MAT 667 (Dynamical Systems)
Syllabus for Fall 2006
MWF 10:20-11:10 in AMB 207

Instructor Information

Instructor: Jim.Swift@NAU.edu  AMB 110  523-6878  www.nau.edu/Jim.Swift

Office Hours: MWF 11:25 - 12:00 and MTWF 2:55 - 3:30. If these times are inconvenient, you can make an appointment, or drop by my office. Of course, you can send me e-mail any time.

Websites: Go to my home page (www.nau.edu/Jim.Swift) and follow the “Teaching” link. That link takes you to the instructor information page, where there is a link to the web site for this class, as well as a link to official U.S. time, http://www.time.gov, that our class will observe.

Course Description

Readings: There is no text book. We will read several journal articles which I will hand out.

Prerequisite: MAT 665, or consent of instructor. This is the official prerequisite, but MAT 239 and the mathematical maturity of

Content: The course is about first order Ordinary Differential Equations (ODEs) and iterated mappings. These model time evolution, hence the name “dynamical systems.” We will explore deterministic chaos as well as regular (non-chaotic) dynamics. Much of the course is based on examples. The logistic map, the solenoid, and the Smale horseshoe are examples of iterated mappings, also called discrete dynamical systems. The Lorenz equations is a chaotic system of ODEs. The course will emphasize the concepts of structural stability and bifurcation theory.

Basis of Evaluation

The grade for the course will be determined by an equal weighting of the following three components

Homework: You know by now that it is necessary to practice math to learn it. You are allowed and encouraged to work together on homework. Some of the homework problems will require computer work.

Project: You will do a research project, and make a presentation to the class. This is not a Masters thesis, and it is OK if you are reproducing known results. However, it is not too hard in this relatively young field to find things that have not been done before. I will give suggestions throughout the early part of the semester on possible topics. These need not be computer-based, but that is probably the best option.

Exams: There will be two take-home midterms. These together have the same weight as the in-class, open-book, comprehensive Final Exam, which is scheduled for Monday, December 11, from 10:00 to 12:00.