Director, Jeff Scroggs
Editor, Miriam Ansley
www.math.ncsu.edu/undergrad
Spring 2007

Mathematics Newsletter

News for the Undergraduate

Undergraduate_Mathematics@ncsu.edu

Meet Dr. Nathan Reading

Nathan Reading was born in Pittsburgh, Pennsylvania, where he lived until attending college at Stanford University. After a few years of playing on the college ultimate team and studying physics, he graduated with a degree in physics and an interest in mathematics graduate school. After college, he spent a year teaching mathematics at a small private school in California, then (braving a severe climate change) entered the graduate program in mathematics at the University of Minnesota. After receiving the PhD in 2002, he was a postdoctoral scholar at the University of Michigan for four years before joining the faculty here in the NC State Math Department in the fall of 2006.

Nathan's research interests are in combinatorics, particularly the combinatorics of Coxeter groups. (Instead of a definition, here is an example: the symmetry group of a regular polygon or polyhedron is a Coxeter group.) Coxeter groups are fundamental mathematical objects that play a role in several mathematical settings, including Lie Theory, Representation Theory and Geometric Group Theory. This semester, Nathan is teaching Math 416, Introduction to Combinatorics.

When Nathan is not teaching or researching mathematics, he mostly spends his time with his family, which consists of his wife Cambria and sons Mark (6), Jonathan (4) and James (1). He also spends time singing and working with his church's youth group.

Q. 1. What is purple and all of its offspring have been committed to institutions?

Advanced Math Courses

These classes may be used as Advanced Math electives.

Summer 2007

MA 341 – Applied Differential Equations
MA 405 – Intro. To Linear Algebra and Matrices
MA 421 – Introduction to Probability
MA 501 – Advanced Math for Engineers and Scientists II
MA 513 – Introduction to Complex Variables

Fall 2007

MA 341 – Applied Differential Equations
MA 351 – Intro. To Discrete Mathematical Models
MA 401 – Applied Differential Equations II
MA 402 – Computational Mathematics
MA 408 – Foundations of Euclidean Geometry
MA 412 – Long-Term Actuarial Models
MA 421 - Introduction to Probability
MA 426 – Mathematical Models in the Physical Sciences
MA 427 – Numerical Analysis I
MA 430 – Mathematical Models in the Physical Sciences
MA 437 – Applications of Algebra
MA 444H – Problem Solving Strategies for Competitions
MA 493B – Game Theory
MA 499 – Independent Research in Mathematics
MA 513 – Intro. To Complex Variables
MA 518 – A First Course in Differential Geometry
MA 520 – Linear Algebra
MA 521 – Abstract Algebra I
MA 532 – Ordinary Differential Equations I
MA 534 – Intro. To Partial Differential Equations
MA 546 – Probability and Stochastic Processes I
MA 573 – Mathematical & Experimental Modeling of Physical Processes I
MA 584 - Numerical Solution of Partial Differential Equations-Finite Element Method
MA 591G – Algebraic Geometry

Honors Program

Two students, Joel Gomez and Jason Yellick completed the Math Honors Program last fall and new students joining the program last semester include Evan Adamek, Cynthia Breault, David Brown, Ryan Going, Emily Gordon, Donovan Gromet, Nichole Kroeger and Cheryl Zapata. Scott Boone and Ellie Ransom did the Budapest Semesters in Mathematics last semester and Kristoph Kleiner is studying abroad in Australia this semester.

Thirty-four students are currently participating in the Math Honors Program and invitations to join the program will be extended sometime during pre-registration. Every year approximately 20-25% of math graduates complete the Math Honors Program and about 80% of those students go on to graduate school. Schools they have attended include Berkeley, Princeton, Stanford, MIT, Cornell, NYU and UCLA. Moreover, math honors students have received 11 NSF Fellowships and 3 DoD Fellowships for graduate school as well as many other honors including 5 Goldwater Scholarships and 2 Gates Fellowships. Besides taking more challenging courses to complete their math degrees, Math Honors Program members also research either at NC State or in a summer REU (Research Experience for Undergraduates). Many of them (22 at last count) have studied abroad, some focusing on mathematics, either at the Budapest Semesters in Mathematics or the Math in Moscow Program. Participation in those programs has played a big role in the success of our students in getting into excellent graduate schools. Dr. Paur is happy to talk to any student interested in participating in the Math Honors Program – either stop by her office in HA 202 or email her at sopaur@math.ncsu.edu for an appointment. More information about the program can be found on the Math Honors website at http://www.math.ncsu.edu/honors.

"He who loves practice without theory is like the sailor who boards ship without a rudder and compass and never knows where he may cast." Leonardo da Vinci,

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Check Out Our New Web Site www.math.ncsu.edu

Congratulations to

Dr. William M. Waters, Jr. who is a 2006 Rankin Award Winner! The Rankin Award is designed to recognize and honor individuals for their outstanding contributions to NCCTM (The North Carolina Council of Teachers of Mathematics) and to mathematics education in North Carolina. It is the highest honor NCCTM can bestow upon an individual.

Welcome Chuck Wessell! *Chuck Wessell is a part-time lecturer who was on Jeopardy!*

Summer Opportunities

The mathematics department is presently taking applications for the REU and REU+ Summer Program. The deadline for applications is March 15th. **Also check out the bulletin board outside of Harrelson 255.** There are lots of great opportunities for undergraduates!

