DATE: Friday, September 4, 2009

LOCATION: Elizabethtown College, Esbenshade Hall, Room 382 (directions at the bottom of this e-mail) followed by dinner at a place to be determined.

4:30 TALK: Andrey Glubokov, Millersville University
“Introduction to ideas of Noncommutative Geometry”

Abstract: The correspondence between geometric spaces and commutative algebras is a familiar and basic idea of algebraic geometry. The theory, called noncommutative geometry, rests on two essential points:

1. The existence of many natural spaces for which the classical set-theoretic tools of analysis, such as measure theory, topology, calculus, and metric ideas which correspond very naturally to a noncommutative algebra. Such spaces arise both in mathematics and in quantum physics, examples include: space of Penrose tilings, space of leaves of a foliation, space of irreducible unitary representations of a discrete group, phase space in quantum mechanics.

2. The extension of the classical tools, such as measure theory, topology, differential calculus and Riemannian geometry, to the noncommutative situation. This extension involves an algebraic reformulation of the above tools, but passing from the commutative to the noncommutative case is never straightforward. On the one hand, completely new phenomena arise in the noncommutative case, such as the existence of a canonical time evolution for a noncommutative measure space. On the other hand, the constraint of developing the theory in the noncommutative framework leads to a new point of view and new tools even in the commutative case, such as cyclic cohomology and the quantized differential calculus which, unlike the theory of distributions, is perfectly adapted to products.

The purpose of this introductory talk is to give an overview of the noncommutative case in the framework of real analysis.