1135-13-2165 **Ranthony A.C. Edmonds*** (ranthony-edmonds@uiowa.edu), Ranthony-Edmonds@uiowa.edu.
Unique Factorization in Polynomial Rings with Zero Divisors.

In a integral domain, it is well known that R is a unique factorization domain (UFD) if and only if $R[X]$ is a unique factorization domain. This result does not hold if we generalize to polynomial rings with zero divisors. In this talk, we will discuss factorization in commutative rings with zero divisors in the context of polynomial rings, with particular attention paid to unique factorization. We discuss when a polynomial ring is a UFR in the sense of Bouvier and Galovich and when it is a UFR in the sense of Fletcher.

Though both Galovich and Fletcher established structure theorems to characterize unique factorization in arbitrary rings, the inherit structure of polynomial rings affords surprisingly straightforward proofs of standard results without the use of such powerful machinery. Specifically, we will show an elementary proof that a polynomial ring $R[X]$ is a unique factorization ring in the sense of Bouvier or Galovich if and only if R is a UFD. We also show that the following are equivalent: (1) $R[X]$ is a UFR in the sense of Fletcher (2) each (regular) nonzero nonunit has unique factorization into irreducible elements (3) each (regular) nonunit element is a product of principal primes (4) R is a finite direct product of UFD's. (Received September 26, 2017)