

SU DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE  
 SYLLABUS (*Tentative*)  
 MATH 475/575 *Introduction to Dynamics and Chaos*

**Description:** Introduction to mathematical dynamics and chaos. Topics include orbits, bifurcations, Cantor sets and other fractals, symbolic dynamics, fractal dimension, notions of stability, and chaos. Includes motivation and historical perspectives, as well as examples of fundamental maps studied in dynamics and applications of dynamics.

**Prerequisites:** Calculus II (MATH 202) and Discrete Math (MATH 210).

**Text:** "A First Course in Chaotic Dynamical Systems: Theory & Experiment," by Robert Devaney; Perseus Publishing (a division of HarperCollins), 1992.

	<i>Weeks</i>
<i>Introduction</i>	1
Continuous vs. Discrete, Linear vs. Non-Linear, Examples, and Objectives	
<i>Linear Systems</i>	1
<i>Non-Linear Systems 1</i>	1
Fixed Points, locating Fixed Points, Stability, and Linearization.	
<i>Non-Linear Systems 2</i>	4
Periodic orbits, Bifurcations, Orbit Diagrams, Sarkovskii's Theorem, Chaos, Symbolic Dynamics, Topological Conjugacy, and the Shift map.	
<i>Fractals</i>	3
Cantor's set and similar examples, Contraction Mapping and Iterated Function Systems, and Fractal Dimension.	
<i>Complex Dynamical Systems</i>	2
Julia Sets, the Mandelbrot Set, and Newton's Method in the Complex Plane.	
<i>Optional topics, projects, and tests</i>	<u>2</u>
	14

**EVALUATION**

Homework	30%
Project	30%
Midterm exam	20%
Final exam	20%