Syllabus for MA321 Introduction to Numerical Methods

University of Kentucky, Spring 2012

Time and place:

Section 001: MWF 12:00-12:50 p.m., CB335

Course instructor and contact information:

Instructor: Dr. Alan Demlow, Associate Professor of Mathematics
Office: POT 775, phone 257-6797
E-mail: alan.demlow@uky.edu

Office hours: Office hours will be held in my office, POT775, Tuesdays 9:45-10:45, Wednesdays 2-3, and Fridays 2-3. You are also welcome to e-mail me for an appointment at other times or drop by my office any time the door is open.

Course website: The course website will be linked to from http://www.ms.uky.edu/~demlow/.

Textbook: There is no required commercial textbook for the course. Most of the course will follow lecture notes provided by Prof. Jeffrey Ovall. These will be made available on the course webpage. In addition, I may occasionally suggest readings or assign homework exercises from the free online text *Numerical Computing with MATLAB*, which will also be linked to from the course webpage. There are also a large number of commercial textbooks which cover roughly the same material at the same level, so if you would like suggestions for reading, feel free to talk with me.

Course overview: Complex mathematical models arise in every area of science and engineering. Only rarely can the equations constituting these models be solved exactly using pencil-and-paper techniques. Usually it is necessary to instead *approximate* their solutions using numerical methods which link the continuous and infinite world of mathematics and the finite and discrete world of computer programming. The goal of this course is to introduce participants to some of the most basic and important numerical methods. The course notes are divided into 6 modules:

1. Preliminaries: Calculus review and computer arithmetic
2. Approximation by polynomials and splines
3. Solution of nonlinear equations
4. Numerical integration and differentiation
5. Numerical solution of ODEs
6. Solution of systems of linear equations.

Homework: There will be roughly 6 homework assignments (one for each module) consisting of problems from the course notes or (occasionally) from Moler's book. Assignments and due dates will be posted on the course website. Homework may be turned in during class, to my office in POT775, or to my mailbox in POT715. You are encouraged to work with others while solving homework problems, but you must write up your own solutions. *You must also code your own computer assignments; sharing of codes is not allowed!* Late homework will not be accepted unless prearranged with the instructor or justified by a legitimate and documented (see the ``attendance'' section below). Homework will be worth 24% of your final grade.

Computer programming: Required homework will include some programming exercises. The default is to use MATLAB for these assignments, which is available on many of the computer labs on campus. You may also choose to use any standard procedural programming language (C, Python, Fortran, etc.) for these assignments, though you should be aware that I will be able to provide more help with Matlab than with most other languages. Student versions of Matlab are available, and you may also want to check out the open-source counterparts Octabe and Scilab (see links on the course website).

Exams: There will be two 50-minute in-class exams during the semester (each worth 20% of your final grade) and a final exam (worth 36% of your final grade). The exam schedule with an approximate breakdown (both subject to change) of material covered on each is:

Prelim 1:	Friday, February 24	Modules 1, 2, and 3
Prelim 2:	Friday, April 6	Modules 4 and 5
Final Exam:	Wednesday, May 2, 1 p.m.	Comprehensive

Makeup exams are allowed only for sanctioned university activities or legitimate emergencies and only with written documentation (see "Attendance" below). If you feel that your situation warrants a makeup exam, please check with your instructor as soon as possible to request one.

Accommodations due to disability: If you have a documented disability that requires academic accommodations, please see me as soon as possible during scheduled office hours. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resource Center (Room 2, Alumni Gym, 257-2754, jkarnes@email.uky.edu) for coordination of campus disability services available to students with disabilities.

Grading: Your final grade will be determined by your composite homework score for the semester (24%), your 2 prelims (40% of your grade, or 20% for each prelim), and your final exam (36%). I will use a standard grading scale (90-100% A, 80-89% B, etc.). Individual grade components and overall course grades may be curved up (but not down) in order to ensure a fair distribution of grades.

Attendance: Attendance is required, and you are responsible for all lecture material and announcements made in class. However, lecture attendance will not be recorded. Legitimate reasons for missing class include serious illness, illness or death of a family member, university-related trips, and major religious holidays. Students asking for makeup exams or extensions of written homework due dates should let me know of any conflicts as soon as possible (but in any case no more than a week after the absence) and be prepared to provide written documentation.

Academic integrity: Violations of academic integrity will be taken seriously and dealt with according to university regulations. Instances of cheating on exams include (but are not limited to) copying from or communicating with another student, bringing any kind of notes into the exam unless expressly permitted, and using any type of electronic aid unless expressly permitted. You are encouraged to work together on homework, but you are required to write up and submit your own solutions to all assignments. This includes computer codes: You may consult with other students about programs but must write your own code. Students caught cheating will be prosecuted according to university guidelines.

Classroom Decorum: Students are expected to be attentive and courteous during class. During class, please put away newspapers, turn off cell phones, and refrain from using laptops or other electronic devices except for note-taking purposes.