Text:

- Strogatz: *Nonlinear Dynamics and Chaos*, second edition

Instructor:

- Dr. Karl Glasner
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- Office Hours: MW 3-4, and by appointment
- Internet: http://www.math.arizona.edu/~kglasner/math454

Course Description:

This course is an outgrowth of the study of ordinary differential equations, and would more typically be called “dynamical systems”. Rather than focusing on the question “what IS the solution” (which is, in most problems, impossible to fully address), we ask “what properties do solutions possess?” The study of dynamical systems is therefore meant to address both qualitative and quantitative features rather than solution techniques (although some will be needed to make things concrete). The end of this course is an introduction to some of the most significant (and well publicized!) developments in quantitative science that have occurred over the last half century. We will encounter and make precise familiar buzzwords such as “chaos” and “fractal”. Along the way, some advanced ideas in applied mathematics will be carefully introduced.

Grading Policy:

Grades are based upon QHEs (see below), and projects that may involve computer work. The lowest QHE grade will be dropped. If a QHE is missed, this will automatically count as the dropped QHE. The course grade will be determined by combining performance on each as follows:

- 70% QHEs
- 30% written projects

Grades will be assigned roughly as 90-100=A, 80-89=B, etc., with some possible adjustment downward being made as the semester progresses. The final grading scale will not reflect a “curve” that is sensitive to the class average, but is rather based upon some fixed benchmark of knowledge acquisition.

QHEs: This is a hybrid evaluation tool, short for quiz-homework-exam, which has the advantage of being more frequent than exams and incentivizes keeping up with the lecture material. It combines some written homework (shown on the website and turned in with the in-class portion) and quiz or exam type questions, given in class. These will often take place on Mondays (with modifications for holidays), and will cover material since the previous
Questions are heavily based on homework problems listed on the web site, so doing these ahead of time will significantly enhance your grade.

Projects:
Projects are based in part on challenging book exercises. Some of the projects require the use of MATLAB, a high-level mathematical environment and language. You will generally be given templates for MATLAB projects, so very little coding on your part will be needed. Projects must be typeset or word processed, and follow the usual rules of good writing and presentation.

Notes:
- **Make-up work**, including the rescheduling of exams, is allowable only after written permission is obtained according to university policy. This applies to assignments or exams missed because of illness, family emergencies or personal problems. If written permission cannot be obtained, no credit will be given. No exceptions to this policy will be made by the instructor.

- **Attendance**: Attendance in EVERY class is mandatory. Students should be familiar with the university attendance policy. As few as three (3) unexcused absences will result in either an administrative withdrawal, OR automatic failure of the class, at the discretion of the instructor.

Calendar:
- Week of Aug 21: Introduction, Chapter 2
- Week of Aug 28: Chapter 2
- Week of Sept 4: Chapter 3 (No class Monday)
- Week of Sept 11: Chapter 3,4
- Week of Sept 18: Chapter 4
- Week of Sept 25: Chapter 5,6
- Week of Oct 2: Chapter 6
- Week of Oct 9: Chapter 6,7
- Week of Oct 16: Chapter 7
- Week of Oct 23: Chapter 8
- Week of Oct 30: Chapter 8,10
- Week of Nov 6: Chapter 10 (No class Friday)
- Week of Nov 13: Chapter 9,11
- Week of Nov 20: Chapter 11 (No Class Friday)
- Week of Nov 27: Chapter 11,12
- Week of Dec 4: Chapter 12 (No Class Friday)