

MATHEMATICS DEPARTMENT SEMINAR SCHEDULE

November 18 – November 22, 2002

All seminars are held in Boyd Graduate Studies unless otherwise noted

MONDAY, November 18, 2002

Group Representation & Cohomology

2:30 p.m., Room 410

Speaker: Cornelius Pillen, University of South Alabama

Title of talk: “*On Extensions for Finite Chevalley Groups and Frobenius Kernels*”

Topology

2:30 p.m., Room 326

Speaker: Nancy Wrinkle and Gordana Matic, University of Georgia

Title of talk: “*Worked examples of the Ozsvath-Szabo invariants*”

Faculty and Graduate Social

3:00 p.m., Room 409

Coffee, Tea, Cookies

Cats

4:40 p.m., Room 306

VIDEO PRESENTATION (38 minutes)

Speaker: Richard Karp, University Professor, U. C. Berkeley

Title of talk: “*NP-Complete Problems*”

Abstract: ACM Turing Award winner Richard Karp clearly defines NP-complete problems. A combinatorial search problem involves searching through a finite, but very large, set of possible patterns or arrangements for one that satisfies a stated set of constraints. Despite decades of effort, many important combinatorial search problems seem intractable, since every known algorithm for their solution experiences a combinatorial explosion in running time as the problem size increases.

TUESDAY, November 19, 2002

VIGRE

2:00 p.m.-3:15 p.m., Room 304

Speaker: William Rulla, University of Georgia

Title of talk: “*Moduli spaces of curves*”

Abstract: The moduli spaces \mathcal{M}_g of Riemann surfaces (or algebraic curves) of genus g are topological spaces (in fact varieties) whose points are in bijection with the set of isomorphism classes of Riemann surfaces of genus g . A person prone to drama might posit that they are as natural and inevitable in mathematics as the complex numbers. Their geometry puts constraints on families of curves.

I will outline some intuition about their properties and construction and discuss some open (and "closed") problems regarding their structure. The talk will be of minimal possible technicality.

Algebraic Geometry

3:30 p.m., Room 326

Speaker: Janice Wethington, University of Georgia

Title of talk: "*Varley's Conjecture*"

Abstract: From Robert's talk last week, we know that the secant map is complex analytically isomorphic up to an identity factor to products of polynomial multiplication maps. Now what? I will discuss a conjecture by Robert concerning an invariant for classifying the singularities of differentiable maps and how they play out for the multiplication maps.

Student Number Theory

3:30 p.m., Room 303

Speaker: TBA

Title of talk: *TBA*

WEDNESDAY, November 20, 2002

Wavelet Analysis

10:10 - 11:00 a.m., Room 410

Speaker: Okkyung Cho, University of Georgia

Title: "*Biorthogonality for bivariate box spline wavelets*"

Graduate Teaching Seminar

2:30 p.m., Room 303

Speaker: Dr. Brad Findell from the Department of Mathematics Education

Title of talk: Dr. Brad Findell from the Department of Mathematics Education will talk about and lead a discussion on the concept of mathematical proficiency, as recently introduced in publications of the National Research Council.

According to the National Research Council, mathematical proficiency consists of five intertwined strands:

- 1) conceptual understanding -- comprehension of mathematical concepts, operations, and relations
- 2) procedural fluency -- skill in carrying out procedures flexibly, accurately, efficiently, and appropriately
- 3) strategic competence -- ability to formulate, represent, and solve mathematical problems
- 4) adaptive reasoning -- capacity for logical thought, reflection, explanation, and justification
- 5) productive disposition -- habitual inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one's own efficacy.

The writing assignment for the November 20 meeting is as follows:

EITHER: Write about mathematical proficiency. Are your students developing mathematical proficiency? If so, in which strands? How do you encourage this development? Are there any strands that you don't address in your course? Do your students do better in some strands than in others?

OR: Write about some aspect of your teaching that you want to think about. This can be an upcoming class or topic that you will be teaching, or it can be some problem or difficulty in your teaching that you would like to resolve.

Faculty and Graduate Social

3:00 p.m., Room 409

Coffee, Tea, Cookies

Math Club Meeting

3:30 p.m., Room 303

Speaker: Dr. Edward Azoff, University of Georgia

Title of talk: *"Mathematics in games and games in mathematics."*

Abstract: The fathers of game theory, von Neumann and Morgenstern, were mathematicians, as was John Nash (of the movie "A Beautiful Mind"), but game theory is most famous for applications outside mathematics. Indeed, Nash's Nobel prize was in economics, and college game theory courses are taught by economists at least as often as by mathematicians. However, there have been applications of game theory to set theory and logic within mathematics. In this talk, we will briefly survey some applications of both types.

Refreshments will be provided.

Numerical Analysis

3:30pm, Room 410

Speaker: Ming-Jun Lai, University of Georgia

Title of talk: *"Domain decomposition methods"*

Abstract: We use the fundamental theorems for subspace decomposition and subspace correction to approach the domain decomposition methods.

Lie Theory

3:30 p.m., Room 302

Speaker: L. Chastkofsky, University of Georgia

Title: *"Lusztig's Conjecture, ctd."*

Abstract: One version of Lusztig's conjecture describes Jentzen's generic decomposition patterns in terms of certain polynomials associated with a Hecke algebra. We will discuss how to compute these polynomials.

Number Theory

3:30 p.m., Room 304

Speaker: Matt Baker, University of Georgia

Title of talk: *"Canonical heights attached to dynamical systems, Part II"*

Abstract: We will continue our discussion of canonical height functions associated to polynomial iteration. We will also introduce transfinite diameters, define equilibrium measure, and present a generalization of Bilu's equidistribution theorem. We will try to make the talk self-contained so that people who could not come to the previous talk will still be able to follow what's going on.

THURSDAY, November 21, 2002**Faculty and Graduate Social**

3:00 p.m., Room 409

Coffee, Tea, Cookies

Colloquium

3:30 p.m., Room 304

Speaker: Professor Rolf Schimmrigk, Kennesaw State University

Title of talk: *"Arithmetic algebraic geometry in string theory"*

Abstract: Several recent results indicate that methods from arithmetic algebraic geometry should be useful in understanding the string theoretic nature of Calabi-Yau manifolds. The main focus of the present talk is on a particular problem that points in this direction. Black holes in string theory compactifications on Calabi-Yau manifolds a priori might be expected to have moduli dependent features. For example the entropy of a black hole, measured essentially by the surface area of the black hole horizon, might be expected to depend on the complex structure moduli of the Calabi-Yau variety. This would be inconsistent with known properties of black holes. Supersymmetric black holes appear to evade this inconsistency by having moduli fields that flow to fixed points in moduli space that depend only on the charges of the black hole. Moore observed in the case of simple compactifications with elliptic factors that these fixed points in moduli space lead to curves with complex multiplication. This talk describes how the concept of complex multiplication of black hole attractor varieties can be generalized to higher dimensional Calabi-Yau manifolds with finite fundamental group.

FRIDAY, November 22, 2002**Geometry**

2:30 p.m., Room 322

Speaker: Jason Cantarella, University of Georgia

Title of talk: *"3rd order link integrals, or "Why are the Borromean rings linked?", continued*

