# Math 471, Fall 2013, Section 001

**Instructor:** Peter Bosler, 4823 East Hall, pbosler@umich.edu
**Class Time / Location :** Tu & Thu, 8 AM – 9:30 AM, 1123 LBME
**Office Hours :** W 3-4PM, F 11AM-12PM, and by appointment

**Textbook :** Brian Bradie. *A Friendly Introduction to Numerical Analysis*, Pearson Prentice Hall, 2006. ISBN 0-13-013054-0.

**Prerequisites :** Differential equations (*e.g.* Math 216, 256, 286, or 316).
Linear algebra (*e.g.* Math 217, 417, or 419).

**Course Website:** www-personal.umich.edu/∼pbosler/teaching/math-471-sec-001-fall-2013.html

Math 471 is a survey of numerical methods for science and engineering. A numerical method is an algorithm, or sequence of steps, for solving a set of equations. These can be linear equations, nonlinear equations, or differential equations. We will study the accuracy, stability, and efficiency of some of the basic methods.
Scientific problems were traditionally investigated by theory and experiment, but now computer simulations are increasingly relied upon for such problems as airplane design, weather forecasting, modeling the spread of diseases, and improving the efficiency of solar cells, to name just a few examples. Many models are solved by software packages that act as numerical "black boxes," outputting model solutions for user-supplied input data. In this course we will examine the methods that provide the foundations for those software packages.

**Syllabus :**
floating-point arithmetic
nonlinear equations and root-finding
numerical linear algebra
two-point boundary value problems
Poisson equations with Dirichlet boundary conditions
eigenvalues
polynomial and spline interpolation
numerical integration
initial value problems and ordinary differential equations

**Exams :**
Midterm Exam : Thursday, October 31, in class
Final Exam : Friday, December 13, 10:30 AM – 12:30 PM, room tba

**Grading Policy :** midterm = 20%, final exam = 40%, homework = 40%

**Homework Policy :** Homework will be assigned every 1–2 weeks. Some problems will require programming, for which Matlab is recommended. Students are encouraged to discuss the problems with each other, but each student must write up and submit his or her own solution set. This includes Matlab code– copying/pasting other students' work is not allowed. Presentation must be neat and legible, and multiple sheets must be **stapled**. Loose papers will not be accepted.

**Other policies :**
1. Questions are encouraged in class (and outside of class too– use email or office hours).
2. Please – keep your electronic devices on silent. No texting, web surfing, *etc.,* during class.