Student Research Awards

The following NC State math majors presented posters and/or papers at the Joint Math Meetings, held in New Orleans, LA in January 2007:

David Roberson presented a talk and a poster, entitled "On The Parameterized Complexity Of Independent Sets" on research he did during the Lafayette REU and last semester.

Cheryl Zapata did a poster presentation on "Blood Flow Regulation during Postural Change from Sitting to Standing" on the research she did during the NC State REU last summer and also won an award for her work.

Adam Attarian also won an award for his work at the NC State REU last summer; his poster was entitled "Optimization of Traveling Wave Tubes using Large Signal Codes and Optical Beam Analysis".

Roberto Rodriguez won an award for "Deterministic and Small-World Network Models of College Drinking Patterns" for research at the Applied Mathematical Sciences Summer Institute.

Cameron Swofford also won an award for his poster on work at the University of Nebraska-Lincoln.

Chelsey Cooley presented both a paper and a poster on her work on Weyl Groups at the NC State REU.

Course Highlights

MA 796S - Convex Optimization and Interior Point Methods
Instructor: Kartik Sivaramakrishnan

The course is a unique blend of the THEORY of conic programming; ALGORITHMS and associated SOFTWARE for solving large scale conic programming problems; and exciting APPLICATIONS of conic programming to real world problems. The theoretical aspect of the course will examine the transition from linear to conic programming, conic duality, basic interior point method theory, and important subclasses of conic programming including second order cone and semidefinite programming. The algorithmic aspect of the course will develop primal-dual interior point methodologies and expose students to associated state-of-the-art computer software for reliably and efficiently solving large scale conic programs. Finally, the application aspect of the course look at applications of conic programming in combinatorial optimization, engineering, robust optimization, and polynomial programming.

Need more info?
Check out http://www4.ncsu.edu/~kksivara/ma796s/MA796Soutline.html for course details and policies. Else, send me an email at kksivara@ncsu.edu

MA 430 - Mathematical Models in the Physical Sciences
Instructor - R. Fulp

In Ma430 in the fall of 2007 the following topics will be covered. Foundations of Newtonian and special relativistic physics formulated in terms of linear geometry. Basic theorems from special relativity. Inertial frames and Galilean transforms in Newtonian physics. Inertial frames and Poincare' transforms in special relativistic physics. Introduction to differential forms and exterior calculus. Maxwell's electrodynamic equations formulated in terms of exterior calculus. The failure of invariance of Maxwell's equations under Galilean transformations but invariance recovered under Poincare' transformations.

Answers from page 1
A simple grape, it has no normal subgrapes.

MA 591G - Special Topic
Instructor - M. Singer

Given a system of linear equations L, Gaussian elimination allows one to transform this system to a new triangulated system from which one can easily read off answers to the following questions: Is L consistent, that is, does it have at least one solution? If L is consistent, does it have a unique solution? If L has more than one solution, what is the dimension of the space of solutions? In MA 591G we will develop the theory (algebraic geometry) and algorithms that allow one to deal with similar questions for general polynomial systems. We will study algebraic varieties (= solution sets of systems of polynomial equations) and explore the notions of Groebner bases, elimination theory, affine and projective geometry and special topics (depending on the tastes and backgrounds of the students) such as sparse polynomial systems and applications to integer programming, coding theory and algebraic statistics. We will use the text "Ideals, Varieties and Algorithms" by Cox,Little and O'Shea.

MA 493B Game Theory
Instructor - S. Schecter

Game theory is not about how to play games; it's about any situation that involves conflict or cooperation. Since the work of John Nash that was shown in the film "A Beautiful Mind," game theory has emerged as a basic language for the social, behavioral, and economic sciences, and even as a way to look at literature and morality. Originally the idea was to find the best strategies for rational opponents; today the emphasis is more on the ability of good strategies to spread by virtue of their success. Hence game theory is now used to understand animal behavior and evolution. We'll use the text "Game Theory Evolving" by Herbert Ginnis, which is mostly a collection of great problems. Their names give the flavor: "The Landlord and the Eviction Notice," "The Samaritan's Dilemma," "The Rotten Kid Theorem," "Battle of the Sexes," "Real Men Don't Eat Quiche," "Evolution of Trust and Honesty." In addition, notes by the instructor will be available on the web. This course can be used to satisfy the mathematical modeling requirement for an applied mathematics degree; there will also be an optional paper for students who want to satisfy the major paper requirement.

A Little Math Humor

There were three medieval kingdoms on the shores of a lake. There was an island in the middle of the lake, over which the kingdoms had been fighting for years. Finally, the three kings decided that they would send their knights out to do battle, and the winner would take the island. The night before the battle, the knights and their squires pitched camp and readied themselves for the fight. The first kingdom had 12 knights, and each knight had five squires, all of whom were busily polishing armor, brushing horses, and cooking food. The second kingdom had twenty knights, and each knight had 10 squires. Everyone at that camp was also busy preparing for battle. At the camp of the third kingdom, there was only one knight, with his squire. This squire took a large pot and hung it from a looped rope in a tall tree. He busied himself preparing the meal, while the knight polished his own armor. When the hour of the battle came, the three kingdoms sent their squires out to fight (this was too trivial a matter for the knights to join in). The battle raged, and when the dust had cleared, the only person left was the lone squire from the third kingdom, having defeated the squires from the other two kingdoms, thus proving that the squire of the high pot and noose is equal to the sum of the squires of the other two sides.

NORTH CAROLINA STATE UNIVERSITY
Department of Mathematics
Campus Box 8205
Raleigh, NC 27695-8205