MA/CS/EGR 537-002 · Numerical Analysis

Spring 2014 · University of Kentucky

Lectures: MWF 11:00AM - 11:50AM , White Hall Classroom Building Room 337

Web Site: http://www.as.uky.edu/~rlca238/ma537

Instructor: Russell Carden (*russell.l.carden@uky.edu*)
Patterson Office Tower 827, 257-5746

Office Hours: MWF 3:00PM - 4:00PM, or by appointment

Prerequisites: Good knowledge of Linear Algebra, Calculus(I,II,III) and Differential Equations.
Experience with a programming language: Matlab/Octave, C/C++, Java, Python.

Grading: 70% Homework, three exams worth 10% each

Problem Sets: There will be approximately ten problem sets, assigned weekly, each will involve written work and occasionally some computational exercises. You may collaborate on the problems, but your write-up and your programs must be your own independent work. Transcribed solutions are unacceptable. A problem set's grade may be based on all or a subset of the assigned problems. Problem sets may be turned in during class, to my office POT827, or to my mailbox in POT 715.

Late Policy: You may turn in two problem sets one assignment period late without penalty, with the exception of pledged assignments. Subsequent late assignments will be penalized 20% each. Homework will not be accepted more than one assignment period late without a written excuse. You may not use two 'lates' on one assignment.

Exams: Two in class exams plus a final will each account for 10% of the final grade.

Text: Kendall E. Atkinson, *An Introduction to Numerical Analysis*

Suggested Reading: Endre Süli, David F. Mayers, *An Introduction to Numerical Analysis*
G.W. Stewart, *Afternotes on Numerical Analysis*
Greenbaum & Chartier,*Numerical Methods*
Kincaid & Cheney, *Numerical Analysis: Mathematics of Scientific Computing*
Cleve Moler , *Numerical Computing with MATLAB* (Free online)
D. J. Higham & N. J. Higham, *MATLAB Guide*

Programming: Most homework assignments will require some programming. Students are encouraged to use MATLAB/Octave for all exercises that involve programing. Your solutions should adhere to good programming standards, and must not be copied from other students. Consult the course web site for pointers to MATLAB tutorials.

Outline: The goal of this course is to introduce participants to some of the most basic and important methods for numerically solving problems of continuous mathematics. There are six topics:

- Error Analysis: Floating Point arithmetic, Conditioning, Cancellation
- Rootfinding: Bisection, Newton, Secant Method
- Interpolation: Lagrange, Newton, Hermite, Numerical Differentiation
- Approximation of Functions: Minmax, Least Squares and Orthogonal Polynomials
- Numerical Integration: Piecewise polynomial, Newton-Cotes, Gaussian Quadrature, Romberg Integration
- Numerical Methods for Differential Equations: Multistep Methods, Initial Value problems, Boundary Value Problem

Any student with a disability requiring accommodation in this course are encouraged contact the Disability Resource Center during the first week of class.

.