

Physics 594: Nonlinear Dynamics

What We'll Do

This course will cover nonlinear differential equations and mappings, and their application to physics, chemistry, and biology. About the last third of the course will be on chaos. We'll also do some computing, either online with codes that already exist, or in a more extensive way.

The only real prerequisite for the course is a basic knowledge of differential equations. Knowledge of a programming language is useful, but not required. Juniors and seniors who are majoring in physics should have enough background for the class. We'll cover most of the topics in the textbook (see below), roughly in order. I'll also add some material on statistical mechanics and perhaps a few other topics. I don't have a formal schedule, however.

If you miss more than a few classes without telling me ahead of time I will contact you with the news that I'll be reducing your grade for more missed classes.

The Professor

My name is Jon Engel. Besides teaching, I do research in theoretical nuclear physics (often applied to particle physics or astrophysics). You can talk to me about that stuff, as well as the course, at any time (provided I have the option of putting you off until office hours, which are **MTW, 11:00 – 12:30**).

Office: 250 Phillips

Phone: 962-2619

email: engelj@physics.unc.edu.

The Text

We'll follow the book, *Nonlinear Dynamics and Chaos* by Steven H. Strogatz, pretty closely. It's a really good book! We'll skip some topics and others we'll treat in more depth than the book does. The second edition differs slightly from the first, but you can get either.

Homework

The weekly assignments will mostly be problems from book, though I'll also ask you to do some numerical experiments. You're welcome to do the homework together but please don't hunt around for solutions on the internet. If I find that you've copied solutions from the internet I'll lower your course grade by one "letter."

Grading

The homework will be worth 20% of your grade. A midterm (on a date to be arranged) will count for 40% and the final (at 8:00 on Friday, April 29, the very first exam period) for the other 40%.

Finally...

I hope this class will be a lot of fun. Please give me feedback on how it's going and suggestions for making it go better. And remember . . .

In nonlinear dynamics, we're keeping it real!