

## The Department of Mathematics

2015–16–B term

**Course Name** Introduction to symbolic dynamics

**Course web page**

[https://www.math.bgu.ac.il/~mtom/symbolic\\_2016/symbolic\\_spring\\_2016.html](https://www.math.bgu.ac.il/~mtom/symbolic_2016/symbolic_spring_2016.html)

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

### Abstract

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

Symbolic dynamics is a branch of mathematics that deals with sequences of characters letters or “symbols” from the point of view of dynamical systems. The basic guiding philosophy is that sometimes it is possible to code and understand complicated systems by a sequence of discrete samples. The decimal expansion of real numbers is a simple example of this kind of procedure. Techniques and ideas from symbolic dynamics have found significant applications in data storage and transmission as well as other parts of mathematics. In this course we will introduce basic notions and results in symbolic dynamics, via interesting examples. We will illustrate relations to other fields and relate to the more general frameworks of topological dynamics and ergodic theory. Basic topics to be covered: A brief introduction to topological dynamics Shift spaces and Languages Shifts of finite type and sofic shifts Cellular automata and sliding block codes, endomorphisms and automorphisms of shift spaces. Topological entropy Possible additional topics (subject to time, participants background and participants preferences): Krieger’s topological embedding theorem On the isomorphism problem for shifts of finite type (strong shift equivalence and shift equivalence) Multidimensional shift spaces and shift spaces over countable groups. We will introduce and study the notions of Measure-preserving transformations, Ergodicity, Recurrence The formal prerequisite is basic knowledge of measure theory. The background in other fields (such as functional and harmonic analysis and probability) is not a prerequisite, but will be introduced as needed.

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



## Course topics