UNIVERSITÄT DES SAARLANDES
Fachrichtung 6.1 Mathematik
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UNIVERSITÄT DES SAARLANDES

Lecture on ergodic methods in number theory, summer semester 2017, Di, Do 10-12, SR 9.

Ergodic theory is concerned with the study of orbits of iterates of a measure preserving transformation or more generally of a group of measure preserving transformations of a measure space. In the last 30 or 40 years a rapidly increasing number of applications of this theory to problems of number theory and of combinatorics has been studied. A prominent example is Furstenberg's ergodic proof of Szemeredi's theorem which asserts that every sufficiently dense subset of the integers must contain arbitrarily long arithmetic progressions. Other examples are results on equidistribution of values of irrational polynomials at integer points and the study of the asymptotics of rational or integral points on certain homogeneous varieties. There are also close connections to the theory of billiards.
In this course I intend to give an introduction to the basics of ergodic theory and to study some of the fascinating number theoretic applications.

The course will be given in English if there are participants who don't understand lectures given in German, in German otherwise.

Prerequisites: Prerequisites are basic knowledge of measure theory (as treated e.g. in Analysis III or in Functional Analysis I) and interest in number theoretic problems. Knowledge of some basic algebra and number theory as covered in "Einführung in Algebra und Zahlentheorie" is helpful but not indispensable.

Literature:

- Einsiedler, Ward: Ergodic theory with a view towards number theory, Springer Verlag.
- Steuding: Ergodic Number Theory, to be found in the web.