Math 420/520, Ordinary Differential Equations, Fall 2008

Class Time: MWF 10-10:50a.m. in Volcanology 101

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Textbook: *Elementary Differential Equations*,
by Boyce and DiPrima, 8th edition.

1. **Background and Goals.** Differential equations are used to describe processes that vary continuously with respect to time. In applications, one often knows some relationship between an unknown function (or system of functions) and its derivatives, and uses this relation to determine the original function. This course covers the basic theory of ordinary differential equations. This includes stability theory and the existence and uniqueness of solutions, and techniques of solutions for linear systems of equations.

2. **Exams.** There will be a midterm in-class exam on Wed. of week 6 and a final exam.

3. **Homework.** Homework problems will be assigned every week and are due in class on Wednesday on the material of the previous week. No late homework will be accepted.

4. **Grading.** The grading distribution will be as follows:

Homework:	25%
Midterm Exam:	25%
Final Exam:	50%

5. **Weekly Schedule.**
   1. *Systems of first order linear differential equations.* Read 7.1, 7.2, 7.3.
   2. *Linear systems with constant coefficients.* Read 7.4, 7.5, 7.6.
   3. *Fundamental matrices and eigenvalues.* Read 7.7, 7.8, 7.9.
   4. *Existence and uniqueness theorems.* Read 2.4, 2.8.
   5. *Stability and the phase plane.* Read 9.1, 9.2
   6. *Almost linear systems, MIDTERM.* Read 9.3
   7. *Applications to population dynamics.* Read 9.4, 9.5
   8. *Liapunov's second method.* Read Chapter 9.6.
   9. *Periodic solutions, limit cycles, and chaos.* Read Chapter 9.7, 9.8.
   10. *Review.*