

Math 8440 - Dynamics and number theory

How often does 7 appear in the decimal expansion of π ?

For all that we have learned about one of mathematics' favorite constants, this simple question remains unanswered. We can't even say whether 7 appears infinitely often in the decimal expansion of π .

Questions such as this will be an entry point to the study of the connections between ergodic theory and number theory. Although we will focus primarily on the ergodic theory of fibred systems—such as base b expansions, continued fractions, β -expansions, and Lüroth series—we will try to cover a variety of techniques that have more general application to either ergodic theory or number theory.

In addition to the fundamentals of ergodic theory, we may include discussion of some of the following topics: normal numbers, constructions and theoretical results; natural extensions; uniform distribution of sequences; Diophantine approximation and metric results, including zero-one laws and Schmidt's method; flows and applications to hyperbolic geometry.

There will not be a course textbook, but some material may come from “Ergodic Theory of Numbers” by Dajani and Kraaikamp, “Uniform Distribution of Sequences” by Kuipers and Niederreiter, “Distribution Modulo One and Diophantine Distribution” by Bugeaud, and “Metric Number Theory” by Glyn Harman.