Alex Iosevich, Professor of Mathematics at the University of Missouri-Columbia, will be visiting Baylor University from October 22 – October 27. He will give three special lectures under the collective title

Geometric Combinatorics, Additive Number Theory, and Fourier Analysis.

Professor Iosevich works in the areas of harmonic analysis (with applications to partial differential equations), classical analysis, geometric combinatorics, geometric measure theory, convex geometry, probability theory, and analytic number theory. To date, he has published more than fifty research papers in these areas.

He obtained his Ph.D. in 1993 in mathematics at the University of California at Los Angeles under the direction of Christopher Sogge; prior to this, he earned his B.S. in mathematics in 1989 at the University of Chicago. He has held visiting positions at McMaster University (Canada), University of New South Wales (Australia), Wright State University, and Georgetown University before joining the faculty at the University of Missouri-Columbia in 2000.

All students and faculty are encouraged to attend this special departmental event; all of Professor Iosevich's lectures will be held in SR 344.

The abstract for his lectures:

Geometric Combinatorics, Additive Number Theory, and Fourier Analysis

Abstract: The purpose of these lectures is to describe some interesting connections between combinatorics, number theory, and harmonic analysis.

We shall focus on the following basic questions:

1. How "large" does a subset of a given vector space need to be in order to contain a "congruent" copy of a given geometric configuration? Similarly, we can ask how many non-congruent configurations of a given type a set determines.

2. Suppose that A is a subset of the ring R. Let

$$A + A = \{a + a' \mid a, a' \in A\}$$

and

$$A \cdot A = \{a \cdot a' \mid a, a' \in A\}$$

denote the sum set and product set, respectively. Is it true that either $A + A$ or $A \cdot A$ must be much larger than A itself, in a suitable sense? The answer, up to some disclaimers, turns

out to be yes and involves, depending on the setting we use, a very powerful and diverse set of machinery.

The lectures are organized as follows. In the first lecture we shall present the problems in question in a variety of different contexts and describe some connections between them. In the second lecture, we shall focus on the combinatorial aspects of these problems and connections with number theory. The final lecture will be dedicated to the Fourier analytic methods and their connections with number theory.