

Ergodic Theory

Bachelor Seminar, SoSe 2026

ORGANIZER

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This seminar will cover introductory material in ergodic theory and topological dynamics and will focus on the study of measure-preserving transformations of probability spaces and continuous transformations of compact Hausdorff spaces. The main resources are the books [3, 2, 1]. The outline of topics is as follows:

- (1) definitions and basic constructions (products, factors, induced transformations)
- (2) examples (Bernoulli actions, odometers, circle rotations)
- (3) ergodicity, freeness, Poincaré recurrence
- (4) mixing, weak mixing
- (5) compact transformations, Halmos–von Neumann theorem
- (6) the Rokhlin lemma
- (7) mean ergodic theorem
- (8) pointwise ergodic theorem
- (9) Koopman operator, dichotomy between weak mixing and compactness
- (10) entropy for probability-measure-preserving transformations
- (11) topological entropy
- (12) possible advanced topics: multiple recurrence, Ornstein theory

There will be an organizational meeting on February 19, 2026, at 14:00 in room 503. If you are unable to attend in person, you may participate via Zoom. Please contact the organizer for the Zoom coordinates.

REFERENCES

- [1] W. Parry. *Topics in Ergodic Theory*. Reprint of the 1981 original. Cambridge Tracts in Mathematics, 75. Cambridge University Press, Cambridge, 2004.
- [2] K. Petersen. *Ergodic Theory*. Cambridge Studies in Advanced Mathematics, 2. Cambridge University Press, Cambridge, 1989.
- [3] P. Walters. *An Introduction to Ergodic Theory*. Graduate Texts in Mathematics, 79. Springer-Verlag, New York-Berlin, 1982.