

**University of Georgia**  
**Department of Mathematics**

**Seminar Schedule**  
**January 23, 2006 - January 27, 2006**

*All Seminars are held in Boyd Graduate Studies Bldg. unless otherwise noted.*

**MONDAY, January 23, 2006**

**Topology/Geometry**

3:15pm - 5:30pm, GA Tech, Skiles 269

3:15 pm Monday, January 23, 2006

**Algebra-Geometry-Topology Seminar: *Existence of Engel structures***

by Thomas Vogel (University of Pennsylvania and IAS) in Skiles 269

Engel structures are non-integrable plane fields on 4-manifolds who share many properties with contact structures. The existence of an Engel structure on a manifold leads to strong restrictions on the topology of the manifold: Under certain orientation assumptions the tangent bundle of the manifold is trivial. In this talk we develop a construction which shows that the converse is also true: Every 4-manifold with trivial tangent bundle admits an Engel structure.

4:30 pm Monday, January 23, 2006

**Algebra-Geometry-Topology Seminar: *A survey of some smooth concordance invariants*** by Matthew Hedden (Princeton) in Skiles 269

In the past few years, several powerful smooth knot concordance invariants have been discovered. Perhaps most notable are the invariants  $\tau(K)$  and  $s(K)$ , both of whose values for the  $(p,q)$  torus knots provide new proofs of Milnor's famous conjecture on the unknotting number of these knots.  $\tau(K)$  was discovered by Ozsváth-Szabó, and independently by Rasmussen, and its definition relies on the analytically defined knot Floer homology theory developed by these authors.  $s(K)$ , on the other hand, was discovered by Rasmussen and its definition is in terms of the combinatorial knot homology theory of Khovanov. Though quite different in their definition, the two invariants share several formal properties, and agree for many knots. Indeed, it was conjectured by Rasmussen that the two invariants are equal, up to normalization. In this talk I will survey what is known about the two invariants, and discuss some of my recent results regarding the invariant  $\tau$ . I will conclude by presenting the first known examples where the invariants disagree, discovered jointly with Philip Ording of Columbia University.

**Algebra**

2:30pm, Room 410

***No Meeting this week***

**Ed Azoff Tea Social**  
3:00pm, Room 409  
Coffee, Cookies, Tea

**Arithmetic Geometry/Number Theory**  
3:30pm, Room 302  
**Speaker:** Ambrus Pal (IHES)

**Title of talk:** *The torsion of the Mordell-Weil group of the Jacobian of Drinfeld modular curves.*

**TUESDAY, January 24, 2006**

**VIGRE-Graduate Student Seminar**  
2:00p.m., Room 304  
**Speaker:** Matt Hedden, Princeton University

**Title of talk:** *Introduction to knot theory and knot invariants*

**Abstract:** I'll begin the talk by introducing what a knot is mathematically, and trying to motivate why someone (probably a topologist) might study them. I'll then discuss how one could go about studying knots through the use of invariants, and introduce two of the most famous invariants, the Alexander and Jones polynomials. I'll may try to conclude by speaking roughly about some beautiful modern generalizations of these polynomials which go by the names of Ozsvath-Szabo and Khovanov homology, respectively. The talk will be aimed at beginning graduate students or advanced undergraduates.

**Ed Azoff Tea Social**  
3:00pm, Room 409  
Coffee, Cookies, Tea

**Colloquium**  
3:30pm, Room 302  
**Speaker:** Ambrus Pal (IHES, France)

**Title of talk:**  *$K_2$  of elliptic surfaces and the rigid analytic regulator*

**Abstract:** Milnor  $K$ -groups of algebraic varieties play a significant role in algebra, geometry, number theory and even in mathematical logic. In spite of some spectacular results, such as the work of Voevodsky on the Bloch-Kato conjecture, some fundamental finiteness conjectures remain open about these objects. In this talk I will explain how a refined form of the Langlands correspondence over function fields were used to make progress in this problem.

**WEDNESDAY, January 25, 2006**

**Geometry in the Curriculum Seminar**

1:25pm, Aderhold Room 111

**Speaker:** Brad Findell, University of Georgia

**Title:** *Geometry in the new Georgia Performance Standards*

**Abstract:** What and where are the geometry ideas in the new Georgia Performance Standards (especially grades 6-12)?

**Algebraic Geometry**

2:30pm, Room 410

*No Meeting this week*

**VIGRE- Algebra**

3:45pm, Room 303

**Speaker:** Brian Boe, University of Georgia

**Title of talk:** *Proof of Kostant's Theorem, continued*

**THURSDAY, January 26, 2006**

**VIGRE – Feynman Diagrams**

2:00pm, Room 326

**VIGRE – Cardiac Physiology**

2:00pm, Room 640

**VIGRE- Zeta Functions**

2:15pm, Room 302

**VIGRE-Algebraic Geometry**

3:30pm, Room 324

**Ed Azoff Tea Social**

3:00pm, Room 409

Coffee, Cookies, Tea

**Colloquium**

3:30pm, Room 302

**Speaker:** Alexander Iosevich, Univ. of Missouri-Columbia

**Title of talk:** *"Analysis, combinatorics and number theory of distance sets"*.

**Abstract:** The Erdos distance conjecture says that  $N$  points in  $d$ -dimensional Euclidean space determine at least  $cN^{\frac{2}{d}}$  distinct distances. The continuous analog of this conjecture, introduced by Falconer says that if the Hausdorff dimension of a set in Euclidean space exceeds  $d/2$  then the Lebesgue measure of the set of distances is positive. We shall discuss these conjectures and connections between them. We shall also describe the finite field analog of these problems where Gauss and Kloosterman sums play a crucial role.

**FRIDAY, January 27 2006**

**Probability Theory**

2:30-3:30pm, Room 303

**Speaker:** Qing Zhang, University of Georgia

**Title of talk:** *Nonlinear filtering*