Mathematics Newsletter
News for the Undergraduate
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Meet Dr. Jeff Scroggs

Jeff Scroggs became Director of the Undergraduate Programs in Math in 1998. Since then, the undergraduate program has grown from 180 students to over 280 (Spring 2007). He values the ability to match undergraduates interested in research with good faculty mentors. He also has enjoyed mentoring some projects himself. You might see him on his ½ mile commute, walking just north of campus, or using the path across Meredith on his bicycle.

Dr. Scroggs' approach to teaching is to identify key topics that are needed for undergrad math students, and to fill those needs. Introductory programming (at a very introductory level) is an example. He developed and taught MA 116, a courses that focuses on programming and problem solving using Matlab, and is an excellent course for students that wish to study numerical analysis, such as MA 427/428.

His research interests initially focused on numerical methods for partial differential equations fluid dynamics. One of the early research projects was climate modeling with Dr. Semazzi. Since then, he has worked in genetics, materials processing, and is currently focused on financial mathematics. His interest in financial math is reflected by some recent projects with students in the area, and also by his directing the Masters of Financial Mathematics Program, a 2-year Professional Science Masters.

In his down time, Dr. Scroggs enjoys nearly anything on or near scenic waterways. He is a weekend warrior on a sailboat racing team that races mostly on the Pamlico Sound, but sometimes travels to Charleston, or as far away as Key West. He also cruises his S2 9.2 (30-foot sailboat) out of Blackbeard Sailing Club near New Bern.

Dr. Scroggs invites you to visit. Appointments are encouraged, but students are welcome in HA 251 anytime the door is open.

Meet Erica Smith NCSU Math Major

Erica Smith, a junior math major from Largo, FL, is a top backstroker for the N.C. State women's swimming team. Her current personal record in the 100-meter backstroke (:56.18) is the second best all time at NCSU, one tenth of a second from the school record. Several other times rank among NCSU's best: 200-meter backstroke (2:01.88, 5th best all time); 50-meter freestyle (:23.86, 7th best all time); medley relay and freestyle relay (2nd best all time).

In this season's ACC meet in Atlanta, she had two strong races (100-meter backstroke, 6th place; and 200-meter backstroke, 12th place). She also scored team points in her relays. Her times have conditionally qualified her to swim in this season's NCAA swim meet.

In high school, Erica participated in crew for two years and band for all four years; she was the drum major during her senior year. She swam just during the seasons her first two years, but made a decision to become a year-round swimmer after her junior season. As a result, her times drastically dropped. She began to qualify for bigger, more prestigious meets and found herself going head-to-head with much faster swimmers.

Erica's father, Jim, is a plant manager in Largo; he is a former college football player at Illinois State University. Her mother, Ellen, is a nurse. Leah, her sister, is a sophomore, mathematics education major at the University of South Florida where she also plays in the marching band. Erica plans to use her degree to pursue a job in the direction of actuarial science or financial mathematics.

"Pure mathematics is, in its way, the poetry of logical ideas." Albert Einstein

In the News

Department Head Signs Agreement with University in China

NCSU Department of Mathematics and the School of Mathematical and Computer Sciences of Nanjing Normal University in China have signed an agreement to promote research collaborations between both departments. The department is excited about the new opportunities that will arise from this global collaboration. Among those opportunities is the opportunity for undergraduates to study abroad at Nanjing Normal University this summer, as well as an international conference on mathematical biology. For more information you can contact Zhilin Li.

Nanjing, where the university is located, is a large city that is close to Shanghai (about 2 hours by train). Nanjing was the capital of China before 1949.

Congratulations to Zack Clawson and Patrick White for being named as a Caldwell Fellow!

News from the Math Honors Program

- Completed the Math Honors Program last fall: Dhrumil Patel
- New students in program: Joseph Briggs, Shawn King, and Leslie Watkins.
- NC State nominees for a Goldwater Scholarship: Ryan Going, Nicole Kroeger
- Budapest Semesters in Mathematics: Chelsey Cooley, Evan Adamek .
- Completing Program in May: Ralph Abbey, Kimberly Bowers, Jennifer Carter, Justin Fowler, Jacob Frelinger, Kristoph Kleiner, Eric Lownes, William Myers, Ryan Pescosolido, Ivan Saldarriaga, Doug Stefanski, and Cheryl Zapata.

Overview of Honors Program

- Thirty-six students are currently participating in the Math Honors Program
- 20-25% of math majors complete the Math Honors Program
- 80% of those students go on to graduate school
- Schools include Berkeley, Princeton, Stanford, MIT, Cornell, NYU and UCLA
- 11 NSF Fellowships
- 3 DoD Fellowships
- 5 Goldwater Scholarships
- 2 Gates Fellowships

Invitations to join the Honors program will be extended sometime during pre-registration. As well as taking more challenging courses to complete their math degrees, math honors program members also participate in research either at NC State or in a summer REU (Research Experience for Undergraduates). Many members (22 at last count) have also studied abroad, either at Budapest Semesters in Mathematics or the Math in Moscow Program. Participation in those programs has played a large role in the success of our students being accepted 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

Advanced Math Courses
These classes may be used as Advanced Math Electives.

