3450:436/536-001 Mathematical Models, Spring 2014
Dr. Kevin Kreider, CAS 273, (330) 972-7519, kreider@uakron.edu
web page:

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Office Hours: daily 12:00-1:00 and by appointment.
Text: *Mathematical Models*, Haberman, SIAM Press, 1998.

Policies:

1. If you have any questions or concerns about this course, don't hesitate to talk with me.

2. The goals of the course are to learn to cast physical problems in mathematical format, to learn tools for the analysis of mathematical problems, and to learn technical writing skills.

3. Course grades are determined by a total of 300 points:

   200 pts 2 midterm exams (100 pts each)
   100 pts homework

   The tentative grade scale is: A (279-300), A- (270-279), B+ (261-269), B (249-260), B- (240-248), C+ (231-239), C (219-230), C- (210-218), D+ (201-209), D (189-200), D- (180-188), F (0-179).

4. Homework problems will be assigned and collected regularly. Students enrolled in 536 will have some extra problems. Homework focuses on analytical techniques, but some problems may require computation. Many problems have a component of formal technical writing.

5. There will be two noncomprehensive exams, one during finals week. Exams will focus on the analytical techniques discussed in class. If you are unable to take an exam, contact me as soon as possible to determine if a make up exam will be allowed.

6. All University regulations apply to this course. In particular, the policies concerning academic dishonesty, sexual harassment and withdrawal from a course apply. The deadline to withdraw is 3 March. The withdrawal policy is found at

   http://www.uakron.edu/ogc/UniversityRules/pdf/20-05.1.pdf

7. If you carry a cell phone, please turn it off while you are in class. Each time your cell phone rings during class, you will lose 5 homework points.

Tentative Syllabus

Any changes will be announced in class

1. Introduction (3 weeks)
    a. Course organization
    b. A classical example
    c. Scaling and nondimensionalization
    d. Technical writing
    e. Deriving differential equations
2. Geometry Model – Hours of Daylight (1 week)
3. Ordinary Differential Equation Models (4 weeks)
    a. Regular perturbations
    b. Systems of equations
    c. Phase plane
    d. Linear stability analysis
    e. Bifurcations
    f. Predator-prey models
    g. Epidemics
    h. Chemical reactions

    Exam 1 after Regular Perturbations
4. Probabilistic Models (3 weeks)
    a. Stochastic and Markov processes
    b. Generating random numbers
    c. Pitting corrosion
5. Partial Differential Equation Models (the rest of the semester)
    a. Conservation of mass, transport equation
    b. Traffic flow

    Exam 2 during finals week

I have made this letter longer than usual, because I lack the time to make it short.
Blaise Pascal, 1623-1662