

**COURSE ANNOUNCEMENT: FALL 2008**  
**MATH 724, TOPICS IN COMMUTATIVE ALGEBRA: MONOMIAL IDEALS**

MWF 11:00-11:50 AM, Dolve Hall 204, 3 credits

Prerequisite: MATH 421/621

No text required, notes will be provided

Instructor: Sean Sather-Wagstaff

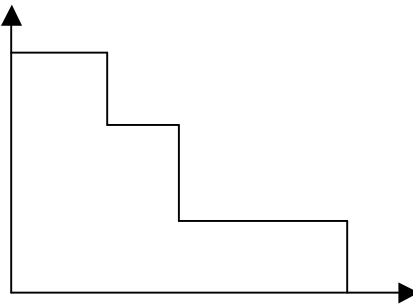
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Course Description: This is a course for graduate students and advanced undergraduate students who are interested in abstract algebra. This course can serve as a transition course for undergraduate students considering graduate school in pure mathematics.

Monomial ideals are ideals in polynomial rings that can be described in combinatorial and geometric terms, for instance, in terms of staircase diagrams.



Here, the corners in the staircase represent monomials in a given monomial ideal. These descriptions make monomial ideals quite accessible by allowing us to employ intuition and tools from discrete mathematics and geometry to study them.

In spite of their simplicity, monomial ideals are powerful tools. For example, in algebraic combinatorics they are used to attach algebraic invariants to finite simple graphs and, more generally, simplicial complexes. These invariants have led to the solutions of several important problems in combinatorics.

We will spend the semester exploring the algebraic properties of monomial ideals.

Tentative course outline:

1. Commutative rings with identity and ideals
2. Monomial ideals and how to graph them
3. Corner elements
4. Parametric decomposition of monomial ideals
5. Monomial covers and irreducibility