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The

# N.C. State University

# Mathematics Newsletter

Website: http://www.math.ncsu.edu/undergrad/

## Meet Molly Fenn

I've lived in rural NY state; Massachusetts; Los Angeles, CA; Anchorage, AK; Budapest, Hungary; and rural Japan.

I've always wanted to be a teacher and am still amazed at how talking with students can brighten up even the most dull days. I started out teaching middle school math in Los Angeles but pretty quickly realized that that wasn't where I belonged. After working as a college admissions counselor for a tiny college in Alaska, I started grad school and was excited to learn that when teaching university students, I didn't have to check their notes, write hall passes, or talk to their parents! Teaching at this level was a much better fit for me.

I moved to Raleigh from Massachusetts in July 2008, knowing no one in the area. By July 2009, I had a husband and a new house in Raleigh, and a whole family's worth of in-laws in Durham! Now all I need is to get my parents and siblings to move to NC and I'll be settled for life.

Outside of teaching math, I love to read all different types of novels and am always looking for recommendations.

I'm mostly a bookworm and like just hanging out and talking with people!

## What's inside?



**MATH RIDDLE:**
What is the integral of "one over cabin" with respect to "cabin"?

Visit
www.math.ncsu.edu/undergrad/newsletter/
for the answer!

# Course Highlights

**MA 430- Mathematical Models in the Physical Sciences**
*Prerequisite: MA 341 and MA 405*
Introduction to 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 and Minkowski geometry; Euclidean and Lorentz tensors; the development of exterior calculus and differential forms; the formulation of Maxwell's equations using relativistic inertial frames, differential forms, and Hodge theory

**MA 512- Advanced Calculus II**
*Prerequisite: MA 341*
This course is an in depth look at multi-variable calculus. It emphasizes intuition behind the proofs of major theorems such as those of partial differentiation, the implicit function theorems, vector calculus in 3-space, line and surface integrals and the classical integral theorems. The emphasis is on knowing how and when to use these techniques. The course, originally designed for graduate engineering students, is also an excellent choice for math, science and engineering majors who have an interest in further study in graduate schools.

**MA 537- Nonlinear Dynamics and Chaos**
*Prerequisite: MA 341 and MA 405*
In recent years there has been an explosion of interest in nonlinear behavior, chaos, and fractals in the physical and biological sciences. Chaotic behavior has been observed in disciplines as diverse as meteorology, medicine, and economics. These phenomena may be introduced at an elementary level because often they are described by nonlinear difference equations, which are discrete dynamical systems and are analyzed by studying iteration of functions. The course will introduce appropriate mathematical concepts, e.g., equilibrium, stability, bifurcation, and fractals. Software will be available so that students can perform computer experiments and discover for themselves the fascinating behavior of nonlinear dynamical systems.

**MA 583- Introduction to Parallel Computing**
*Prerequisite: CSC 302 or MA 402 or MA/CSC 428 or MA/CSC 580*
Introduction to basic parallel architectures and multicore processors, parallel matrix products, domain decomposition with direct and iterative methods for linear systems and applications such as 2D heat and mass transfer. The first half of the course will introduce the basic message passing interface (MPI) subroutines. The second half will use MPI to solve linear systems via direct and minimized iterative methods. Accounts on current multiprocessing computers will be provided.

**MA 591- Filtering Turbulent Systems**
*Prerequisite: Contact J. Harlim*
An important emerging scientific issue in many practical problems ranging from climate and weather prediction to biological science involves the real time filtering and prediction through partial observations of noisy turbulent signals for complex dynamical systems with many degrees of freedom. This course is an introduction to the mathematical theories and ideas from blending the classical stability analysis for PDE's and their finite difference approximations, Kalman filtering, and stochastic models from turbulence theory to deal with model errors.

**MA 797: Mathematical Fluid Mechanics**
*Prerequisite: Contact M. Shearer*
In this course, fluid mechanics will be presented from a mathematics perspective. The equations of fluid mechanics will be introduced, and areas of active research will be discussed. The course is suitable for graduate students in mathematics, physics and engineering, and advanced undergraduates. Topics will include physical concepts such as viscosity and surface tension, and mathematical formulations of Stokes flow, lubrication theory, boundary layers, potential flow, as well as presentations on stability and wave propagation.

