Math 668: Introduction to Ergodic Theory
Spring 2003

In this course, we present basic notions from Ergodic Theory and illustrate them on examples, using principally rotations of the circle and algebraic toral automorphisms. Topics to be covered include:

Spectral Theory: ergodicity and mixing.

Ergodic Theory: Ergodic theorems of Birkhoff and Kingman. Homeomorphisms of the circle: rotation numbers and minimality. Toral automorphisms: ergodicity, mixing, coding on examples, stability. Entropy: definition, the Shannon-McMillan-Breiman theorem. Introduction to Smooth Ergodic Theory: the Oseledec theorem, Lyapunov exponents, relation with entropy and dimension.

The material will be taken from several sources. Most of the basic ergodic theory can be found in:

P. Walters. An Introduction to Ergodic Theory. Graduate Texts in Math. 2000 (new edition).

A companion book for the course is
B. Hasselblatt & A. Katok. A first course in Dynamics, Cambridge University Press (publication in February 2003).

The classical A. Katok & B. Hasselblatt. Introduction to the modern theory of dynamical systems. Cambridge University Press, and others introduction books will be used for supplementary reading.

The prerequisites are a basic course in real analysis and an introductory course in differentiable manifolds.