FALL 2019

Date and Time: Friday, November 8, 2019, at 9 AM

Location: PB 032

Title: *On the Gevrey Ultradifferentiability of Weak Solutions of an Abstract Evolution Equation*

Speaker: Marat Markin

Abstract:

Given the abstract evolution equation

$$y'(t) = Ay(t),\ t \in \mathbb{R},$$

with a *scalar type spectral operator* A in a complex Banach space, we find conditions on A, formulated exclusively in terms of the location of its *spectrum* in the complex plane, *necessary and sufficient* for all *weak solutions* of the equation, which a priori need not be strongly differentiable, to be strongly Gevrey ultradifferentiable of order $\beta \geq 1$, in particular *analytic* or *entire*, on $\mathbb{R}$. We also reveal certain inherent smoothness improvement effects and show that, if all weak solutions of the equation are Gevrey ultradifferentiable of orders less than one, then the operator A is necessarily *bounded*. The important particular case of the equation with a *normal operator* A in a complex Hilbert space follows immediately.

Date and Time: Friday, October 18, 2019, at 9 AM

Location: PB 032

Title: *Two-intersection sets in the project space PG(3,9)*

Speaker: Morgan Rodgers

Abstract:

This talk will consider point sets in the projective space $\mathrm{PG}(r,q)$ having special intersection properties. A set of points $\mathcal{K}$ is called a *two-intersection set* if there are precisely two different intersection sizes with lines of the space. Such a set is also called a set of type (m,n), where m and n are the intersection sizes that occur. A two-intersection set can be used to construct an error correcting code with precisely two weights of codewords, and can also be used to define a graph with strong regularity properties [1]. There are many well-studied examples in projective planes; for example a set of type $(0,2)$ in a projective plane is called a *hyperoval*. However there is no known example of an (m,n) set in $\mathrm{PG}(r,q)$, with $2 \leq m,n \leq q-1$, for $r > 2$.

After introducing some necessary conditions due to Tallini-Scafatti [2], a nd using the determination of all sets of type (m,n) in the projective plane $\mathrm{PG}(2,9)$ given by Penttila and Royle [3], we will discuss some progress towards determining the existence of a set of type (m,n) in $\mathrm{PG}(3,9)$ (the smallest open case).

References

[1] Calderbank, R. and Kantor, W.M., The geometry of two weight codes, Bull. London Math Soc. **18** (1986), 97–122.

[2] Tallini-Scafati, M., Calotte di tipo (m,n) in un spazio di Galois $S_{r,q}$, Rend. Accad. Naz. Lincei, **53** (1973), 70–81.

[3] Penttila, T. and Royle, G., Sets of type (m,n) in the affine and projective planes of order nine, Des. Codes Cryptogr. **6** (1995), 229–245.

Date and Time: Friday, September 27, 2019, at 9 AM

Location: PB 032

Title: *Rainbow Spanning Trees in Edge-Colored Complete Graphs*

Speaker: Katherine Perry, Ph.D. (Soka University)

Abstract:

A spanning tree of an edge-colored graph is rainbow provided that each of its edges receives a distinct color. In 1996, Brualdi and Hollingsworth conjectured that if K_{2m} is properly $(2m-1)$-edge-colored, then the edges of K_{2m} can be partitioned into m rainbow spanning trees, except when $m = 2$. In this talk, we'll look at the history and recent results concerning this conjecture and related questions and also consider the extremal question of maximizing and minimizing the number of rainbow spanning trees in K_n, given a special type of $(n-1)$-edge-coloring which is surjective and rainbow cycle free, called a *JL-coloring*.

Keywords: edge-coloring, complete graph, rainbow spanning tree