

# APPM 3010

## Introduction to Dynamical Systems

### MWF 12-12:50 - Fall 2004

#### 1. Overview

This course is an introduction to the exciting world of dynamical systems, with an emphasis on application. Topics covered will include stability of equilibrium points, existence of periodic orbits, bifurcation theory, and chaos, and examples will be taken from such diverse fields as biology (population dynamics, oscillators), chemistry (reaction kinetics), and physics (mass on a spring, pendulum, Hamiltonian systems). Calculus II (APPM 1360 or equivalent) should suffice as a prerequisite.

#### 2. Instructor :

- Dr. Jamison Moeser
- Email : moeser@colorado.edu
- Phone : 303-492-7569
- Office : ECOT 234
- Office hours : TBA

#### 3. Course Goals:

- To learn the basic analytical techniques which form the cornerstone of modern dynamical systems theory.
- To develop a geometric intuition about continuous and discrete dynamical systems.
- To gain an appreciation for the use of these techniques in analyzing models of a wide variety of physical phenomena.

#### 4. Grading:

- Homework - 25%  
Homework will be collected approximately every two weeks. A random sample of problems will be graded, and solutions will be posted on the course webpage. **Late homework will not be accepted under any circumstance.** However, the lowest assignment will be dropped. The homework will reinforce the material from class and is an essential part of the course. A number of questions on the exams will come directly from the homework. Group work is encouraged, but each person must hand in his/her own assignment.
- Two midterm exams - 25% each  
The exam dates will be announced at least two weeks in advance. There are no make-up exams. If you miss one exam, your other midterm score will count twice.
- Final exam or project - 25%  
Each student will have a choice between a final exam or project. Those students who choose a project must provide me with an outline after the second midterm. I have many suggestions for potential projects, and class time will be set aside for oral presentations. For those students electing to take the final, the exam will be cumulative and will take place during the time allotted in the finals period.

#### 5. Textbook :

- *Nonlinear dynamics and chaos with applications to physics, biology, chemistry, and engineering* - Steven Strogatz - 1994 (Westview Press)

The book is available in the bookstore. Most of the reading and homework assignments will be from here, though I may occasionally use handouts. The book is **very** good.

#### 6. Attendance :

Class will start promptly at noon in ECCR 108.  
Please do not arrive late.