

## The Department of Mathematics

2017–18–B term

**Course Name** Random walks and harmonic functions

**Course Number** 201.2.0391

**Course web page**

<https://www.math.bgu.ac.il/en/teaching/spring2018/courses/random-walks>

**Lecturer** Prof. Ariel Yadin, <yadina@bgu.ac.il>, Office 114

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

### Abstract

### Requirements and grading<sup>1</sup>

This course deals with random walks, harmonic functions, the relations between these notions, and their applications to geometry and algebra (mainly to finitely generated groups).

The modern point of view will be presented, following recent texts by: Gromov, Kleiner, Ozawa, Shalom & Tao, among others.

### Course topics

In a random process, by definition, it is not possible to deterministically predict the next step. However, we will see in this course how to predict rigorously the long term behavior of processes. We will study in this course processes, known as *Markov processes*, in which the next step depends only on the current position. We will see that these processes are deeply related to electrical networks, and to notions from information theory such as entropy. We will develop techniques of discrete analysis, which are counterparts of classical analysis in the discrete setting. These notions are at the cutting edge of current research methods in these fields

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