Fall 2022

- **August 30**
  Speaker: N/A
  Title: Organizational Meeting
  Abstract: We will discuss plans for this semester

- **September 13**
  Speaker: Sailun Zhan (Binghamton)
  Title: P-adic integration and motivic integration
  Abstract: We will give an introduction to some integration techniques in number theory and algebraic geometry, which allow us to compare the number of points over finite fields and some geometric properties between algebraic varieties. If there is time left, we will also talk about an equivariant version.

- **September 20**
  Speaker: Alexander Borisov (Binghamton)
  Title: Geometry of algebraic surfaces
  Abstract: I will discuss some standard material on algebraic surfaces, including some material on surfaces with singularities

- **October 11**
  Speaker: Sarah Lamoureux (Binghamton)
  Title: ADOs on the Completion of the Maximal Unramified Extension
  Abstract: This past spring, I gave a talk about arithmetic differential operators (ADOs) f : R^d → R, where R is a compact discrete valuation ring. The notion of an ADO generalizes to maps (\hat{R}^{\textup{ur}})^d → \hat{R}^{\textup{ur}}, where \hat{R}^{\textup{ur}} is the completion of the maximal unramified extension of R. This talk explores properties of these maps and their relationship to ADOs from R^d to R.

- **October 18**
  Speaker: Alexander Borisov (Binghamton)
  Title: Geometry of algebraic surfaces, Part 2
  Abstract: This is the continuation of my September 20 talk. In particular, I plan to discuss intersection theory on singular surfaces.

- **October 25**
  Speaker: Jaiung Jun (SUNY New Paltz)
  Title: From chip-firing games to vector bundles for schemes over natural numbers
  Abstract: In tropical geometry, finite (metric) graphs play a role of algebraic curves. Baker and Norine proved that an analogue of Riemann-Roch theorem holds in this setting. To generalize this result to higher dimension, one is naturally led to study the scheme theory over idempotent semifields (or more generally schemes over natural numbers). I will introduce basic notions and properties for line bundles and vector bundles in this setting. I will also discuss some related concepts (finiteness, flatness, projectivity). This is joint work with James Borger.

- **November 1**
  Speaker: Sayak Sengupta (Binghamton)
  Title: Locally nilpotent polynomials over Z (Part III)

Abstract: This is a continuation of two talks on the subject which were given in the Spring semester of 2022. So far we have defined locally nilpotent polynomials at r, seen several examples of locally nilpotent polynomials for different r's and also stated and proved a complete classification of locally nilpotent polynomials at 1 and -1. In order to prove this classification we only needed tools from elementary number theory. In this talk we will analyze the locally nilpotent polynomials at r when r\in Z without \pm 1. Here we will use a very deep result from algebraic number theory and even then we will see that only the linear polynomials could be studied and understood. I will start with a brief recollection of the major definitions and results, along with some notation and terminology and build our way up to the “general r” case.

- **November 29**
  Speaker: Alexander Borisov
  Title: Singularities in birational algebraic geometry
  Abstract: I will give a light overview of various classes of singularities that appear in birational algebraic geometry, with a special emphasis on surface singularities.

- **December 6** (by Zoom: Zoom link)
  Speaker: Krishna Kishore (Indian Institute of Technology (IIT) Tirupati)
  Title: Matrix Waring Problem
  Abstract: We will explain the following statement: Let q be a prime power. For every positive integer k there is a constant C_k depending only on k such that for all $q > C_k$ and for all $n \geq 1$ every matrix in $M_n(F_q)$ is a sum of two kth powers. Here F_q denotes the finite field with q elements.