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Director: Jeff Scroggs Editor: Nicole Dahlke Edition: Spring 2009 Website: <u>http://www.math.ncsu.edu/undergrad/</u> E-mail: Undergraduate_Mathematics@ncsu.edu

Meet Dr. Alina Duca

One of our newest Faculty Members



Alina Duca was born and raised in Iasi, an old Romanian town with a rich cultural and academic life, the home of the oldest University in the country. She completed her undergraduate work at the "Al. I. Cuza" University, Iasi, in 1998, receiving a Bachelor of Science Degree

with a major in Education. The same year she married her husband, Sebastian, who she had met in high school. Alina spent two years teaching mathematics at a high school in Iasi, and during this time she continued her mathematical education, earning a Master of Science Degree in Algebra from the same University.

With the encouragement and support of her husband, Alina Duca continued her graduate studies at the University of Manitoba in Winnipeg, Canada. In 2007 she received her PhD in Mathematics and soon afterwards Dr. Duca accepted a one-year visiting position at Vassar College, a private liberal arts college in NY. In August 2008 she relocated with her family to Raleigh, NC to start her new position as a Teaching Assistant Professor in the Math Department at NCSU.

Advanced Math Courses &

Course Highlight

Math Honor Program

Alina Duca takes a keen interest in teaching mathematics. When asked what she has learned from her students she answered "I realize that the students will not get excited about learning mathematics unless I get excited when I teach."

Dr. Duca's research interests are in the Theory of Rings and Modules, and in particular the Noetherian rings (Weyl algebras and related algebras of differential operators). She is also investigating the model theoretic techniques that can be applied to solve problems in Module Theory.

Alina has been married for over 10 years and has a 4 year old daughter, Andrea, who she describes as her greatest accomplishment. In her spare time she enjoys following current social & political events, reading (latest favorite author is Thomas Friedman, columnist of NY Times), volleyball, and cooking; but most of her free time is spent reading classic children's books for and with her daughter.

Out with the Old, In with the New

Congratulations

Undergraduates

News for

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An adorable article was written in the N&O Jan 21, closing the book on NCSU's landmark building, Harrelson Hall. To read the article in full visit the site below: www.newsobserver.com/nrn/story/1375820 .html

With that said, let's say hello to **The New Mathematics & Statistics Build.** We are scheduled to move in May 2009! To map its progress visit the site below: <u>www4.ncsu.edu/~njrose/Special/Tidbits/Ne</u> <u>wBuilding.html</u>



Course Highlights

MA 402: Computational Mathematics Instructor: R White

This is numerical modeling course with an emphasis on numerical partial differential equations. The course requires a basic understanding of physics, matrices and programming, and Matlab will be frequently used to illustrate the algorithms and models. MA 242 is a prerequisite and all other topics will developed as is needed. Prerequisite: Fortran or C or Pascal, Physics, Corequisite: MA 341

MA 513- Introduction To Complex Variables

Instructors: R. Fulp

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This course will develop the basic properties of calculus in the complex domain. These ideas are crucial to a great many areas of research in both pure and applied mathematics. Both the development of theoretical ideas and problem solving skills will be emphasized. This course is a good "warm up" course for those anticipating taking multi-variable analysis courses such as MA 426 but is useful to other students as well. Prerequisite: MA 242

MA 522 Computer Algebra Instructor: E. Kaltofen

Computer Algebra covers basic algorithms in symbolic computation, such as polynomial greatest common divisors and polynomial and integer factorization, exact solution of linear systems, and Buchberger's algorithm to compute Groebner bases. The course describes exact arithmetic with algebraic numbers and the computation of the Galois group of a polynomial. Prerequisite: MA 407 or MA 521 & MA 405 or MA 520

MA546: Probability Theory and Stochastic Processes I Instructor: M. Kang

The course aims at laying a solid foundation in probability theory and stochastic analysis. Students

> with primary mathematical basis (set theory, logic, numbers, functions) are welcome. Background



in mathematical analysis is preferable but not required. The course will rigorously cover intrinsic concepts/theorems in probability, law of large numbers and central limit theorem. Prerequisite: MA 421 & MA 425 or MA 511

MA 573- Mathematical & **Experimental Modeling of Physical Processes I**

Instructor: R. Smith

Mathematics provides a fundamental tool for modeling and analyzing physical, biological, biomedical and social phenomena. In MA 573. we develop models for a range of applications including heat transfer, population and disease dynamics, structural vibrations, and traffic flow. Properties of these models are investigated numerically and experimentally with data collected at the CRSC/Math Instructional and Research Laboratory. The prerequisites for this course include MA 341 and an interest in seeing how mathematics directly interfaces with the real world. Prerequisite: MA 341, MA 405

MA580-Numerical Analysis I Instructor: Prof. S. Tsynkov

The course will discuss a number of fundamental issues in numerical analysis, including the solution of linear and nonlinear equations, and the solution of eigenvalue problems.