Summer 2008
First Session
MA 341 – Applied Differential Equations I
MA 421 – Introduction to Probability
MA 501 – Adv. Mathematics for Engineers & Scientists I
MA 513 – Intro to Complex Variables
Second Session
MA 341 - Applied Differential Equations I
MA 401 – Applied Differential Equations II
MA 502 – Adv. Mathematics for Engineers and Scientists II

Fall 2008
MA 335 – Symbolic Logic
MA 341 – Applied Differential Equations I
MA 351 – Intro to Discrete Mathematical Models
MA 401 – Applied Differential Equations II
MA 402 – Computational Mathematics: Models, Methods and Analysis
MA 408 – Foundations of Euclidean Geometry
MA 412 – Long-Term Actuarial Models
MA 421 – Intro to Probability
MA 426 – Mathematical Analysis II
MA 427 – Intro to Numerical Analysis I
MA 430 – Mathematical Models in the Physical Sciences
MA 437 – Applications of Algebra
MA 440 – Game Theory
MA 499 – Independent Research in Mathematics
MA 501 – Advanced Mathematics for Engineers and Scientists I
MA 508 – Geometry for Secondary Teachers
MA 511 – Advanced Calculus I
MA 513 – Intro to Complex Variables
MA 518 – A First Course in Differential Geometry
MA 520 – Linear Algebra
MA 523 – Linear Transformations and Matrix Theory
MA 546 – Probability and Stochastic Processes I

Puzzler:

Driving along, Terry notices that the last four digits on the odometer are palindromic. A mile later, the last five digits are palindromic. Two miles later, all six are palindromic. What was the odometer reading when Terry first looked at it?

Log on to www.math.ncsu.edu for answers.

Course Highlights

MA 430 – Mathematical Models in the Physical Sciences

Instructor – R. Fulp (HA 219) fulp@math.ncsu.edu
The purpose of this course is to introduce the student to certain ideas and concepts in physics from a mathematics perspective. Topics include: a linear algebra approach to Euclidean geometry and its implications in Newtonian physics; a review of very basic electromagnetism using Newtonian inertial frames; introduction to basic special relativity; the development of exterior calculus and differential forms; the formulation of Maxwell's equations using relativistic inertial frames, differential forms, and Hodge theory. Prerequisites are MA242, MA225, MA405 or permission of instructor.

MA 518 – 1st Course in Differential Geometry

Instructor – R. Fulp (HA 210) fulp@math.ncsu.edu
Modern differential geometry is the outcome of centuries of development by mathematicians and consequently can be a daunting subject of study for a beginner. This course has as its aim to develop these complex ideas and tools in a setting, which initially builds on the intuitive geometrical ideas implicit in MA 242 (the third calculus course). Thus we begin with the geometry of curves and study in detail arclength, torsion, and curvature of curves. We then proceed to study curvature of surfaces and various geometric properties of surfaces. In this latter study we introduce concepts of manifold theory in the setting of three dimensions where one is able to use one's intuition from calculus to understand the formalism. Prerequisites are MA 405 and proficiency of multivariable calculus.

Q: What do 2 poor monomials do at a restaurant?
A: Binomial

MA 522 Computer Algebra I
Instructor A. Szanto (HA 347)

aszanto@math.ncsu.edu
The course will equip students with advanced, but well-established, material in algorithmic approach to algebra, such as algorithms for symbolic matrices, algorithms for commutative algebra and (real) algebraic geometry, and algorithms for differential and difference equations. The course prepares the student to conduct independent research in this fast growing field. At the end of the course a list of research projects will be available for interested students to participate in research. Completing the course work, the students will be able to develop advanced algorithms in computer algebra, to read critically scientific articles published in journals and conferences, and to carry out original research in computer algebra or related subjects. Prerequisites are MA 403, 407 or 521 and MA 405 or 520, or consent of instructor.

MA 793C – Mathematical Optimal Control

Instructor – N. G. Medhin (HA 315)
ngmedhin@math.ncsu.edu
This course is intended to give a broad and self-contained foundation of the mathematical theory of optimal control processes and differential games. Topics include: direct methods in the calculus of variations, formulation of control problems, existence of controls (compact and noncompact constraints), generalized Hamilton-Jacobi and sufficiency theory, dynamic programming, Pontryagin's maximum principle, differential games, stochastic controls/games, infinite dimensional optimization theory, nonsmooth analysis. Applications from physics, economics, engineering, and sociodynamics will be discussed. Please contact me if you have any questions or concerns.
Course Material: Notes will be provided.
Course Evaluation: Exercises and Projects will be assigned.

A Little Math Humor

A farmer is wondering how many sheep he has in his field, so he asks his sheepdog to count them. The dog runs into the field, counts them, and then runs back to his master. "So," says the farmer. "How many sheep were there?" "40," replies the dog. "How can there be 40?" exclaims the farmer. "I only bought 38!" "I know," says the dog. "But I rounded them up."

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