

MATH 638 CONTINUOUS DYNAMICAL SYSTEMS

SYLLABUS – SPRING 2010

Instructor: Antonio Palacios
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Office Hours: MW 1PM – 2PM, and by appointment.

Textbook: Nonlinear Dynamics and Chaos. Author: S. Strogatz.

In addition to a textbook, the material covered in this course will also be drawn from several reference books and a number of journal articles. A final oral presentation of research work/paper in nonlinear dynamics will be required. The actual research work will be chosen based on individual interests. The purpose of this presentation is to provide exposure to scientific or industrial applications of nonlinear science methods.

REFERENCES

- Chaos: An Introduction to Dynamical Systems. Authors: Kathleen T. Alligood, Tim D. Sauer, James A. Yorke. Publisher: Springer 1996.
- S. Wiggins, Introduction to Applied Nonlinear Dynamical Systems and Chaos, Springer-Verlag
- Collection of research papers.

Grading	Homework	50%	Grading Scale: A -- 90% and above B -- 80% and above C -- 65% and above D -- 55% and above
	Midterm Exam	25%	
	Final Project	25%	

Make-up Policy: Homework dates will be announced in advance. Late homework will not be accepted. Make-up tests are given only under verifiable cases. **Software recommended:** MATLAB

OUTLINE OF COURSE

Dynamical systems is the study of phenomena that evolve in space and/or time. Whether a particular system comes from biology, physics, chemistry, or even the social sciences, dynamical systems is the subject that provides the mathematical tools for its analysis. Chaotic systems, which can be very simple, are capable of generating erratic behavior that is different from the one produced by quasi-periodic systems with a large number of frequencies of oscillations. Such systems are the subject of this course. In M538, we studied discrete-time dynamical systems. Now in M638 the focus will be on continuous-time systems. M538, however, is not a prerequisite for this course.

Throughout the semester we will learn different analytic and geometric techniques for studying nonlinear dynamical systems. Specific examples from interdisciplinary areas will be covered as time allows it. Mathematical software such as MATLAB will be used to enhance basic concepts. The course is intended for first year graduate students in Applied Mathematics, Computational Science, Engineering, Physics, Chemistry, Biology, etc. Senior undergraduate students can also register with permission from instructor.

IMPORTANT DATES

Withdrawal (fees refunded) Day: January 19
Last Day of Classes: May 12