

The Department of Mathematics

2023–24–B term

Course Name probabilistic methods in geometric group theory

Course Number 201.2.0601

Course web page

<https://math.bgu.ac.il/en/teaching/spring2024/courses/probabilistic-methods-in->

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Office Hours <https://math.bgu.ac.il/en/teaching/hours>

Abstract

Requirements and grading¹

Course topics

in this course we will build methods from probability theory and apply them to study geometric questions regarding finitely generated groups. we will ultimately aim to provide a proof of Gromov's celebrated theorem: a finitely generated group is virtually nilpotent if and only if it has polynomial growth. we will also bring up open questions for further research.

Topics:

- .1 conditional expectation and martingales
- .2 random walk on groups
- .3 Cayley graphs
- .4 entropy
- .5 harmonic functions
- .6 unitary actions

¹Information may change during the first two weeks of the term. Please consult the webpage for updates



- .7 nilpotent and solvable groups
- .8 Milnor-Wofl theorem
- .9 Gromov's theorem ** time permitting:
- .10 bounded harmonic functions
- .11 Choquet-Deny theorem
- .12 positive harmonic functions