



Unless stated otherwise, the seminar meets Tuesdays in room WH-100E at 2:50 p.m. There will be refreshments served at 4:00 in room WH-102.

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

To receive announcements of seminar talks by email, please join the seminar's mailing list.

Fall 2018

- **August 28**

[Organizational Meeting](#)

Title of Talk

Abstract: Please come or contact the organizers if you are interested in giving a talk this semester or want to invite someone.

- **September 4**

[Casey Donovan](#) (Binghamton University)

Covering Number of Semigroups

Abstract: A semigroup is a set S equipped with an associative operation. The covering number of a semigroup S is the minimum number of proper subsemigroups whose union is S . In this talk, I will introduce basic semigroup theory and some fundamental examples while proving the following theorem: If S is a finite semigroup that is not a group nor generated by a single element, then the covering number of S is 2. Similar questions have been studied for groups and loops. (Joint work with Luise-Charlotte Kappe and Marcin Mazur.)

- **September 11**

[No Classes](#) (University)

Title

Abstract: Abstract text

- **September 18**

[Joe Cyr](#) (Binghamton University)

Semilattice Modes

Abstract: A mode A is an algebra which is idempotent and in which every operation is a homomorphism from the appropriate power of A to A . We will explore some results on a particular class of modes which are constructed from semilattices. In particular, we will look at the question of when is a semilattice mode subdirectly irreducible, both in general and in the particular case of when the mode has a single binary operation.

▪ **September 25**

[Matt Evans](#) (Binghamton University)

Spectral properties of involutory BCK-algebras

Abstract: BCK-algebras are algebraic structures arising from non-classical logic. This talk will focus primarily on the classes of commutative BCK-algebras and commutative involutory BCK-algebras. Particularly, I will discuss some basic ideal theory and spectral properties of such algebras, looking at differences between the bounded and unbounded cases.

▪ **October 2**

[Mark Lewis](#) (Kent State University)

Centers of centralizers and maximal abelian subgroups

Abstract: In this talk we consider the centers of the centralizers of elements in finite groups. We will then obtain a lower bound on the order of a maximal abelian subgroup in terms of the indices of the centralizers of elements and the orders of the centers of the centralizers of elements. We will use this to obtain a lower bound for maximal abelian subgroups of semi-extraspecial groups.

▪ **October 9**

[Fernando Guzman](#) (Binghamton University)

Polynomials Automorphisms of the Regular d -ary Tree

Abstract: We explore the question of when does a polynomial with integer coefficients induce an automorphism of the infinite regular d -ary tree. This is well-known for $d=2$, and there are some partial results for d prime. We extend the results to the case when d is square-free.

▪ **October 16**

[Luise-Charlotte Kappe](#) (Binghamton University)

A generalization of the Chermak-Delgado lattice to words in two variables

Abstract: The Chermak-Delgado measure of a subgroup H of a finite group G is defined as the product of the order of H with the order of the centralizer of H in G , $|H||C_G(H)|$, and the set of all subgroups with maximal Chermak-Delgado measure forms a dual sublattice of the subgroup lattice of G . In this talk we step back from centralizers and consider four types of centralizer-like subgroups, defined using general words in the alphabet $\{x, y, x^{-1}, y^{-1}\}$ instead of the specific commutator word. We show that this generalization results in four sublattices of the subgroup lattice of a finite group, some of which may be equal to one another depending on the word. We consider which properties of the Chermak-Delgado lattice generalize to the new lattices, and which properties are specialized in the Chermak-Delgado lattice. (This work is joint with Elizabeth Wilcox.)

- **October 23**

Eran Crockett (Ripon College)

The variety generated by the triangle

Abstract: This talk will consist of a (quick) introduction to universal algebra where we focus on three topics: the definability of principal congruences, classifying subdirectly irreducibles, and determining the clone of term operations. We will attempt to understand these topics by focusing on two examples: the two-element semilattice and the three-element non-transitive tournament (a.k.a. the triangle).

