

TITLE	DG Homological Algebra and Vanishing of (Co)homology over Local Rings
SPEAKER	Saeed Nasseh Georgia Southern University, USA
TIME	Thursday, December 14, 2017, 11:00 - 13:00
VENUE	Lecture Hall 1, Niavaran Bldg.

SUMMARY

The use of techniques from differential graded (DG) homological algebra was established by Avramov, Buchsbaum, Eisenbud, Halperin, Kustin, Miller, and Weyman in commutative algebra, for instance, via DG algebra structures on Koszul complexes and free resolutions. It has been shown recently that these techniques can be applied to solve non-trivial problems in commutative algebra. In this talk, we will discuss the following major problems: Auslander-Reiten Conjecture (1975). If M is a finitely generated module over a local ring R with $\text{Ext}_R^i(M, M \oplus R) = 0$ for all i large enough, then $\text{pd}_R(M) < \infty$. Vasconcelos' Conjecture (1974). There are only finitely many semidualizing modules, up to isomorphism, over a local ring. In a part of this talk, which is based on joint works with Luchozar Avramov, Srikanth Iyengar, and Sean Sather-Wagstaff, we present results about vanishing of homology over trivial extensions of DG algebras and use them to introduce new classes of commutative local rings that satisfy the Auslander-Reiten Conjecture. Another part of the talk, which is based on a joint work with Sean Sather-Wagstaff, is devoted to sketch a complete solution to Vasconcelos' Conjecture using geometric aspects of representation theory for DG algebras.