

ETH-ZÜRICH MATHEMATIK

Sommersemester 2003

Vorlesung:

Introduction to ergodic theory

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Ergodic theory is the investigation of iteration of a measure-preserving mappings of a measure space to itself. Original impetus for the study of the subject came from some ideas of Boltzmann about the foundations of statistical mechanics, but it has found application in many other fields, e.g., probability theory, differentiable dynamical systems and even number theory and combinatorics. Goal of the course is to present the main ideas and methods of general “abstract” ergodic theory, i.e., with relatively little attention to special features when the transformation is in fact a smooth mapping. I plan to discuss the following topics:

1. Introduction: Definitions and examples
2. Poincaré recurrence
3. Mean and pointwise ergodic theorems
4. The mixing property and its generalizations
5. Spectral invariants
6. Kolmogorov-Sinai entropy
7. Shannon-McMillan-Breiman theorem
8. Automorphisms of compact metric spaces
9. Subadditive ergodic theorem and Lyapunov exponents

Prerequisites: Measure theory (on the level of *Analysis III*), and rudiments of Hilbert space theory. Some knowledge of probability theory – notably infinite product measures – will be useful but not indispensable.

Zeit: Donnerstag, 13.15–15.00 Uhr

Ort: HG E1.2

Beginn: Donnerstag, 3. April