MEASURE THEORY
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PROVISIONAL SYLLABUS

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Basic measure theory

Measurable space, measure space, monotone class theorem, extension of additive set functions, outer measures, integral, convergence theorems, uniform integrability, product spaces, absolute continuity and singularity, signed measures.

Topological measure theory

Representation of linear functionals on spaces of continuous functions. Weak convergence of measures. Existence and uniqueness of Haar measure on a locally compact topological group.

Polish measure spaces


Geometric measure theory

Covering theorems, differentiation of measures, differentiability a.e. of Lipschitz maps, Lipschitz change of variables in integration, Hausdorff measures on submanifolds of $\mathbb{R}^d$, area and coarea formulae.

Possible additional topics

Probability theory, harmonic analysis, fractals, Souslin theory.