

Department of Mathematics, BGU

Colloquium

On *Tuesday, May, 10 2022*

At *14:30 – 15:30*

In *Math 101-*

Nathan Keller (BIU)

will talk about

Can you hear the shape of a low-degree Boolean function?

Abstract: Analysis of Boolean functions aims at “hearing the shape” of functions on the discrete cube $\{-1,1\}^n$ – namely, at understanding what the structure of the (discrete) Fourier transform tells us about the function. In this talk, we focus on the structure of “low-degree” functions on the discrete cube, namely, on functions whose Fourier coefficients are concentrated on “low” frequencies. While such functions look very simple, we are surprisingly far from understanding them well, even in the most basic first-degree case. We shall present several results on first-degree functions on the discrete cube, including the recent proof of Tomaszewski’s conjecture (1986) which asserts that any first-degree function (viewed as a random variable) lies within one standard deviation from its mean with probability at least $.1/2$. Then we shall discuss several core open questions, which boil down to understanding, what does the knowledge that a low-degree function is bounded, or is two-valued, tell us about its structure.

Based on joint work with Ohad Klein