Department of Mathematics, BGU

Colloquium

On *Tuesday, April ,25 2017*

At *14:30 – 15:30*

In *Math 101-*

Inna Entova-Aizenbud (BGU)

will talk about

Stability in representation theory of the symmetric groups

Abstract: In the finite-dimensional representation theory of the symmetric groups S_n over the base field $\mathbb{C}$, there is an an interesting phenomena of "stabilization" as $n \to \infty$: some representations of S_n appear in sequences $(V_n)_{n\geq 0}$, where each V_n is a finite-dimensional representation of S_n, where V_n become "the same" in a certain sense for $n >> 0$.

One manfiestation of this phenomena are sequences $(V_n)_{n\geq 0}$ such that the characters of S_n on V_n are "polynomial in n". More precisely, these sequences satisfy the condition: for $n >> 0$, the trace (character) of the automorphism $\sigma \in S_n$ of V_n is given by a polynomial in the variables x_i, where $x_i(\sigma)$ is the number of cycles of length i in the permutation σ.

In particular, such sequences $(V_n)_{n\geq 0}$ satisfy the agreeable property that $\dim(V_n)$ is polynomial in n.

Such “polynomial sequences” are encountered in many contexts: cohomologies of configuration spaces of n distinct ordered points on a connected oriented manfiold, spaces of polynomials on rank varieties of $n \times n$ matrices, and more. These sequences are called FI-modules, and have been studied extensively by Church, Ellenberg, Farb and others, yielding many interesting results on polynomiality in n of dimensions of these spaces.

A stronger version of the stability phenomena is described by the following two settings:

I will describe both settings, show that they are connected, and explain some applications in the representation theory of the symmetric groups.