Spring 2024

- **January 23**
  Speaker: N/A
  Title: Organizational Meeting
  Abstract: We will discuss plans for this semester

- **February 13**
  Speaker: Alexander Borisov (Binghamton)
  Title: Locally Integer Polynomial Functions
  Abstract: I will discuss the ring of integer-valued functions on the integers with a peculiar property: when restricted to any finite subset, the interpolation polynomial has integer coefficients. The original motivation for this comes from Sayak Sengupta's work on iterations of integer polynomials, but this and related objects appear to be of independent interest.

- **February 20**
  Speaker: Sayak Sengupta (Binghamton)
  Title: Nilpotent and Infinitely Nilpotent Integer Sequences
  Abstract: We say that an integer sequence $\{r_n\}_{n\ge 0}$ has a generating polynomial $u(x)$ over $\mathbb{Z}$ if for every positive integer n one has $u^{(n)}(r_0)=r_n$. In addition, if such a sequence satisfies the condition that $r_n=0$ for some positive integer n (respectively, $r_n=0$ for infinitely many positive integers n), then we say that $\{r_n\}_{n\ge 0}$ is a nilpotent sequence (respectively, $\{r_n\}_{n\ge 0}$ is an infinitely nilpotent sequence). In this talk we will provide (and discuss) some important characteristics of nilpotent and infinitely nilpotent sequences.

- **March 12** by Zoom: Zoom link
  Speaker: Haiyang Wang (UGA)
  Title: Elliptic curves with potentially good supersingular reduction and coefficients of the classical modular polynomials
  Abstract: Let O_K be a Henselian discrete valuation domain with field of fractions K. Assume that O_K has algebraically closed residue field k. Let E/K be an elliptic curve with additive reduction. The semi-stable reduction theorem asserts that there exists a minimal extension L/K such that the base change E_L/L has semi-stable reduction. It is natural to wonder whether specific properties of the semi-stable reduction and of the extension L/K impose restrictions on what types of Kodaira type the special fiber of E/K may have.
  In this talk we will discuss the restrictions imposed on the reduction type when the extension L/K is wildly ramified of degree 2, and the curve E/K has potentially good supersingular reduction. We will also talk about the possible reduction types of two isogenous elliptic curves with these properties and its relation to the congruence properties of the coefficients of the classical modular polynomials.

- **March 19**
  Speaker: Shane Chern (Dalhousie)
  Title: The Seo-Yee conjecture: Nonmodular infinite products, seaweed algebras, and integer partitions
  Abstract: In this talk, I will present my recent work on the Seo-Yee conjecture, which claims the nonnegativity of coefficients in the expansion of a q-series infinite product. The Seo-Yee conjecture arises from the study of seaweed algebras (a special type of Lie algebra), and is closely tied with the enumeration of the index statistic of integer partitions. Our proof of the Seo-Yee conjecture is built upon the asymptotic analysis for a generic family of nonmodular infinite products near each root of unity.

- **March 26**
  Speaker: Alexander Borisov (Binghamton)
  Title: On irreducibility of higher derivatives of polynomials x^n+...+x+1
  Abstract: In our 1999 joint paper with Filaseta, Lam, and Trifonov we proved, among other results, that for every fixed positive integer k the k-th derivatives of the polynomials in the title are irreducible over the rationals for a density one set of natural n. The proof relies on understanding the “location” of the roots of these derivatives in complex numbers and in p-adic complex numbers for primes dividing (n+1)n...(n+1-k). I will explain the main ideas of the proof while trying to avoid the rather formidable technical details.

- **April 9** 4:00-6:00 pm Special Event: PhD Defense
  Speaker: Sayak Sengupta (Binghamton)
  Title: Iteration of Polynomials over Integers
  Abstract: For a polynomial $u=u(x)$ over $\mathbb Z$ and $r\in\mathbb Z$, we consider the orbit of u at r, denoted and defined by $\mathcal{O}_u(r):=\{u(r),u(u(r)),\ldots\}$. There are two main questions that we plan to answer: (1) what are the polynomials u for which $0\in \mathcal{O}_u(r)$, and (2) what are the integer polynomials u that satisfies the condition that for each prime number p there is some iteration m_p of u such that $p|u^{(m_p)}(r)$? In this talk we will provide partial answer to (1), and a complete answer to (2).

- **April 16**
  Speaker: Alexander Borisov (Binghamton)
  Title: On the Nyman-Beurling-Baez-Duarte criterion for the Riemann Hypothesis
  Abstract: I will talk about an attractive criterion for the Riemann Hypothesis, originally due to Nyman and Beurling in early 1950s and strengthened by Baez-Duarte in early 2000s. The talk will be partially based on my 2005 paper https://people.math.binghamton.edu/borisov/documents/papers/quot-fact-rh.pdf and will also include some more recent unpublished considerations.

- **April 29 (Monday)** 4:00-6:00 pm Special event: Admission to candidacy
  Speaker: Mithun Veettil (Binghamton)
  Talk 1 (4:00-4:55)
  Title: Hilbert's Irreducibility Theorem
  Abstract: Hilbert's irreducibility theorem deals with the following problem: Let $f(t,x)$ be an irreducible polynomial in $K[t,x]$. Then for which field K is it true that there are infinitely many specializations $t\mapsto t_0\in K$ such that $f(t_0,x)$ is irreducible in $K[x]$? Surprisingly, it turns out that $\mathbb{Q}$ and function fields have this property.
  Talk 2 (5:00-5:55)
  Title: Golomb Topology on a Domain
  Abstract: Golomb topology on a domain is a generalization of arithmetic topology on $\mathbb{Z}^+,$ appearing in Furstenberg's proof of the infinitude of primes. This paves way for the otherwise rare examples of countably infinite connected Hausdorff spaces. Following this, I shall conclude with a homeomorphism problem of Golomb topology on Dedekind domains. This talk is based on the 2019 paper by Pete Clark, Noah Lebowitz-Lockard, and Paul Pollack http://alpha.math.uga.edu/~pete/CLLP_November_30_2017.pdf