UNIVERSITY OF MICHIGAN
Department of Mathematics

Seminar & Events Bulletin: Student Commutative Algebra

01-01-2013 to 06-30-2013

Wednesday, January 16, 2013	
3:00pm-4:00pm	**Student Commutative Algebra** -- All (UM) *Organizational meeting* -- 2866 East Hall

Wednesday, January 23, 2013	
3:00pm-4:00pm	**Student Commutative Algebra** -- Luis Nunez-Betancourt (UM) *An overview of tight closure* -- 2866 East Hall

Wednesday, January 30, 2013	
3:00pm-4:00pm	**Student Commutative Algebra** -- Sarah Mayes (University of Michigan) *Applications of Commutative Algebra: Integer Programming* -- 2866 East Hall

Wednesday, February 06, 2013	
3:00pm-4:00pm	**Student Commutative Algebra** -- Zhibek Kadyrsizova (UM) *Tight closure of ideals* -- 2866 East Hall

Wednesday, February 20, 2013	
3:00pm-4:00pm	**Student Commutative Algebra** -- Patricia Klein (UM) *Algebraic Statistics* -- 2866 East Hall

Wednesday, February 27, 2013	
3:00pm-4:00pm	**Student Commutative Algebra** -- Luis Nunez-Betancourt (UM) *The Hilbert-Kunz multiplicity* -- 2866 East Hall

Wednesday, March 13, 2013	
3:00pm-4:00pm	**Student Commutative Algebra** -- Sarah Mayes (UM) *Applications of commutative algebra to game theory* -- 2866 East Hall

Wednesday, March 20, 2013	
3:00pm-4:00pm	**Student Commutative Algebra** -- Linquan Ma (UM) *Colon-capturing* -- 2866 East Hall

Wednesday, March 27, 2013	
3:00pm-4:00pm	**Student Commutative Algebra** -- Jenna Rajchgot (UM) *F-splitting, Grobner bases, and applications* -- 2866 East Hall

Wednesday, April 03, 2013	
3:00pm-4:00pm	**Student Commutative Algebra** -- Luis Nunez-Betancourt (UM) *F-purity* -- 2866 East Hall

Wednesday, April 10, 2013	
3:00pm-4:00pm	**Student Commutative Algebra** -- Ashley Wheeler (UM) *Introduction to Semigroup Rings* -- 2866 East Hall

Wednesday, April 17, 2013	
3:00pm-4:00pm	**Student Commutative Algebra** -- Ashley Wheeler (UM) *Introduction to Semigroup Rings II* -- 2866 East Hall

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Wednesday, April 24, 2013	
3:00pm-4:00pm	**Student Commutative Algebra** -- Angelica Benito (UM) *Test ideals in quotients of F-finite regular local rings* -- 2866 East Hall

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Abstracts

Student Commutative Algebra
Wednesday, January 16, 2013, 3:00pm-4:00pm
2866 East Hall
All (UM)
Organizational meeting

Student Commutative Algebra
Wednesday, January 23, 2013, 3:00pm-4:00pm
2866 East Hall
Luis Nunez-Betancourt (UM)
An overview of tight closure

Tight closure is an operation on ideal in ring of prime characteristic. Since this theory was introduced by Hochster and Huneke in the 80s, it has been used to study several properties of a ring, for instance, Cohen-Macaulayness. In the last years it has been used to study singularity through test ideals and several invariants. In this talk we will give a general picture of this beautiful theory and its applications.

Student Commutative Algebra
Wednesday, January 30, 2013, 3:00pm-4:00pm
2866 East Hall
Sarah Mayes (University of Michigan)
Applications of Commutative Algebra: Integer Programming

An integer programming problem is a type of optimization problem in which only integer solutions are allowed. Integer solutions are frequently required in applications, since it is not possible to schedule 4.8 airplanes to fly or to carry 50.6 boxes per order. In this talk we will explore these problems and see how tools from computational commutative algebra, such as Groebner bases, may be used to solve them.

