

MAT560. Applied Dynamical Systems Methods, SLN 25615
Syllabus, Spring 2009

Texts (optional):

S.H. Strogatz [1994], "Nonlinear Dynamics and Chaos with Applications to Physics, Chemistry, and Engineering," Addison-Wesley.

J. Guckenheimer and P.J. Holmes [1983], "Nonlinear Oscillators, Dynamical Systems, and Bifurcations of Vector Fields," Springer-Verlag (7th printing 2002).

J.M. Ottino [1989], "The Kinematics of Mixing: Stretching, Chaos, and Transport," Cambridge University Press.

Instructor: Wenbo Tang

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Phone: x5-1476

Email: Wenbo.Tang@asu.edu (preferred)

Meeting Schedule: MW 2:00PM-3:15PM, PSA 308

Office hours: MW 3:15PM-4:30PM (subject to change) and by appointment, at PSA 837

Contents and prerequisites:

We focus on applications of modern dynamical systems methods to problems in physics, biology and engineering. We emphasize, among other applications, 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 spring break.

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

ACADEMIC DISHONESTY!

In the “Student Academic Integrity Policy” manual, ASU defines “Plagiarism’ [as] using another’s words, ideas, materials or work without properly acknowledging and documenting the source. Students are responsible for knowing the rules governing the use of another’s work or materials and for acknowledging and documenting the source appropriately.” You can find this definition at:

http://www.asu.edu/studentaffairs/studentlife/judicial/academic_integrity.htm#definitions■

Academic dishonesty, including inappropriate collaboration, will not be tolerated. There are severe sanctions for cheating, plagiarizing and any other form of dishonesty.

Please see me after class if you have questions or concerns.