MATH 605 **TOPICS IN PROBABILITY** **SPRING 2010**

Stochastic Dynamical Systems:

Stability, Equilibrium and Bifurcation for Stochastic Differential Equations

Dynamical systems is the name given to the study of the large time qualitative behavior of a deterministic system whose evolution (in continuous time) is given by an ordinary differential equation. In this course we will consider similar questions for systems given by stochastic differential equations (SDE). Topics will include

- conditions for non-explosion, recurrence or transience
- stability and Lyapunov exponents for linear SDE
- multiplicative ergodic theorem and local stable manifold theorem
- examples of stochastic bifurcations

There is no single text for the course. The material for the course will be taken from a variety of books and papers.

PREREQUISITE. Students should have a knowledge of stochastic integration, Itô's formula, and the basic existence and uniqueness theorem for stochastic differential equations. All other required results and techniques will be developed within the course. This background material can be found in Chapters 3, 4 and 5 of the book "Stochastic Differential Equations" by Bernt Øksendal. (Students who wish to get a head start in the course are advised to read Chapter 7 also.)

TIME & PLACE. There will be an organizational meeting on Monday January 11 at 2 pm in the Math Common Room KAP 410.

For more information, contact Peter Baxendale `baxendal@math.usc.edu`