# Advanced Mathematics Courses

**These classes may be used as Advanced Math Electives in the Spring 2010.**

**MA 325:** Introduction to Applied Math
**MA 401:** Applied Differential Equations II
**MA 408:** Foundations of Euclidean Geometry
**MA 410:** Theory of Numbers
**MA 413:** Short-Term Actuarial Models
**MA 416:** Introduction to Combinatorics
**MA 421:** Introduction to Probability
**MA 426:** Mathematical Analysis II
**MA 428:** Intro. to Numerical Analysis II
**MA 430:** Math Models in the Physical Sciences
**MA 437:** Applications of Algebra
**MA 501:** Advanced Math for Engineers & Scientists I
**MA 512:** Advanced Calculus II
**MA 513:** Intro. To Complex Variables
**MA 520:** Linear Algebra
**MA 537:** Nonlinear Dynamics and Chaos
**MA 555:** Introduction to Manifold Theory
**MA 583:** Introduction to Parallel Computing
**MA 587:** Numerical Soln. of PDE--Finite Element Method
**MA 591:** Filtering turbulent systems
**MA 591:** Geometric combinatorics with P. Hersh

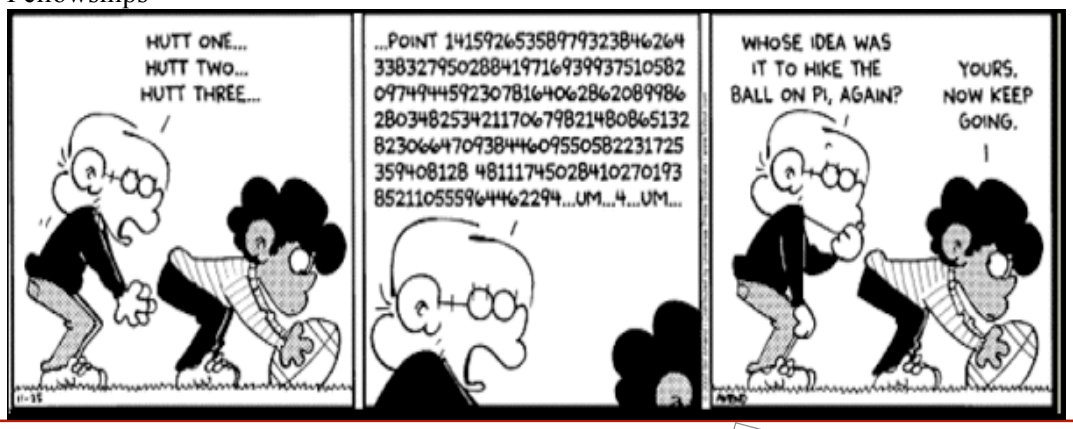
# Math Honors Programs

- **Eight** students completed the Math Honors Program last Spring
- **Six** new students in the program this Fall
- Seven of the eight students who graduated last spring are attending graduate school in a variety of areas, including math, physics, and electrical engineering.
- Nick Yelle has returned from study abroad in Africa
- Becky Maust is doing study abroad in India.
- Joseph Briggs has returned from the Budapest Semesters in Mathematics..

Overview of Honors Program

- **Twenty-nine** students are currently participating in the Math Honors Program
- **20-25%** of students graduating with a Math BS complete the Math Honors Program
- **80%** of those students go on to graduate school
- Schools include Berkeley, Princeton, Stanford, MIT, Cornell, NYU and UCLA
- 14 NSF Fellowships
- 4 DoD Fellowships
- 6 Goldwater Scholarships
- 3 Gates Fellowships

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). Since 1992, 38 students have studied abroad, including 29 at the Budapest Semesters in Mathematics and two at 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 SAS 3144 or email her at sopaur@math.ncsu.edu for an appointment. Invitations to join the Honors program will be extended sometime during pre-registration. More information about the program can be found on the Math Honors website at www.math.ncsu.edu/honors.




