



The seminar will meet in-person on Tuesdays in room WH-100E at 2:50 p.m. There should be refreshments served at 4:00 in room WH-102. Masks are optional.

Anyone wishing to give a talk in the Algebra Seminar this semester is requested to contact the organizers at least one week ahead of time, to provide a title and abstract. If a speaker prefers to give a zoom talk, the organizers will need to be notified at least one week ahead of time, and a link will be posted on this page.

If needed, the following link would be used for a zoom meeting (Meeting ID: 93487611842) of the Algebra Seminar:

[Algebra Seminar Zoom Meeting Link](#)

Organizers: [Alex Feingold](#), [Daniel Studenmund](#) and [Hung Tong-Viet](#)

To receive announcements of seminar talks by email, please email one of the organizers with your name, email address and reason for joining this list if you are external to Binghamton University.

Fall 2024

- **August 20**
[Organizational Meeting](#)

Please think about giving a talk in the Algebra Seminar, or inviting an outside speaker.

- **August 27**
[Alex Feingold \(Binghamton University\)](#)
Tessellations from Affine and Hyperbolic Weyl groups

Abstract: Weyl groups are Coxeter groups generated by reflections determined by a Cartan matrix associated with a Kac-Moody Lie algebra. We will discuss examples where the Weyl group acts on a Euclidean space (affine case) as well as examples where it acts on a hyperbolic space (hyperbolic case). In either case, the action is properly discontinuous so it has a fundamental domain whose reflections tessellate the space. In joint work with Robert Bieri and Daniel Studenmund, we are investigating the geometry of such tessellations in order to define and obtain generators for groups of piecewise

isometries of the tessellations which generalize the Thompson group $\text{PPSL}(2, \mathbb{Z})$.

- **September 3**

[Dikran Karagueuzian \(Binghamton University\)](#)

Elliptic Curves for Dummies

Abstract: A theorem on the random variable of inverse image sizes for a polynomial over a finite field of order q computes the moments of the random variable of inverse images sizes up to an error term. This error term decreases with the inverse of the square root of q . Standard results in the theory of elliptic curves will be used to show that this error term cannot generally be improved. No familiarity with the extensive theory of elliptic curves will be assumed.

- **September 10**

[Fernando Guzman \(Binghamton University\)](#)

The Isomorphism Theorems for g -digroups

Abstract: Digroups, and generalized digroups, g -digroups for short, have been considered as a generalization of continuous groups whose tangent space is a Leibniz algebra. This structure has been seen as a generalization of groups, therefore, efforts have been done to study properties and results that come from group theory, to explore if they hold in this new setting. In this talk, we'll discuss the isomorphism theorems for g -digroups, and show that the results for groups do extend to g -digroups. This is joint work with Olga Patricia Salazar-Diaz.

- **September 17**

[Ryan McCulloch \(Binghamton University\)](#)

Centralizers of a group

Abstract: Given a group G , define an equivalence relation on the elements of G by $x \sim y$ iff $C_G(x) = C_G(y)$, and let X denote a fixed set of representative elements. The set X can be used to define any centralizer in G , since for every centralizer H , there is a unique maximal subset S of X so that $H = C_G(S)$. We observe a Galois connection between the lattice of centralizer subgroups of G and this poset of maximal subsets of X corresponding to centralizers. We show other interesting properties related to this relationship. This is joint work with Wil Cocke and Mark Lewis.

- **September 24**

[No Algebra Seminar](#)

- **October 1**

[No Algebra Seminar \(Recess 1 PM\).](#)

- **October 8**

[No Algebra Seminar \(Friday Classes Meet\).](#)

- **October 15**

[HanLim Jang \(Binghamton University\)](#)

Lefschetz properties through a topological lens

Abstract: The topic of this lecture is the algebraic Lefschetz properties, which are abstractions of the

important Hard Lefschetz theorem from geometry. I will introduce what are Lefschetz properties and show the relation between Lefschetz properties and commutative algebra.

- **October 22**

[No Algebra Seminar](#)

- **October 29**

[Marcin Mazur \(Binghamton University\)](#)

Applications of Zsigmondy's theorem to some results in algebra

Abstract: This is an expository talk which should be accessible to anyone with just basic knowledge of rings and groups. We will state a result from elementary number theory, called Zsigmondy's theorem, and show how to use it to get rather straightforward proofs of some basic results from algebra like the celebrated theorem of Wedderburn that any finite division algebra is a field.

- **October 29, 4:15 Arithmetic Seminar**

[Jaiung Jun \(SUNY New Paltz, IAS\)](#)

Schemes over the natural numbers

Abstract: In this talk, I will first explain how a notion of positivity in algebraic geometry / number theory could be captured in terms of semirings by providing an example of the narrow class group of a number field as a reflexive Picard group. Then, I will introduce a notion of equivariant vector bundles over the natural numbers, and prove a version of Klyachko classification theorem of toric vector bundles in this setting.

- **November 5**

[Tae Young Lee \(Binghamton University\)](#)

Realizing quotients of étale fundamental groups as monodromy groups

Abstract: The étale fundamental groups are analogues of the fundamental groups, in the sense that it classifies the finite étale covering just like how the fundamental groups classify the covering spaces. It is a profinite group, and a characterization of its finite quotient groups is known. However, the proof of this doesn't tell us how to actually construct these finite groups as homomorphic images of the étale fundamental group. In this talk, I will discuss a project of Katz, Rojas León, Tiep and me, which classifies the finite quotients of the étale fundamental group of the multiplicative group \mathbb{G}_m over the algebraic closure of finite fields that can be realized as monodromy groups of certain local systems called hypergeometric sheaves.

- **November 12**

[Chris Schroeder \(Binghamton University\)](#)

An introduction to permutation representations of finite groups

Abstract: One often first encounters the representation theory of groups through their actions on vector spaces. It is also natural to consider group actions on sets with no additional structure, so-called permutation representations. Concretely, whereas a linear representation is a group homomorphism to a general linear group, a permutation representation is a group homomorphism to a symmetric group. In this talk, we will introduce the basic definitions and examples of permutation representations of finite groups, and discuss the analogies with linear representations.

- **November 19**
[? \(University\)](#)
Title

Abstract: Text of Abstract

- **November 26**
[No Algebra Seminar \(Friday Classes Meet\).](#)
- **December 3**
[Tan Nhat Tran \(Binghamton University\)](#)

Worpitzky-compatible sets and the freeness of arrangements between Shi and Catalan

Abstract: Given an irreducible root system, the Worpitzky-compatible subsets are defined by a geometric property of the alcoves inside the fundamental parallelepiped of the root system. This concept is motivated and mainly understood through a lattice point counting formula concerning the characteristic and Ehrhart quasi-polynomials. In this talk, we show that the Worpitzky-compatibility has a simple combinatorial characterization in terms of roots. As a byproduct, we obtain a complete characterization by means of Worpitzky-compatibility for the freeness of the arrangements interpolating between the extended Shi and Catalan arrangements. This completes the earlier result by Yoshinaga in 2010 which was done for simply-laced root systems. This is joint work (arXiv:2403.17274) with Takuro Abe (Tokyo).

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- [Pre-2014 semesters](#)
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