

Seminar & Events Bulletin: What is... ?
01-01-2013 to 06-30-2013

Tuesday, January 15, 2013

2:10pm-3:00pm **What is... ?** -- Peter Miller (Univ of Michigan) *What is the inverse-scattering transform?* -- 3866 East Hall

Tuesday, January 29, 2013

2:10pm-3:00pm **What is... ?** -- Jean-francois Lafont (Ohio State University) *What is... a homology manifold?* -- 3866 East Hall

Tuesday, February 19, 2013

2:10pm-3:00pm **What is... ?** -- Joseph Silverman (Brown University) *A whirlwind survey of the arithmetic of elliptic curves* -- 3866 East Hall

Tuesday, March 12, 2013

2:10pm-3:00pm **What is... ?** -- Andreas Blass (University of Michigan) *What Is ... Ingleton's Inequality?* -- 3866 East Hall

Tuesday, March 19, 2013

2:10pm-3:00pm **What is... ?** -- John Schotland (University of Michigan) *What is ... the inverse problem?* -- 3866 East Hall

Tuesday, March 26, 2013

2:10pm-3:00pm **What is... ?** -- Mattias Jonsson (Univ of Michigan) *What is a Berkovich space* -- 3866 East Hall

Tuesday, April 02, 2013

2:10pm-3:00pm **What is... ?** -- Bob Griess (Univ of Michigan) *What is moonshine?* -- 3866 East Hall

Tuesday, April 23, 2013

2:10pm-3:00pm **What is... ?** -- Bill Fulton (Univ of Michigan) *What is ... a bad math talk?* -- 3866 East Hall

Seminar & Events Bulletin: What is... ?
01-01-2013 to 06-30-2013

Abstracts

What is... ?

Tuesday, January 15, 2013, 2:10pm-3:00pm

3866 East Hall

Peter Miller (Univ of Michigan)

What is the inverse-scattering transform?

The inverse-scattering transform was first discovered in the 1960's by Gardner, Greene, Kruskal, and Miura as a method of solving the initial-value problem for the Korteweg-de Vries equation, a well-known nonlinear partial differential equation modeling (among many other things) the propagation of surface water waves in a channel. It soon became apparent that the method applies more broadly to a wider class of problems of great interest in nonlinear wave theory. I will describe some of the history and then explain how the method can be used to solve the defocusing cubic nonlinear Schrödinger equation, as was first discovered by Zakharov and Shabat. As suggested by the name of the method, the key ideas come from the mathematical treatment of the direct and inverse-scattering problems for various linear equations, problems that are of independent interest in applications (see John Schotland's upcoming talk in this seminar).

Although this will be Part II, with particular emphasis on the representation of the inverse scattering problem as a Riemann-Hilbert problem of complex function theory, I will try to make the talk self-contained for those interested people who may have missed Part I last November.

What is... ?

Tuesday, January 29, 2013, 2:10pm-3:00pm

3866 East Hall

Jean-francois Lafont (Ohio State University)

What is... a homology manifold?

I'll provide an introduction to homology manifolds and related notions. This talk should be accessible to graduate students; I will only assume familiarity with the first year topology sequence.

Seminar & Events Bulletin: What is... ?
01-01-2013 to 06-30-2013

What is... ?

Tuesday, February 19, 2013, 2:10pm-3:00pm

3866 East Hall

Joseph Silverman (Brown University)

A whirlwind survey of the arithmetic of elliptic curves

In this talk I will discuss elliptic curves, starting with their topology, geometry (both analytic and algebraic), and etymology, and proceeding to their number theoretic properties, including their group of rational points, set of integral points, points over finite fields, and L-series, with a brief mention of applications ranging from cryptography to Fermat's Last Theorem. There will be no proofs, but at the conclusion I hope to have provided you with a panorama of this beautiful subject.

What is... ?

Tuesday, March 12, 2013, 2:10pm-3:00pm

3866 East Hall

Andreas Blass (University of Michigan)

What Is ... Ingleton's Inequality?

Consider a finite-dimensional vector space and a finite sequence of linear subspaces. Consider also the subspaces obtainable as sums of subsequences of the given sequence. What can one say about the dimensions of such sums? Perhaps surprisingly, there are nontrivial things to be said; Ingleton's inequality is the simplest of these. Perhaps more surprisingly, although some further inequalities beyond Ingleton's are known, there might be more that are still unknown. I'll describe this situation and, if time permits, a couple of related situations outside linear algebra.

What is... ?

Tuesday, March 19, 2013, 2:10pm-3:00pm

3866 East Hall

John Schotland (University of Michigan)

What is ... the inverse problem?

This is an introductory talk on inverse problems for PDEs and their relation to imaging. We will focus on the Calderon problem, which consists of determining the electrical conductivity of a medium from boundary measurements. We will survey what is known about this problem and its cousin, the inverse scattering problem for waves in random media.

Seminar & Events Bulletin: What is... ?
01-01-2013 to 06-30-2013

What is... ?

Tuesday, March 26, 2013, 2:10pm-3:00pm

3866 East Hall

Mattias Jonsson (Univ of Michigan)

What is a Berkovich space

When naively trying to do analytic geometry over fields other than the complex numbers, one often encounters various unpleasant facts, such as the spaces in question being totally disconnected or not locally compact. In the late 1980's, Vladimir Berkovich found a way to define analytic spaces with good topological properties over any field equipped with a norm. I will give a gentle introduction to these spaces, now commonly called Berkovich spaces.

What is... ?

Tuesday, April 02, 2013, 2:10pm-3:00pm

3866 East Hall

Bob Griess (Univ of Michigan)

What is moonshine?

In mathematics, the term "moonshine" indicates a surprising connection between distinct areas of mathematics. The term originated in the late 70s concerning connections between the Monster sporadic simple group and the set of genus 0 function fields on the upper half plane. In this lecture, we briefly list about half a dozen moonshine phenomena, involving finite simple groups, number theory and Lie theory. I will describe a few points in detail. An "explanation" of a moonshine phenomena would probably be some kind of mathematical context where all aspects of the phenomenon are visible and understandable. After three decades, there is hardly anything which qualifies as a real explanation.

What is... ?

Tuesday, April 23, 2013, 2:10pm-3:00pm

3866 East Hall

Bill Fulton (Univ of Michigan)

What is ... a bad math talk?

This talk -- aimed at young mathematicians, and hoping for audience participation -- will attempt to describe what it takes to make a mathematics talk bad. We will sketch the history of bad mathematics talks, including the great progress that has been made possible in recent decades. We will also discuss some of the similarities and differences between giving bad talks and writing bad papers.