SPRING 2006 597 F

Topics in dynamical systems and ergodic theory

A.Katok

Tentative plan. The order of lectures may not follow the order below. References are for orientation.

HYPERBOLIC DYNAMICS
Gibbs measures, SRB measures and absolutely continuous invariant measures for hyperbolic systems (IDS, Chapter 20).

Introduction to partially hyperbolic systems. The center manifold theorem . Accessibility property. Criteria for topological transitivity. Periodic cycles functionals and solutions of cohomological equations.

GENERAL TOPICS
Cohomological equations for different classes of dynamical systems. (IDS ,Section 2.9; CC, Chapter 11)

Slow topological and metric entropy (PS, Sections 2.5 and 3.7)

Local theory of normal forms, its generalizations and applications (IDS, Section 6.6)

ELLIPTIC DYNAMICS
Elements of KAM theory (IDS Sections 2.7, 12.3) including the theorem about invariant curves for area-preserving twist maps (Levi-Moser paper)

Introduction to Liouvillean dynamics including theory of periodic approximation and approximation by conjugation construction and its applications (CC, Part I; IDS section 12.5)

PARABOLIC DYNAMICS
Horocycle flows, elements of Ratner theory.

Interval exchange transformations: direct methods (IDS Sections 14.5-14.7) including Boshernitzan's criterion of unique ergodicity.

Time change and mixing in special flows and flows on surfaces.

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Texts:

1. IDS Katok-Hasselblatt Introduction to the modern theory of dynamical systems required.

2.PS Hasselblatt-Katok Principal structures from Handbook of Dynamical systems, reprints will be provided.

3.CC Katok Combinatorial constructions in ergodic theory and dynamics, recommended

The course will include a limited number of homework problems, presentations by participants
possibilities for writing projects and problems which may lead to new, possibly publishable, results.