

# MATH 371, Fall 2008, Numerical Methods, Section 001

Instructor: Robert Krasny, 4830 East Hall, (734)-763-3505, krasny@umich.edu

Class Time/Location: TuTh 12pm-1:30pm, 2150 DOW

Office Hours: Tu 3-4pm, W 11am-1pm

Textbook: "A Friendly Introduction to Numerical Analysis", by Brian Bradie, ISBN 0-13-013054-0, 1st edition, Prentice Hall

Prerequisites: Math 216 or Math 256, Engin 101

Course Website: [www.math.lsa.umich.edu/~krasny/math371.html](http://www.math.lsa.umich.edu/~krasny/math371.html)

Course Preface:

This course presents a survey of numerical methods used in engineering and science. A numerical method is an algorithm for solving a set of equations. We'll study the accuracy, stability, and efficiency of different methods, so we can compare their capability.

Before computers were built, scientific problems were analyzed using theory and experiments, but now computer simulations are also used in all technical fields. Some examples include airplane design, weather and climate prediction, and modeling the spread of an epidemic.

Of course there are software packages that can be used as a black box. But in this course we'll look under the hood and see how the methods work.

Course Goals for the Students:

1. learn numerical methods used in engineering and science
2. practice programming of numerical methods
3. reinforce math learned in previous courses (calculus, differential equations, linear algebra)

Syllabus:

- floating-point arithmetic (1.3-1.4)
- nonlinear equations and root-finding (2.1-2.7)
- numerical linear algebra (3.1-3.10)
- two-point boundary value problems (8.1-8.2)
- eigenvalues (4.1-4.2)
- polynomial and spline interpolation (5.1-5.7)
- numerical integration (6.3-6.7)
- initial value problems for ordinary differential equations (7.1-7.5)

Final Exam Date: Monday, December 15, 4-6pm, room tba

Grading Policy: midterm #1 = 15%, midterm #2 = 15%, final = 30%, homework = 40%

Homework Policy:

There will be homework assignments roughly every 2 weeks. Homework is due at the beginning of class on the due date. Students are encouraged to discuss the problems with each other and work together in groups. Students have the option to form a team consisting of two people who submit one writeup for grading. The presentation should be neat and legible. Please staple the sheets together.

Other Class Policies:

1. Questions are encouraged in class (and outside class too!).
2. Please - no cellphones, eating, reading newspapers, or web surfing in class. Thank you!