

MATHEMATICS DEPARTMENT SEMINAR SCHEDULE

November 4 – November 8, 2002

All seminars are held in Boyd Graduate Studies unless otherwise noted

MONDAY, November 4, 2002

Group Representation & Cohomology

2:30p.m., Room 410

Speaker: Kenyon Platt, University of Georgia

Title of talk: *“Blocks of Modular Representations”, continued*

Topology

2:30p.m. Room 326

Speaker: Nancy Wrinkle, University of Georgia

Title of talk: *“An introduction to Ozsvath-Szabo invariants of 3-manifolds”, continued*

Faculty and Graduate Social

3:00 p.m., Room 409

Coffee, Tea, Cookies

Analysis

3:30pm, Room 222

TBA

Cats

4:40 p.m., Room 306

Speaker: Jacob Martin Graduate student in Computer Science, UGA

Title of talk: *“Genetic Algorithms and Singular Value Matrix Decompositions”*

Abstract: The technique of singular value decomposition (SVD) has proved invaluable in several different problem domains. It has been proven effective in data compression, image recognition and classification, chemical reaction analysis, and document comparison. Although these domains are quite different in some respects, each can be reduced to a problem of ascertaining relevance in data. Intuitively, the abstract concept of relevance depends critically on the nature of the problem at hand. However, the SVD invariably provides a method for mathematically ranking correlations within data. Latent semantic indexing (LSI) is a method of using the SVD to discover and expose latent, or hidden, relationships between terms in documents. Although similar vector-based models exist for analyzing relationships within documents, experiments indicate that LSI outperforms these methods. In fact, empirical evidence concerning document comparison suggests that not only does LSI save space and speed up queries, it actually improves the quality of the information retrieved. Successful applications of the SVD to many genres implies that it may benefit other genres as well.

Genetic Algorithms have been successfully applied to many different types of problems. How can the SVD be incorporated into a genetic algorithm? There are several possible approaches, but the one to be considered and evaluated here is based on qualifying candidate individuals for recombination. Candidates are qualified based on their proximity to a select group of individuals. A brief overview of Genetic Algorithms and results from this process for several different problem domains: n-queens problem, instruction scheduling, multiple sequence alignment, and function minimization; will be presented and evaluated.

TUESDAY, November 5, 2002

VIGRE

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

Speaker: William Graham, University of Georgia

Title of talk: "*Combinatorics and geometry*"

Abstract: There are many quantities in mathematics which are known to be non-negative integers. It may happen, however, that even if one has a formula for such a quantity, the formula involves both positive and negative terms, and non-negativity of the final result is not at all obvious from the formula. The challenge is then to find a non-negative formula; the best formula (from the point of view of combinatorics) is one identifying the quantity as the number of elements of some explicitly describable finite set. In this talk I will discuss some examples of this in geometry and Lie theory.

Algebraic Geometry

3:30 p.m., Room 326

Speaker: Daniele Arcara, University of Georgia

Title of talk: "*Workshop on the Verlinde formula*"

Abstract: I will bring with me a few formulations of the Verlinde formula and challenge the audience to come up with a way to prove that the strange duality conjecture makes sense, i.e., the two vector spaces involved have the same dimension.

Student Number Theory

3:30 p.m., Room 303

Speaker: TBA

Title of talk: "*TBA*"

Math Club Meeting

4:30 p.m., Room 303.

Speaker: Dr. Dino Lorenzini, University of Georgia

Title of talk: "*Number Theory, easy questions, hard answers.*"

Abstract: This is a talk about number theory intended for people with no background in number theory. We'll talk about history: who invented the numbers, philosophy: what is a large number, and aesthetics: what is a beautiful theorem.

Refreshments will be provided.

WEDNESDAY, November 6, 2002

Wavelet Analysis

10:10 – 11:00 a.m., Room 410

Speaker: Okkyung Cho, University of Georgia

Title of talk: “*Bivariate biorthogonal Wavelets based on box splines*”

Graduate Teaching Seminar

2:30 p.m., Room 303

No Meeting this week

Faculty and Graduate Social

3:00 p.m., Room 409

Coffee, Tea, Cookies

Numerical Analysis

3:30pm, Room 410

Speaker: Ming-Jun Lai, University of Georgia

Title of talk: “*Hierarchical basis methods*”

Lie Theory

3:30 p.m., Room 302

Speaker: William Graham, University of Georgia

Title of talk: “*Kazhdan-Lusztig polynomials for 321 hexagon avoiding permutations*”

Abstract: I will describe (without proof) a formula of Billey and Warrington for computing Kazhdan-Lusztig polynomials associated to certain permutations.

Number Theory

3:30 p.m., Room 304

No Meeting this week

THURSDAY, November 7, 2002

Faculty and Graduate Social

3:00 p.m., Room 409

Coffee, Tea and Cookies

Colloquium

3:30 p.m., Room 304

Speaker: Arpad Toth, Forham University, NY

Title: “*Factorization of primes in rings of algebraic integers*”

Abstract: Given a polynomial with rational coefficients one can use a root of the polynomial to construct a finite ring extension of the ring of ordinary integers. A fundamental arithmetic problem is to determine, how ordinary prime numbers factor in this extension. (Many times they do!) In the first half of the talk I will illustrate through examples how this problem is solved in case the Galois group of the equation is abelian. At the end I plan to outline a solution to the problem in a non-abelian situation using Felix Klein's solution of the quintic equation. (This is joint work with W. Duke.)

FRIDAY, November 8, 2002

Special Seminar – Analysis/Number Theory

2:30 p.m., Room 304

Speaker: Arpad Toth, Forham University, NY

Title: “*Estimation of Fourier coefficients of Siegel modular forms*”

Abstract: Siegel modular forms are special functions on the symplectic group $Sp(2n, \mathbb{R})$ with certain invariance properties under $SP(2n, \mathbb{Z})$. They can be expanded in a Fourier series, and the coefficients are interesting arithmetic functions. In case the forms decays rapidly one expects good estimates for the Fourier coefficients. After reviewing the necessary background, I will outline the theory in the well-understood case of $SL(2, \mathbb{R})$. At the end I explain a recent result in the case of $SP(4, \mathbb{R})$.

Geometry

2:30 p.m., Room 322

No meeting this week, postponed until 11/15/2002:

Speaker: Jason Cantarella, University of Georgia

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

Abstract: The Borromean rings are a collection of 3 unknots, which are pairwise unlinked. However, as a 3-component link, everyone "knows" that the Borromean rings are inseparable.

How do you prove this? The answer depends on constructing a version of the linking number which operates on 3-component links whose pairwise linking numbers are zero. This is a good first example of a lifting construction in algebraic topology.

We'll show that this "Massey product" construction has a natural interpretation in terms of a version of the Gauss integral. (Despite all this terminology, this expository talk will be appropriate for first-year grad students.)