

**MATH 360-1, Fall 2009****MENU Applied Analysis**

**Instructor:** Paul Goerss Lunt 206, office phone 491-8544.

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Office hours: Monday, Wednesday, 2 – 3 or by appointment

**Course Time:** MWFTh Lunt 101 at 1PM

**Text:** R.L. Borelli and C.S. Coleman, *Differential Equations: A Modeling Perspective*, 2nd ed.

The course covers (parts of) Chapters 2, 3, 4, and 6. The second quarter would cover Chapters 5, 7, 8, and 10, with supplementary material on PDEs. In particular, anyone taking both quarters would have a healthy background in differential equations and their applications to science.

**Web site:** This class will have a computer component, for one theme of this class is to learn when the computer can – and when it cannot – help with differential equations. The web site will have the syllabus (this document), assignments, information about our numerical solver, and the like.

**Maple:** The numerical solver supported by the instructors is Maple 10. How to obtain Maple, basic instructions on its use, and worked out examples of the kind of problems we will encounter are on the class web site. The first quiz section (9/24) will be about trying to download and use Maple.

**Homework:** Homework will be assigned every day and will be a basis of discussion in class. Most will not be collected; however, intelligence guided by experience will tell you that a student behind on homework is a student adrift. In the weeks without a project or test a small number of harder problems may be collected.

**The Evaluation Component – Grades:** Your performance will be assessed by means of two in-class exams, and three projects on a schedule of roughly once every two weeks. The exact schedule is below. The test will be in a standard, closed book, fifty minute format. The format for the projects will be much more flexible, but each will have a mathematical (that is, written) and computer component. More details will be supplied at the appropriate time. Each of the five will count as 20% of your grade. There will be no final. I reserve to myself the privilege of adjusting grades upward if I detect signs of originality, insight, or creativity. Here is the exact schedule:

- Project 1: Due Friday, October 9. This will be drawn from Chapters 1 and 2.
- Test 1: Friday, October 23, covering roughly Chapters 1–3.
- Project 2: Due Friday, November 6. This will be drawn from Chapters 3 and 4.
- Test 2: Friday, November 20, covering roughly Chapters 6–8.
- Project 3: Due on or before 5PM, December 11. This will be drawn from Chapter 6.

Note that there is no final exam. The last project is due on the last day of exams, although you are welcome to hand it in earlier.

## Schedule of Topics

The following schedule should be regarded as a close approximation, not completely exact.

Week 1. Week of 9/23.

Modeling problems; simple differential equations (Chapter 1)

Week 2. (9/28)

First order differential equations. (Chapter 2)

Week 3. (10/5)

Qualitative behavior of first order equations (Chapter 2)

Project 1 due Friday

Week 4. (10/12)

Second order equations: applications, some basic solutions (Chapter 3)

Week 5. (10/19)

Second order equations: further analysis (Chapter 3)

Test 1 on Friday

Week 6. (10/26)

Linear systems of equations (Chapter 6)

Week 7. (11/2)

Phase plane analysis (Chapter 6)

Project 2 due Friday

Week 8. (11/9)

Non-linear equations; linearization (Chapter 6)

Week 9. (11/16)

Applications: pendulums and populations (Chapters 2,3, and 6).

Test 2 on Friday

Week 10. (11/23)

Review for final project.

Thanksgiving week

Week 11. (Reading week)

Project 3 due exam week