

Advanced theory of dynamical systems, Spring 2023

Topics for presentations

Student presentations are for cca. 25 minutes. To be delivered on

(A) May 24; 16.15-17.45 (two presentations)

(B) June 5; 10.15-12.45 (four presentations)

(C) June 7; 16.15-18.45 (four presentations)

1. Lasota-Yorke example of a transformation without absolutely continuous invariant measure ([2], section 5.3)
2. Ergodic properties of the Gauss map and continued fraction expansions ([3], section 4.8)
3. Circle homeomorphisms ([3], section 7.1, possibly 7.2) – can be suitable for two presentations
4. Proving the Central Limit Theorem for expanding maps with spectral methods ([5], sections 1-2-3, possibly 4, or [2], section 8.5) – can be suitable for two presentations
5. Proof of the Birkhoff ergodic theorem ([1])
6. Countable Lebesgue spectrum and Bernoulli shifts ([1], [7])
7. Peripheral spectrum of the Perron-Frobenius operator for piecewise expanding interval maps ([1])
8. Example of a weakly mixing but not strongly mixing transformation ([4], [7])
9. Hopf's method for proving ergodicity of hyperbolic toral automorphisms ([1])
10. Ergodic theorem for iterated maps ([6])
11. Fürstenberg's multiplicative recurrence theorem and Szemerédi's theorem ([3], section 4.11)

References

- [1] BÁLINT, P.; SZÁSZ, D.: *Ergodelmélet és dinamikai rendszerek*, Typotex, 2011 (in Hungarian, but to some chapters an English version is also available)
- [2] BOYARSKI, A.; GÓRA, P.: *Laws of Chaos, Invariant Measures and Dynamical Systems in One Dimension*, Birkhäuser, 1997
- [3] BRIN, M.; STUCK, G.: *Introduction to Dynamical Systems*, Cambridge University Press, 2002
- [4] CHACON, R.: *Weakly mixing transformations which are not strongly mixing*; Proceedings of the American Mathematical Society, **22** (1969) 559–562
- [5] GOUËZEL, S.: *Limit theorems in dynamical systems using the spectral method*; in Proceedings of Symposia in Pure Mathematics, Volume 89, 2015 (preprint available from the author's webpage)
- [6] ELTON, J.: *An ergodic theorem for iterated maps*; Ergodic Theory and Dynamical Systems, **7** (1987) 481–488
- [7] PETERSEN, K. *Ergodic theory*, Cambridge University Press, 1983