## CONGRATULATIONS Math Department!

Mathematics and Statistics have officially moved into the *New Math & Stat Building,* formally named SAS Hall.

For information about the Dedication or other useful information about our new building visit the website below: http://www.ncsu.edu/bulletin/archive/2009/05/05-07/sas-hall.php

More Congratulations on page 6

# News for Undergraduates

## Scholarships:

Scholarships for Undergraduates:

www.math.ncsu.edu/undergrad/scholarships/

## Math Undergraduate Blog!

http://Blogs.lib.ncsu.edu/roller/UndergraduateMathematics/

## Clubs & Extracurricular Activities

**SUM Series**

Come enjoy a slice of pizza while you listen to an informal, interesting talk on a mathematical topic. The SUM Series meets on Wednesdays from 4:00 to 4:50 in SAS 2229.

**STEM**

The NSF-funded S-STEM Research Scholars Program invites applications for scholarships of $4,625 from undergraduate students to support for tuition, fees, and textbook charges. Undergraduate students are eligible for S-STEM scholarships in their junior and senior years. Please visit the web site below for criteria and application materials. Applications for the academic year 2010-2011 will be accepted until **April 30, 2010**. www.math.ncsu.edu/summer/STEM/index.php

**SAMSI Summer 2009 Program on Psychometrics**

The first week of the program will be devoted to morning tutorial sessions, and contributed and invited research talks during the afternoons. Topics covered during the morning sessions will include IRT models, cognitive diagnostic models, and variations of generalized linear latent and mixed models. During the second week of the program, three working groups will convene to discuss current, practical applications of methodology presented during the first week of the program. The application is online and the deadline is **June 19, 2009**. www.samsi.info/200910/psycho/psycho-application200907.html


**We have a *NEW* Math Undergraduate Lounge in SAS Hall room 2202! Check it out!**


**FOR MATH CONTESTS**
**Go online to:**
www.math.ncsu.edu/undergrad/contests/

# Sudoku

Medium

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 5 | | | | 6 | 9 |
| | 5 | | 4 | | | 2 | | |
| | 4 | | | 7 | 9 | 1 | | |
| 5 | 6 | | 8 | | | 9 | | |
| | | 8 | 9 | | 2 | 6 | 7 | |
| 2 | | 1 | | | | | 8 | |
| | | 3 | | | 8 | | 4 | |
| 9 | | | 3 | | | 8 | | |
| 1 | | 5 | | | 7 | | | |

Visit
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for the solution!

**SIAM-SEAS**

The **34th SIAM Southeastern-Atlantic Section Conference** (SIAM-SEAS) will be hosted by the Mathematics Department, March 20-21, 2010. We would like volunteers to help with the conference. Visit:
www4.ncsu.edu/~scroggs/SIAMSEAS

# Congratulations:

**Faculty News:**

- Professors H. Thomas Banks and Carl T. Kelley were inducted as fellows of SIAM, the Society for Industrial and Applied Mathematics.

**Student News & Awards:**

- Brittany Boudreaux, a Applied Math & Civil Engineering double major, was awarded the Astronaut Scholarship.
- Stuart Ralston Gordon, a Math & Math-Ed double major, was awarded the Caldwell Fellowship
- Angelean Hendrix, a first year Applied Mathematics graduate student, has been awarded a three year NSF Graduate Research Fellowship to work with Prof. Selgrade.
- Congratulations to the S-Stem Scholarship Award Winners:
  - Shannon Barone
  - Kimberly Gladden
  - Heather Goodykoontz
  - Rachael Gordon-Wright
  - Arneida Harley
  - Allison McAlister
  - Cassie McLain
  - Jennifer Piasio
  - Ashley Walls
  - Courtney Waterman

**BABY NEWS:**

Congratulations to the Proud Parents!

- Nathan Reading recently welcomed a Baby Boy, Daniel!
- Seyma Bennett-Shabbir is expecting a Baby Boy in November.

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