Math 5470 - 1  Chaos Theory                                          January 11, 2016
Math 6440 - 1  T, Th 9:10 - 10:30  in LS 101.

Homepage:       http://www.math.utah.edu/~treiberg/M5470.html
Instructor:     A. Treibergs, JWB 224, 581 - 8350.
Office Hours: MW 11:45-12:45, T10:45-11:45 (tent.) & by appt.
E-mail: treiberg@math.utah.edu

Prerequisites: “C” or better in MATH 2250 OR MATH 2280 OR consent of instructor.

Texts:          Stephen H. Strogatz, Nonlinear Dynamics and Chaos: With Applications to
Physics, Biology, Chemistry, and Engineering (Studies in Nonlinearity)

Grading
Homework:   To be assigned weekly. Homework will be due Fridays and will be collected
in class. Papers turned into my mailbox in the math mail room (JWB 228) by
4:00 PM Fridays before I leave will be regarded as being turned in on
time. Homework that is late will receive half credit.

Term Project:   Students will write a short mathematical paper on an approved topic of
their choice. This paper will allow students to explore in some detail a
mathematical theory or a model from science or engineering beyond what's
covered by lectures. Students will meet individually with the instructor
to discuss an outline of their proposed project. Project outlines must be
approved by Mar. 10. Completed projects are due the last day, Apr. 26.

Exams:   Exams will be closed book except that you will be allowed
to bring a “cheat sheet,” an 8.5” x 11” piece of paper with
notes on both sides. Your text, notes, homework papers,
calculators laptops, tablets, phones, text messaging devices,
and other books will not be allowed.

Midterms: There will be two in-class one-hour midterm exams on Thursdays
Feb. 18 and Mar. 31.

Final Exam: Wed., May 4, 8:00 – 10:00 AM. Half of the final will be devoted to
material covered after the second midterm exam. The other half will be
comprehensive. Students must take the final to pass the course.

Course grade: Two midterms 40% + Project 10% + HW 20% + final 30%.

Withdrawals: Last day to drop a class is Jan. 22. Last day to add a class is Jan. 22.
Until Mar. 4 you can withdraw from the class with no approval at all.
After that date you must petition your dean's office to be allowed to
withdraw.

ADA:            The University of Utah seeks to provide equal access to its programs,
services and facilities for people with disabilities. If you will need
accommodations in this class, reasonable prior notice needs to be given
to the Center for Disability Services, 162 Olpin Union Building,
581-5020 (V/TDD). CDS will work with you and the instructor to make
arrangements for accommodations. All information in this course can be
made available in alternate format with prior notification to the Center
for Disability Services (www.hr.utah.edu/oeo/ada/guide/faculty/)

Faculty and Student Responsibilities:
All students are expected to maintain professional behavior in the
classroom setting, according to the Student Code, spelled out in the
Student handbook. Students have specific rights in the classroom as
detailed in Article III of the Code. The Code also specifies proscribed
conduct (Article XI) that involves cheating on tests, plagiarism and/or
collusion, as well as fraud, theft, etc. Students should read the Code
carefully and know they are responsible for the content. According to the
Faculty Rules and Regulations, it is faculty responsibility to enforce
responsible classroom behaviors, beginning with verbal warnings and
progressing to dismissal from class and a failing grade. Students have
the right to appeal such action to the Student Behavior Committee.
Faculty must strive in the classroom to maintain a climate conducive to
thinking and learning (PPM 6-316). Students have a right to support and
assistance from the University in maintaining a climate conducive to
thinking and learning (PPM 6-400).

Note:          The syllabus is not a binding legal contract. It may be modified by the
instructor when the student is given reasonable notice of the
modification.

Course Description:
Chaos is everywhere around us from fluid flows, weather forecasting, stock
prices and fractal images. The theory of nonlinear dynamical systems uses
bifurcations, attractors and fractals to describe the chaotic behavior in the real world. The course gives an introduction to chaotic motions, strange attractors, fractal geometry:

We shall generally follow Strogatz' text. We will emphasize applications taken from various subjects like mathematical biology, engineering, geometry and physics. Occasionally we'll refer to other texts. Topics include (depending on time):

- Mechanical Vibrations
- Chemical Oscillators
- Superconducting Circuits
- Insect Outbreaks
- Genetic Control Systems
- Chaotic Water Wheel
- Noisy Communications