MATHEMATICS DEPARTMENT SEMINAR SCHEDULE
April 1 – April 5, 2002

All seminars are held in Boyd Graduate Studies unless otherwise noted

MONDAY, April 1, 2002

Faculty and Graduate Social
3:00 p.m., Room 409
Coffee, Tea and Cookies

Group Representation and Cohomology
2:30 p.m., Room 410
Speaker: Kenyon Platt, University of Georgia
Title of talk: *"Representations of the Symmetric Group"*

Topology
3:00 p.m., Room 322
TBA

Number Theory
3:30 p.m., Room 304
Speaker: TBA
Title of talk: *TBA*

Numerical Analysis
3:30 p.m., Room 410
Speaker: Okkyung Cho, University of Georgia
Title of talk: *"Construction of Biorthogonal Wavelets"*
Abstract: In this talk, we discuss how to construct concrete examples of biorthogonal wavelets.

Lie Theory
3:30 p.m., Room 302
Speaker: Markus Hunziker, University of Georgia
Title of talk: *"Duality III: The Springer Correspondence", continued*

CATS
4:40 p.m., Room 306
Speaker: Yangrong Ling**,** Graduate Student, Computer Science Dept.
Title of talk: *"Analysis of Eigenface and Fisherface Algorithms for Face Recognition"*
Abstract: The general method of identifying images is to measure the similarity between images. The similarity measures can be calculated on the images in their original space or on the images projected into a new space. Two pattern classification algorithms for solving the face recognition problem, namely Eigenface and Fisherface methods are examined. The Eigenface method uses principal components analysis (PCA) for

dimension reduction, yields projection directions that maximize the total scatter across all classes. The Fisherface algorithm is based on Fisher's Linear Discriminant and produces well-separated classes in a low-dimensional subspace. Experiments are performed to test hypotheses regarding the relative performance of subspace and difference

TUESDAY, April 2, 2002

VIGRE
2:00 p.m-3:15 p.m., Room 304
Speaker: Prof. Gary Kennedy, Ohio State University
Title of talk: *"The trillionth (hexadecimal) digit of pi"*

Graduate and Faculty Social
3:00 p.m., Room 409
Coffee, Tea, Cookies

Colloquium
3:30 p.m., Room 304
Speaker: Prof. Gary Kennedy, Ohio State University
Title of talk: *"Exploiting the recursive structure of moduli space"*
Abstract: An elementary dimension count shows that, in the complex projective plane, the number of rational curves of degree d passing through 3d-1 specified points is finite, but until the last decade these numbers had been computed only through dimension d = 5. Now all such numbers are known, thanks to a remarkable recursion discovered by Konstevich. After looking at a naive proof, we delve more deeply and see that Kontsevich's formula is the numerical aspect of a deeper recursive structure: the moduli space for such curves can be compactified in such a way that the compactifying matter is built out of simpler instances of the same sort of moduli space. Using the moduli space, we can even define a new "quantum product" extending the ordinary cup product on the projective plane, and observe that Kontsevich's formula is exactly the statement that this product is associative.

Algebraic Geometry
3:30 p.m., Room 326
No meeting this week
(Please note Gary Kennedy's colloquium talk at this same time.)

Analysis
3:30 p.m., Room 326
No meeting this week

Student Number Theory
3:30 p.m., Room 302
Speaker: Charles Pooh, University of Georgia
Title of talk: "*Large integer multiplication: Fast Fourier Transform"*

WEDNESDAY, April 3, 2002

Group Representation and Cohomology
2:30 p.m., Room 410
Speaker: Kenyon Platt, University of Georgia
Title of talk: *"Representations of the Symmetric Group"*

