Department of Mathematics
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ALGEBRAIC GEOMETRY AND COMMUTATIVE ALGEBRA SEMINAR

Speaker: Eric Ramos
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Date: Wednesday, April 25, 2018
Time: 3:00 PM
Location: 258 Hurley Hall

Lecture Title:
Commutative algebra in the configuration spaces of graphs

Abstract

Let G be a graph, thought of as a 1-dimensional simplicial complex. Then the n-stranded configuration space of G is the space $F_n(G) = \{(x_1, \ldots, x_n) \in G^n \mid x_i \neq x_j\}/S_n$, where S_n is the symmetric group on n letters. While one would hope to say something meaningful about the homology groups $H_i(F_n(G))$ of these spaces, it is known that they can be quite chaotic. Following recent trends in algebra, we therefore shift our focus to studying all of these groups simultaneously $+_n H_i(F_n(G))$, sacrificing knowledge about individual homology groups for statements which are more asymptotic in nature. In particular, it can be shown that $4 +_n H_i(F_n(G))$ can be encoded as the additive group of some finitely generated graded module over an integral polynomial ring. Specializing to the case of trees, we compute the generating degree of this module, and show that it naturally decomposes as a direct sum of graded shifts of square-free monomial ideals. As an application we show that the homology groups of$F_n(G)$, in the case of trees, are only dependent on the degree sequence of G. We conclude the talk by discussing what little is known in the general case, and provide a conjecture describing what the Hilbert polynomials of such modules look like.