APM560. Applied Dynamical Systems Methods, SLN 87500
Syllabus, Fall 2013

Texts (optional):
S.H. Strogatz [1994], “Nonlinear Dynamics and Chaos with Applications to Physics, Chemistry, and Engineering,” Addison-Wesley.


Instructors: Wenbo Tang
Office: PSA 837
Meeting Schedule: T Th 3:00-4:15PM, PSA 308
Office hours: T Th 12:00-1:15PM and by appointment, in PSA837

Contents and prerequisites:
We focus on applications of modern dynamical systems methods to problems in physics, biology and engineering. We emphasize, among other things, the applications in fluid mechanics including transitions to turbulence and chaotic Lagrangian mixing.

There is no prerequisite for this course, although prior exposure to ODEs and PDEs is certainly helpful.

Topics

Introduction to Dynamical Systems

Bifurcations

Averaging and perturbations

Weakly nonlinear dynamics; center manifold theorem

Stability and bifurcation in fluid dynamics

Mixing and Chaos

Homework assignments and grading:
There is no homework in this course. Students are assigned class projects 3-4 weeks into the semester which they work on and present at the end of the semester. There is also a mid-term presentation of the projects after the fall break.

Grades are given based upon class participation: 25%, mid-term presentation: 35% and the final presentation: 40%.