The Algebra Seminar

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. As of Saturday, March 26, 2022, 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 join the seminar's mailing list.

Fall 2023

- **August 22**
  Organizational Meeting

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

- **August 29**
  Chris Schroeder (Binghamton University)
  Finite groups with many p-regular conjugacy classes

  Abstract: It is a classical topic in finite group theory to understand a finite group through its simple composition factors. To this end, one would like to construct group invariants that distinguish the nonabelian finite simple groups. One heuristic for simple groups is that they have “few” inequivalent irreducible linear representations, as they have few normal subgroups. In this talk, we will construct invariants from this observation and show how they can be used to determine the structure of finite groups. Our talk aspires to be accessible and interesting to a wide mathematical audience.

- **September 5**
  No Algebra Seminar - Monday classes meet

- **September 12**
  Dikran Karagueuzian (Binghamton University)
  Polynomial and Random Maps of Finite Fields

  Abstract: We study the relations between polynomial and random maps by computing the moments of the random variable of inverse image sizes. In the polynomial case, these moments are connected to the Galois Theory of the polynomial over a function field. For random maps, the moments can sometimes be computed using generating function techniques. These computations show both similarities and differences between the two cases.

- **September 19**
  Nguyen N. Hung (University of Akron)
  A conjectural link between the field of values and degree of an irreducible character

  Abstract: For an irreducible character χ of a finite group G, we define $f(\chi)$ as the `cyclotomic deficiency' of χ. This deficiency is the degree of the field extension from the field of values of χ to its cyclotomic closure. Over thirty years ago, Cram proved that when G is solvable, $f(\chi)$ is always a divisor of the character degree $\chi(1)$. In this talk, I will present strong evidence suggesting that for all finite groups, $f(\chi)$ is bounded above by $\chi(1).$

- **September 26**
  Daniel Studenmund (Binghamton University)
  Hidden symmetries of lattices in solvable Lie groups

  Abstract: The abstract commensurator of a group G, the group of isomorphisms between finite-index subgroups modulo equivalence, encodes symmetries of G that may be ``hidden.'' When G is a lattice in a simple Lie group incommensurable with $\operatorname{PSL}(2,\mathbb{R})$, work of Mostow, Prasad, Borel, and Margulis shows that the abstract commensurator of G detects whether the group arises through arithmetic constructions. In this talk, I will discuss results on abstract commensurators of the other significant class of lattice in Lie groups, the solvable groups. This builds on classical work of Malcev for nilpotent groups and more recent rigidity results of Mostow, Morris, and Baues–Grunewald.

- **October 3**
  Daniel Studenmund (Binghamton University)
  Hidden symmetries of lattices in solvable Lie groups, part II

  Abstract: The abstract commensurator of a group G, the group of isomorphisms between finite-index subgroups modulo equivalence, encodes symmetries of G that may be `hidden'. When G is a lattice in a simple Lie group incommensurable with $\operatorname{PSL}(2,\mathbb{R})$, work of Mostow, Prasad, Borel, and Margulis shows that the abstract commensurator of G detects whether the group arises through arithmetic constructions. In this talk, I will discuss results on abstract commensurators of the other significant class of lattice in Lie groups, the solvable groups. This builds on classical work of Malcev for nilpotent groups and more recent rigidity results of Mostow, Morris, and Baues–Grunewald.

- **October 10**

Olga Patricia Salazar-Diaz (Binghamton University and National University of Colombia)

An introduction to generalized digroups (g-digroups)

Abstract: In this talk we describe what a g-digroup is, and some of its group-type properties.

- **October 17**

  ? (University)

  Title

  Abstract: Text of Abstract

- **October 24**

  Alireza Salahshoori (Binghamton University)

  Totally Unimodular Matrices: An Introduction

  Abstract: Totally unimodular matrices have very nice properties with respect to solutions of linear equations, linear programming and combinatorial optimization. I will introduce them and some of the reasons they get attention.

- **October 31**

  Chris Schroeder (Binghamton University)

  Flipping a quantum coin

  Abstract: The state of a quantum system is described by a vector in a complex vector space. Therefore, whenever a group of transformations acts on a quantum system, we obtain a complex representation of the group. In this talk, we will work out a concrete example – the representation theory of physical rotations acting on a two-state quantum system – and discover the spookiness of quantum theory.

- **November 7**

  Marwa Mosallam (Binghamton University)

  Localization with respect to certain periodic homology theories

  Abstract: We will define localization and mention some results of Bousfield on localization in the stable homotopy category. If time permits we might explain the difference between localization of spectra and spaces.

- **November 14**

  Mithun Veettil (Binghamton University)

  Wreath Product of groups and indicatrix polynomial of a group action

  Abstract: First, we will define the wreath product of finite groups. Then we will define a polynomial called `indicatrix of a group' that captures the fixed points of the action of the group on some set. It turns out that the indicatrix behaves `nicely' upon taking the wreath product. If time permits, we shall go through specific examples; we will compute the indicatrix of the symmetric group on k letters, S_k, acting naturally on {1,2,...,k}.

- **November 21**

  No Algebra Seminar - Friday classes meet

- **November 28**

  Hao Ye (Binghamton University)

Recovering Objects with Morphisms-elementary introduction to category theory

Abstract: It is about the theme of “Recovering Objects with Morphisms.” It will begin by introducing basic concepts of category and related functors, as well as natural transformations. Following that, I will use universal properties and the Yoneda Lemma to illustrate the theme, and I will outline the general approach for proving the Yoneda Lemma. During the talk, I will use some examples from the book “Abstract Algebra” by Dummit and other relevant sources, such as “Category Theory: A Gentle Introduction” by Peter Smith and “The Rising Sea: Foundations of Algebraic Geometry” by Ravi Vakil.

- **December 5**
  Andrew Manuel Velasquez-Berroteran (Binghamton University)
  Introduction to Group Rings

Abstract: Given a group G and a ring R we can formulate a new ring, called the group ring RG, whereby elements in this ring can be thought of as an R-linear combination of elements of G. We will look at examples of groups rings, theorems and propositions of groups rings as well as look at some basic module theory. This talk will be accessible to students who have taken a first semester undergraduate course in modern algebra.

- Pre-2014 semesters
- Fall 2014
- Spring 2015
- Fall 2015
- Spring 2016
- Fall 2016
- Spring 2017
- Fall 2017
- Spring 2018
- Fall 2018
- Spring 2019
- Fall 2019
- Spring 2020
- Fall 2020
- Spring 2021
- Fall 2021
- Spring 2022
- Fall 2022
- Spring 2023