 12:50 Anderson Hall 265)

Instructor:  Prof. Fuhua (Frank) Cheng
            763B Anderson Hall
            Phone: 257-6760
            Email: cheng@cs.uky.edu
            http://www.cs.uky.edu/~cheng/

Office hours:  MWF 1:00-2:00 pm
              and by appointment

Lab:  MultiLab
      Location: Second floor, EE Annex
      Hours: Sunday 12:00pm - Friday 10:00pm,
              Saturday 9:00am - 7:00pm

       (Author: Cheney and Kincaid  Publisher: Brooks/Cole)
       and my notes (can be downloaded from my home page)

* You will also need an inexpensive pocket calculator of the scientific
  type for homework and exams.

Grading Policy:  

    Homework 20%
    Programming Assignments** 30%
    Midterm 25%
    Final 25%

** Programming assignments have to be done in C or C++.

Late Penalty:

I will accept programs and homework up to 1 week late for a penalty of
5% for each day past due. Programs and homework more than one week
late will not be considered for a grade.

Cheating and Plagiarism:

Plagiarism and cheating are serious academic offenses. The minimum
penalty for those academic offenses is final grade E in the course. The
university regulations pertaining to this matter can be found at
http://www.uky.edu/StudentAffairs/Code/
Of particular relevance is Part II, SELECTED RULES OF THE UNIVER-
SITY SENATE GOVERNING ACADEMIC RELATIONSHIPS, Section
6.3 that can be found at
http://www.uky.edu/StudentAffairs/Code/part2.html

(These rules in particular say:
6.3.1 PLAGIARISM All academic work, written or otherwise, submitted by students to their instructors or other academic supervisors, is expected to be the result of their own thought, or self-expression. In cases where students feel unsure about a question of plagiarism involving their work, they are obliged to consult their instructors or the matter before submission. When students submit work purporting to be their own, but which in any way borrows ideas, organization, wording or anything else from another source without appropriate acknowledgment of the face, the students are guilty of plagiarism.
Plagiarism includes reproducing someone else’s work, whether it be published article, chapter of a book, a paper from a friend or some file, or whatever. Plagiarism also includes the practice of employing or allowing another person to alter or revise the work which a student submits as his/her own, whoever that other person may be. Students may discuss assignments among themselves or with an instructor or tutor, but when the actual work is done, it must be done by the student and the student alone.
When a student’s assignment involves research in outside resources or information, the student must carefully acknowledge exactly what, where, and how he/she has employed them. If the words of someone else are used, the student must put quotation marks around the passage in question and add an appropriate indication of its origin. Making simple changes while leaving the organization, content, and phraseology intact is plagiaristic. However, nothing in these Rules shall apply to those ideas which are so generally and freely circulated as to be a part of the public domain.
6.3.2 CHEATING Cheating is defined by its general usage. It includes, but is not limited to, the wrongfully giving, taking, or presenting any information or material by a student with the intent of aiding himself/herself or another on any academic work which is considered in any way in the determination of the final grade. Any question of definition shall be referred to the University Appeals Board.)

I want to emphasize that in this class students are allowed to discuss ideas and are allowed to help others by explaining concepts and possible solutions. However, all the work that is submitted must be performed by the students individually. Any sharing of electronic files, printouts and other materials developed by the students is not allowed. If any fragments of text appearing in books, journals, conference proceedings, web pages, etc. are used, students must provide appropriate citations. Any help from others must also be acknowledged.

**Scale:**

90 -100   A
80 - 89   B
Course Description:
This course presents the basic techniques for the design, use, and understanding of numerical algorithms. The students will be given application-oriented programming assignments to enhance their ability in solve practical problems.

Learning Outcomes:
Students will learn basic concepts, problems and methods used in numerical computing. Specifically students will be able to
1. estimate computed errors
2. select/propose methods that yield small errors (if possible)
3. understand important properties for a number of basic methods (e.g., Gaussian elimination, Lagrange and spline interpolation, Trapezoidal and Simpson’s quadratures, Newton’s iteration, Runge-Kutta methods).
4. modify problems for better algorithm performance
5. analyze results computed in fl-arithmetic

Course Contents:
1. Number representations and Errors
2. System of Linear Equations (Numerical Linear Algebra)
3. Computation of Matrix Eigenvalues*
4. Polynomial Interpolation
5. Solution of Nonlinear Equations
6. Numerical integration
7. Curve Fitting to Measured Data
8. Interpolation/Approximation by spline functions
9. Ordinary differential equations*

* Optional

Important Dates:
Midterm 10/18/04 (Monday)
Last day to withdraw from a course 10/22/04 (Friday)
Last day of classes 12/10/04 (Friday)
Final Exam 12/15/04 (Wednesday 10:30 am)