

Syllabus for MA321 (Numerical Methods)

University of Kentucky, Fall 2006

Time and place:

Section 001: MWF 8:00-8:50 a.m., FB213

Course instructor and contact information:

Instructor: Dr. Alan Demlow, Assistant Professor of Mathematics

Office: POT 775, phone 257-6797

E-mail: demlow@ms.uky.edu

Office hours: Office hours will be held in POT 775, Tuesdays 9:45-10:45 and Fridays 1-2 or by appointment. You are also welcome to drop by my office any time the door is open.

Course website: The course website is http://www.ms.uky.edu/~demlow/321_sp07/. The website will be the official repository for homework assignments, exam information, etc., so please bookmark it!

Textbook: *Numerical Computing with Matlab*, by Cleve Moler. The book and accompanying software are available for free online at <http://www.mathworks.com/moler/>, and the book may also be purchased at the campus store. The text takes a minimalist approach in its coverage of numerical methods, so I have also placed another standard text (*Numerical Mathematics and Computing*, by Cheney and Kincaid) on reserve in the Mathematics Library in the basement of Patterson Office Tower in case you want a more in-depth treatment or a different perspective on topics.

Software and programming: This course requires access to the MATLAB scientific computing environment. The student version of MATLAB may be ordered for \$99 from www.mathworks.com or elsewhere. You are strongly encouraged to purchase your own version of MATLAB, as this will afford you the easiest access to the software. Some campus computer labs also have MATLAB installed, but hours are uncertain at this point. However, I will try to ensure access during the first couple of weeks of the semester in order until you are able to purchase your own copy. Exact times and locations will be announced later.

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. The goal of this course is to introduce participants to some of the most basic and important numerical methods. We will cover the part of Chapter 1 of the text (concerning floating-point arithmetic), the bulk of chapters 2 through 6 (Linear Equations, Interpolation, Zeros and Roots, Least Squares, and Quadrature), and time permitting also some of Chapter 7 (Ordinary Differential Equations).

Prerequisites: Officially students are only required to achieve satisfactory performance in MA114 (Calculus II) prior to enrolling in MA321, but most students would be better served by taking further math courses first. MA322 (Matrix Algebra) would be especially helpful as some of the most important topics in MA321 concern matrices and linear systems of equations. MA213 and MA214 are also natural predecessors to MA321.

Homework: There will be weekly homework assignments consisting mostly of problems from the textbook. You will be asked to hand in all assigned problems, and I will select a few of these to grade each week. You are encouraged to consult with classmates while doing your homework, but you must write up each problem yourself. In addition, many assignments will require writing some code in MATLAB. As above, you may consult with classmates about your codes, but you are required to write and run your own programs. Homework will be worth 150 points.

Exams: There will be two one-hour in-class preliminary exams during the course of the semester. These exams are tentatively scheduled for February 13 and March 28 and will each be worth 100 points. A two-hour comprehensive final exam, worth 150 points, will be held Wednesday, May 2 at 8 a.m. A precise breakdown of material to be covered on each exam will be given later.

Note that while the course homework will often employ MATLAB, the exams will not. Exam problems may sometimes require use of a non-programmable calculator, however; more information will be given on exam review sheets prior to each exam.

Grading: Your final grade will be determined by your composite homework score for the semester (150 out of 500 points, or 30% of your final grade), your 2 prelims (worth 100 points or 20% of your final grade each), and the final exam (worth 150 points, or 30% of your final grade). The standard grading scale will be employed, i.e., 90-100% A, 80-90% B, 70-80% C, 60-70% D, and <60% E. Grades may be curved slightly (but only upward) if this is deemed necessary to ensure a fair grading scale for the course.

Attendance: You are responsible for all lecture material and announcements made in class. Attendance will not be recorded, however.

Academic integrity: All violations of academic integrity will be taken seriously and dealt with according to university regulations.