

**MATH 360-1, Fall 2008****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:** *Mathematical Modelling with Case Studies* by B. Barnes and G.R. Fulford  
The course covers essentially Parts I and II. The next quarter would cover much of Parts III and IV, with supplementary material on PDEs.

**Web site:** This class will have a computer component, for one of the most important things to learn about differential equations is when the computer can – and when it cannot – help. The web site will have the syllabus (this document), assignments, information about our numerical solver, and 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 (9/25) will give examples of what can be done with 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 10. This will be drawn from Chapters 2 and 3.
- Test 1: Friday, October 24, covering roughly Chapters 2–5.
- Project 2: Due Friday, November 7. This will be drawn from Chapters 5 and 6.
- Test 2: Friday, November 21, covering roughly Chapters 6–8.
- Project 3: Due on or before 5PM, December 12. This will be drawn from Chapters 7 and 8.

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 9/24.

Modelling problems; simple differential equations. (Chapter 2)

Week 2. (9/29)

Population problems (Chapter 3)

Week 3. (10/6)

Numerical solutions of ODEs (Chapter 4)

Project 1 due Friday

Week 4. (10/13)

Interacting populations; predator-prey, species die-out (Chapter 5)

Week 5. (10/20)

Phase plane analysis; applications to population problems (Chapter 6)

Test 1 on Friday

Week 6. (10/27)

Phase planes, linearization, systems of equations (Chaps 6–7).

Week 7. (11/3)

Non-linear problems; applications of linearization (Chap 7.)

Project 2 due Friday

Week 8. (11/10)

Improved populations models (Chap 8)

Week 9. (11/17)

Population models; case studies (Chap 8)

Test 2 on Friday

Week 10. (11/24)

Review for final project.

Thanksgiving week

Week 11. (Reading week)

Project 3 due exam week