

**MATHEMATICS DEPARTMENT SEMINAR SCHEDULE**  
**November 12 – November 16, 2001**

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

**MONDAY, November 12, 2001**

**Group Representation & Cohomology**

2:30 - 3:30 p.m., Room 410

**Speaker:** Graham Matthews, University of Georgia

**Title of talk:** *"Representations of the Symmetric Groups"*

**Special Computational Topology/Geometry Seminar**

2:30 p.m., Room 303

**Speaker:** Saugata Basu, Georgia Institute of Technology

**Title of talk:** *"On the topological complexity of semi-algebraic sets"*

**Abstract:** I will describe some recent results refining the Oleinik-Petrovsky-Thom-Milnor bound on the sum of Betti numbers of semi-algebraic sets, leading to tight bounds on the individual Betti numbers separately and algorithms for computing them. I will also describe certain connections between the topological complexity of semi-algebraic sets and the combinatorial complexity of arrangements used in computational geometry.

**Faculty and Graduate Social**

3:00 p.m., Room 409

Coffee, Tea, Cookies

**Teacher Education Seminar**

3:30-4:30 pm, Room 302 Boyd

**Speaker:** Tom Cooney, Department of Mathematics Education, University of Georgia

**Title of talk:** *"Examining the Mathematics in Mathematics Teacher Education"*

**Abstract:** Linkages between the historical development of mathematics (especially the emphasis on mathematical formalism) and the teaching of mathematics will be made. Implications of research from around the world on teacher's knowledge and beliefs for reform in the teaching of mathematics will be considered. As a result of these analyses, three principles for teaching mathematics to teachers will be presented and illustrated.

**Number Theory**

3:30 p.m., Room 304

**Speaker:** Andrew Granville, University of Georgia

**Title of talk:** *"Cycle lengths in permutations are Poisson distributed"*

**Topology**

*No Meeting this week*

## **TUESDAY, November 13, 2001**

### **VIGRE Seminar**

Room 302, 2:00 p.m.-3:15 p.m.

*No Meeting today, Please see Thursday, November 15, 2001*

### **Algebraic Geometry**

3:30 p.m., Room 326

**Speaker:** Bill Graham, University of Georgia

**Title of talk:** CANCELLED "Schubert varieties"

**Abstract:** Equivariant K-theory is a tool which can be used to study Schubert varieties and their singularities; it also leads to some problems of combinatorial interest. In this talk I will give a brief introduction to equivariant K-theory and then discuss some results specific to Schubert varieties.

### **Student Number Theory**

3:30 p.m., Room 303

*No Meeting this week*

## **WEDNESDAY, November 14, 2001**

### **Group Representation & Cohomology**

2:30 - 3:30 p.m., Room 410

**Speaker:** Kenyon Platt, University of Georgia

**Title of talk:** 'Representations of the Symmetric Groups'

### **Faculty and Graduate Social**

3:00 p.m., Room 409

Coffee, Tea, Cookies

### **Representation Theory**

3:30 p.m., Room 302

**Speaker:** TBA

**Title of talk:** "TBA"

### **Numerical Analysis**

3:30 - 4:30 p.m., Rm. 410

**Speaker:** Victoria Baramidze, University of Georgia

**Title of talk:** "Spherical Splines"

**Abstract:** In this talk, spherical splines on 3-sphere will be introduced. First, we discuss how to triangulate the scattered data locations on the 3-sphere. Then Bezier polynomials defined on spherical triangle will be defined. De Casteljau's algorithm for evaluating the spherical Bezier polynomials will be given. We end this talk by explaining the smoothness conditions for connecting Bezier polynomials.

### **Arithmetic Geometry**

3:30 p.m., Room 304

**Speaker:** Stephen Donnelly, University of Georgia

**Title of talk:** "*Construction of Elliptic Curves whose Tate-Shafarevich Group has large  $l$ -rank*", continued

### **CATS**

#### **Combinatorics, Algorithms, and Theoretical Computer Science Seminar**

<http://www.cs.uga.edu/~rwr/seminar.html>

4:40 p.m., Rm. 306

**Speaker:** Jian Wang

**Title of talk:** "*Dynamic Programming Algorithms For Global and Local Sequence Alignment*"

**Abstract:** In this talk, we will discuss how to use the dynamic programming approach to solve inexact matching and alignment problems that are of great importance in molecular and evolutionary biology. A (global) alignment of two strings  $s_1$  and  $s_2$  is obtained by first inserting chosen spaces (or dashes), either into or at the ends of  $s_1$  and  $s_2$ , and then placing the two resulting strings one above the other so that every character or space in either string is opposite a unique character or a unique space in the other string. The local alignment problem for two strings  $s_1$  and  $s_2$  is to find substrings  $a$  and  $b$  of  $s_1$  and  $s_2$  whose similarity (optimal global alignment value) is maximum over all pairs of substrings from  $s_1$  and  $s_2$ . We will show how to apply the dynamic programming approach to solve for global and local alignments of two strings. We will also demonstrate that using the dynamic programming approach we can solve both the global and local alignment problems in time  $O(mn)$ , where  $m$  and  $n$  are the lengths of the two strings.

## **THURSDAY, November 15, 2001**

### **VIGRE Seminar**

Room 302, 2:00 p.m.-3:15 p.m.

**Speaker:** Rob Ghrist, Georgia Tech

Title of talk: "*Go with the flow - an introduction to Morse Theory*"

### **Analysis**

3:30 p.m., Room 304

**Speaker:** Michael Lacey

**Title:** '*Carleson's theorem w/ quadratic phase*'

**Abstract:** I will discuss the proof of the  $L^2$  boundedness

of the maximal operator  $\sup_{a,b} \left| \int e^{i(ay+by^2)} f(x-y) \frac{dy}{y} \right|$   
The sup over  $a$  alone is Carleson's theorem on Fourier series, over  $b$  alone is an observation of E.M. Stein.

## FRIDAY, November 16, 2001

### Geometry Seminar

2:30 p.m., Room 322

**Speaker:** Heunggi Park, University of Georgia

**Title of talk:** "The kinematic formula for real subspaces of complex space forms, Part 2"

## Upcoming Seminars

## MONDAY, November 19, 2001

Colloquium

3:30 p.m., Room 304

**Speaker:** Ken Ono, University of Wisconsin at Madison

**Title of talk:** 'Values of modular functions and divisors of modular forms'

**Abstract:** The values and the coefficients of the modular function  $j(z)$  play a variety of important roles in number theory and representation theory. For example, its values generate class fields in algebraic number theory, and its coefficients are the degrees of the graded representation of the Monster group. In this lecture I will describe recent work with Jan Bruinier and Winfried Kohnen. I will introduce a specific sequence of modular functions  $j_n$  whose arithmetic literally dictates the behavior of all modular forms on  $SL_2(\mathbb{Z})$ . The corollaries include:

- Borcher's type infinite products for generic forms,
- Universal recursions for Fourier expansions of all forms,
- $p$ -adic class number formulas.

## WEDNESDAY, November 28, 2001

### Teacher Education Seminar

3:30-4:30 pm, Room 328 Boyd

**Speaker:** TBA

**Title of talk:** "TBA"

**Abstract:** TBA

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