UGA Math Club Problem Solving Group
2:30 p.m., Room 302

Faculty and Graduate Social
3:00 p.m., Room 409
Coffee, Tea, Cookies

Arithmetic Geometry
3:30 p.m., Room 304
No Meeting this week

THURSDAY, April 4, 2002

Colloquium
2:00, Room 304
Speaker: Ernest S. Croot III, UC Berkeley
Title of talk: "Sign oscillations of multiplicative functions"
Abstract: Suppose that f(n) is a completely multiplicative function taking on the values +1 and -1. It is easy to show that f(n) = f(n+1) for > c x values n < x (where c is some constant): by a pigeonhole argument, there exist integers i, j with 0 <= i < j <= 2, such that f(2n+i) = f(2n+j) for > c x values of n with 2n+2 < x. If i=0, j=2, then

$$f(n) = f((2n+i)/2) = f((2n+j)/2) = f(n+1);$$

and the other possibilities for i,j immediately yield > c x consecutive number 2n+i, 2n+i+1 = 2n+j, such that f(2n+i) = f(2n+i+1).

The following `complementary' problem, however, is not so easy to solve: For how many integers n < x do we have f(n) = -f(n+1)? That is, how many sign changes does f(n) go through as n goes from 1 to x? I will give some of the history of this problem, including partial results and conjectures due to G. Harman, Pintz, Wolke, and Hildebrand, R. Heath-Brown, Ruzsa, and Balog, as well as a sketch of the following recent result due to myself: There are at least x / exp((log x)^{1+o(1)}) values n < x such that f(n) = -f(n+1).

Faculty and Graduate Social
3:00 p.m., Room 409
Coffee, Tea, Cookies

Colloquium
3:30 p.m., Room 304
Speaker: Prof. Juan Carlos Alvarez, Polytechnic University
Title: *Jewels and Open Problems in Finsler geometry.*
Abstract*:* Finsler manifolds --- manifolds provided with a norm in each tangent space --- have long been the poor cousins of their Riemannian counterparts. However recent researches relating their study to convex, metric, integral, and symplectic geometry suggest that Finsler geometry may very well develop to be one of the most exciting branches of global differential geometry. In this talk I will survey some of the most attractive results and open problems in the field.

FRIDAY, April 5, 2002

Geometry
2:30 p.m., Room 322
Speaker: Prof. Juan Carlos Alvarez, Polytechnic University
Title of talk: "Symplectic Techniques in the Theory of Normed Spaces."
Abstract: In this talk we will explore the relationship between symplectic geometry and the duality of normed spaces and apply it to the study of the intrinsic geometry of the unit sphere in a normed space. In particular we will sketch a proof of the following conjecture of Sch\"affer: the infimum of the lengths of all spherical curves joining a pair of antipodes is the same for a normed space and its dual. Here length is measured using the corresponding norm.

Special Seminar Series
3:30 – 4:30 p.m., Room 322
Speaker: Cal Burgoyne, University of Georgia
Subject: *"Symmetries of Maxwell's Equations"*

Upcoming Events

THURSDAY, April 11, 2002

Faculty and Graduate Social
3:00 p.m., Room 409
Coffee, Cookies, Tea

Colloquium
3:30 p.m., Room 304
Speaker: Prof. Chris Phillips, University of Oregon
Title of talk: *"The structure of C* algebras associated with minimal diffeomorphisms "*
Abstract: C*-algebras are a particularly tractable class of Banach algebras, and are moreover important in the unitary representation theory of groups, in mathematical physics, and in parts of geometry and topology such as index theorems and foliations. The Elliot classification program seeks to determine up to isomorphism all simple separable nuclear C*-algebras in terms of K-theory (essentially algebraic topology) and traces

The easiest case, the purely infinite case, is done up to one technical problem. The next case is the stably finite case with projections. Here, much is known about C*-algebras obtained as direct limits of more elementary C*-algebras. However, C*-algebraists are more interested in crossed products, and they are also closer to the applications listed above. Qing Lin and I have proved a direct limit decomposition theorem for crossed products by minimal diffeomorphisms of compact manifolds. If the diffeomorphism is uniquely ergodic and the image of the K-theory under the trace is non-trivial (both are often satisfied), then the crossed product belongs to the class of simple separable nuclear C*-algebras known to be determined up to isomorphism by the Elliott invariant.