- **October 30**

Dan Rossi (Binghamton University)

Brauer characters and fields of values

Abstract: The complex irreducible characters $\text{Irr}(G)$ of a finite group G contain a lot of information about G itself. Recently, it has been realized that some of this information can still be captured if, instead of considering the entire set $\text{Irr}(G)$, one only considers those irreducible characters taking values in some suitable subfield of \mathbb{C} . This motivates the following definitions: $\text{Irr}_{\mathbb{F}}(G)$ is the subset of irreducible characters taking values in the subfield $\mathbb{F} \subseteq \mathbb{C}$; and $\text{Cl}_{\mathbb{F}}(G)$ is the set of conjugacy classes of G whose elements, when evaluated at every character of G , take values in \mathbb{F} . A result of Isaacs & Navarro says that $|\text{Irr}_{\mathbb{F}}(G)| = |\text{Irr}_{\mathbb{F}}(G/N)|$ and $|\text{Cl}_{\mathbb{F}}(G)| = |\text{Cl}_{\mathbb{F}}(G/N)|$ whenever $N \unlhd G$ contains no non-trivial \mathbb{F} -elements. For a prime p , the p -Brauer characters of G arise from representations of G over $\overline{\mathbb{F}}_p$. They provide a link between the representation theory of G in characteristic 0 and in characteristic p . Whenever one has a relationship involving characters and conjugacy classes of G , it is natural to wonder if there is an analogous relationship between the p -Brauer characters and p -regular conjugacy classes. I will give some examples of the sorts of \mathbb{F} -generalizations alluded to in the first paragraph; introduce the basic notions of Brauer characters; and discuss a Brauer analogue of the Isaacs-Navarro result mentioned above.

- **November 6**

Casey Donovan (Binghamton University)

Covering Number of Semigroups (cont.)

Abstract: I will continue my exploration of covering numbers of semigroups by considering specific classes of semigroups. A monoid is a semigroup with an identity. An inverse semigroup S is a semigroup such that for each element $a \in S$ there exists a unique element $a^{-1} \in S$ such that $aa^{-1}a = a$ and $a^{-1}aa^{-1} = a^{-1}$. I will give a complete description of the covering number of monoids and inverse semigroups with respect to submonoids and inverse subsemigroups respectively (modulo the covering numbers of groups and semigroups). I will use Green's relations and other results to describe the structure of such semigroups.

- **November 13**

Casey Donovan (Binghamton University)

Fractal Subgroups of Profinite Groups

Abstract: Often, we think of fractals as subsets of \mathbb{R}^n . Many definitions in fractal geometry can be generalized to any metric space, including groups equipped with a metric. In particular, the Hausdorff dimension and Box counting dimension can be defined on any metric space. Profinite groups can be equipped with a natural

metric, under which we can discuss fractal properties. This will be an expository talk in which I define fractal dimensions and profinite groups. My goal is to set up the following question: Given two fractal subgroups of the automorphism group of the rooted infinite n -ary tree, what is the dimension of their intersection?

▪ **November 20**

[Hung Tong-Viet](#) (Binghamton University)

Conjugacy classes of p -elements and normal p -complements

Abstract: The commuting probability $d(G)$ of a finite G (introduced by Erdős and Turán in 1968), is defined to be the probability that two randomly chosen elements of G commute. The commuting probability $d(G)$ is also called the commutativity degree of G . Erdős and Turán showed that $d(G) = k(G)/|G|$, where $k(G)$ is number of conjugacy classes of G . In 1973, W. H. Gustafson proved that $d(G) \leq 5/8$ for any non-abelian group G . Since then, there are numerous results concerning the structure of finite groups using various bounds on the commuting probability. In this talk, I will consider a p -local version of the commuting probability. Specifically, for a prime p , we define $d_p(G)$ to be the ratio $k_p(G)/|P|$, where $k_p(G)$ is the number of conjugacy classes of p -elements of G and P is a Sylow p -subgroup of G . Using the invariant $d_p(G)$, we obtain some new criteria for the existence of normal p -complements in finite groups.

▪ **November 27**

[Nicholas Gardner](#) (Binghamton University)

An Introduction to the Chermak-Delgado Lattice

Abstract: For a subgroup H of a finite group G , the Chermak-Delgado measure of H is defined as $m_G(H) := |H||C_G(H)|$. The subgroups of G with maximum Chermak-Delgado measure form a dual sublattice of the subgroup lattice of G . In this talk I will discuss some properties of such maximum-measure subgroups and calculate the Chermak-Delgado lattice for some classes of finite groups.

▪ **December 4**

[Speaker](#) (University)

Title

Abstract: Abstract text

- Pre-2014 semesters
- [Fall 2014](#)
- [Spring 2015](#)
- [Fall 2015](#)
- [Spring 2016](#)
- [Fall 2016](#)
- [Spring 2017](#)
- [Fall 2017](#)
- [Spring 2018](#)

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