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Student Commutative Algebra
Wednesday, February 06, 2013, 3:00pm-4:00pm
2866 East Hall
Zhibek Kadyrsizova (UM)
Tight closure of ideals

We will define the notion of tight closure of ideals in Noetherian rings of prime characteristic p>0 and prove properties of tight closure some of which will allow us to reduce to the case of reduced rings or domains. In addition, we will show that regular rings are weakly F-regular.

Student Commutative Algebra
Wednesday, February 20, 2013, 3:00pm-4:00pm
2866 East Hall
Patricia Klein (UM)
Algebraic Statistics

We will discuss several statistical problems that arise naturally from the study of phylogenetics and sequence alignment and see how these questions can be naturally packaged as questions about polynomial rings. We will then see in broad strokes how techniques in computational commutative algebra can answer these questions (relatively) efficiently.

Student Commutative Algebra
Wednesday, February 27, 2013, 3:00pm-4:00pm
2866 East Hall
Luis Nunez-Betancourt (UM)
The Hilbert-Kunz multiplicity

We will introduce the Hilbert-Kunz multiplicity; as well, as give the prove that it is well defined. In addition, we will give properties of this multiplicity, including interactions with tight closure.

Student Commutative Algebra
Wednesday, March 13, 2013, 3:00pm-4:00pm
2866 East Hall
Sarah Mayes (UM)
Applications of commutative algebra to game theory

In this talk we will use examples to illustrate how polynomials arise from simple games and discuss how techniques from computational algebra may be used to solve problems from game theory.

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Student Commutative Algebra
Wednesday, March 20, 2013, 3:00pm-4:00pm
2866 East Hall
Linquan Ma (UM)
Colon-capturing

We will discuss the colon-capturing property of tight closure and give the definition of F-rational ring, and also discuss some connections to local cohomology.

Student Commutative Algebra
Wednesday, March 27, 2013, 3:00pm-4:00pm
2866 East Hall
Jenna Rajchgot (UM)
F-splitting, Grobner bases, and applications

I'll attempt to provide a link between the two main themes of this semester's seminar (char. p commutative algebra and applications of commutative algebra) by discussing a theorem of Knutson. I'll then provide examples of how one can use the theorem to study varieties arising in combinatorial commutative algebra.

Student Commutative Algebra
Wednesday, April 03, 2013, 3:00pm-4:00pm
2866 East Hall
Luis Nunez-Betancourt (UM)
F-purity

We will define F-purity and mention several properties; in particular, Fedder's Criterion. In addition, we will discuss interactions with rings of differential operators, F-modules, local cohomology, and tight closure.

Student Commutative Algebra
Wednesday, April 10, 2013, 3:00pm-4:00pm
2866 East Hall
Ashley Wheeler (UM)
Introduction to Semigroup Rings

We first discuss the generation of semigroup rings by lattice ideals. Then, we focus on the more special case of affine semigroup rings, where the defining lattice ideals are prime. In the affine case properties of the ring correspond to the geometry of an associated polyhedral cone. The talk is example-heavy with casual mention of the research context for semigroup rings, including toric varieties and rings of invariants.

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Student Commutative Algebra
Wednesday, April 17, 2013, 3:00pm-4:00pm
2866 East Hall
Ashley Wheeler (UM)
Introduction to Semigroup Rings II

We first discuss the generation of semigroup rings by lattice ideals. Then, we focus on the more special case of affine semigroup rings, where the defining lattice ideals are prime. In the affine case properties of the ring correspond to the geometry of an associated polyhedral cone. The talk is example-heavy with casual mention of the research context for semigroup rings, including toric varieties and rings of invariants.

Student Commutative Algebra
Wednesday, April 24, 2013, 3:00pm-4:00pm
2866 East Hall
Angelica Benito (UM)
Test ideals in quotients of F-finite regular local rings

In this talk we continue discussing some facts about F-purity and test ideals, we will start with an overview of the basic definitions we have worked with during the semester and then we will discussed Vassilev's ideas. There she proved that one can construct a filtration of test ideals (in the quotient) with some good properties. We will finish the talk showing some examples that are presented in Vassilev's paper.