Advanced Mathematics Courses

These classes may be used as Advanced Math **Electives in the Fall 2009.**

MA 351-Introduction to Discrete Mathematical Models

MA 401-Applied Differential Equations II MA 402-Computational Mathematics: Models, **Methods & Analysis MA 408-Foundations of Euclidean Geometry MA 412-Long-Term Actuarial Models MA 421-Introduction to Probability** MA 426- Mathematical Analysis II MA 427-Introduction to Numerical Analysis I MA 432-Mathematical Models in Life & Social Sciences **MA437-Applications of Algebra** MA 440-Game Theory MA 444H-Problem Solving Strategies for Competitions **MA 513-Introduction To Complex Variables** MA 518- A First Course in Differential Geometry MA 521- Abstract Algebra I MA 522-Computer Algebra MA 531-Dynamic Systems & Multivariable Control I MA 546- Probability and Stochastic Processes I MA 565-Graph Theory MA 573- Mathematical & Experimental Modeling of **Physical Processes I**

It will be offered as a blend of theory and computer-based applications. This is a beginning graduate level class accessible by both mathematics majors and non- algorithm design and majors. Senior undergraduates are also most welcome. The course will be taught out of "A Theoretical Introduction to numerical Analysis," by V. S. Ryaben'kii and S. V. Tsynkov, CRC Press, 2007. Prerequisite: MA 405; MA 425 or MA 511

MA 584: Numerical Solution of **Partial Differential Equations--Finite Difference Methods** Instructor: Z. Li

It is strongly believed that the knowledge of Finite Difference Methods for PDEs is a MUST for mathematicians, scientists, and engineers, who are interested in solving their problems using computers. This course will cover the basic theories and algorithms of finite difference methods for partial differential equations

including elliptic, parabolic and hyperbolic PDEs. The emphasis in this course is on implementation. We will also explore available software packages in this field. Prerequisite: MA 501

MA 591- Combinatorics I Instructor: P. Hersh

Now that NCSU has several faculty members working in combinatorics, we are introducing a new full year graduate-level combinatorics class. It will be offered for the first time in 2009-2010. The focus will be on algebraic and enumerative combinatorics in the fall semester and on more geometric and opological aspects of combinatorics in the spring semester.

<u>Math's Honor Program</u>

- **Two** students completed the Math Honors Program last Fall
- One new student in the program this Fall
- Nicole Kroeger participated in the MASS (Mathematics Advanced Study Semester) at Penn State and Joseph Briggs is studying abroad at 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
- 13 NSF Fellowships
- 4 DoD Fellowships
- 6 Goldwater Scholarships
- 2 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 HA 202 or email her at <u>sopaur@math.ncsu.edu</u> 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 <u>www.math.ncsu.edu/honors</u>

Business/Finance Math Focus

Congratulations to the Math Honors Program ranking in the top 10 colleges that participate in the Budapest Semesters in Mathematics. NC State was the only public University in the top 10.

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Math Majors! If you have interest in applying your problemsolving skills in business/finance, consider studying Statistics, Economics, or Actuarial Science. Highly qualified students might manage the 5-year Accelerated MS program in **Financial Mathematics**. For more information, browse: <u>www.math.ncsu.edu/finmath/undergraduate</u>



CONGRATULATIONS

Demetrio Labate has won a National Science Foundation CAREER Award, NSF's most prestigious award for junior faculty

Professor Emeritus LeRoy Martin has been honored with the nineteenth PAMS Distinguished Alumni Award

Assistant Professor **Patricia Hersh's** op ed column on the contributions of the Big Three automakers to science education appeared in the Raleigh News and Observer on Dec. 11.

Congratulations to **Denise Seabrooks** for 30 years of service and **Carolyn Gunton** for 20 years of service in the Mathematics Department.



Ryan Going (pictured left), Applied Math & Electrical Engineering, UHP & URP, is one of 37 students awarded the Gates Scholarship. The N&O wrote a great story about Mr. Going on Feb. 22, visit the site below:

www.newsobserver.com/news/tarheel/story/1414545.html

Going has also been named a finalist in the Atlanta region of the Marshall Scholarship competition, won an Astronaut Scholarship, honorable mention in the Goldwater Scholarship, and is currently engaged in a senior design project on solar re-chargeable lanterns.

Congratulations to **Kristopher Kleiner**, Financial Math, PAMS Scholarly Achievement Award in the Fall 2008.

Jeff Olander, (pictured right) a double major in Physics and Mathematics has been chosen as the best example of the University's "**Red Means Go**" spirit.





Kasey Phillips, Physics & Applied Math, and Courtney Fox, Chemical Engineering (pictured left) had the extraordinary American Holiday, in the UK. Kasey is at Cambridge studying applied math and theoretical physics supported by and NSF Graduate Research Fellowship and Cambridge Trusts funding, and Courtney is doing research at Imperial College, London.

<u>Riddle</u>:

A man was found murdered on Sunday morning. His wife immediately called the police. The police questioned the wife and staff and got these alibis: The Wife said she was sleeping. The Cook was cooking breakfast. The Gardener was picking vegetables. The Maid was getting the mail. The Butler was cleaning the closet. The police instantly arrested the murdered. Who did it and how did they know?

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

News for the Undergraduate

The Sum Series

Come listen to an informal, interesting talk on a mathematical topic or an issue of interest to math majors. The SUM Series meets on Thursdays from 3:00 to 3:50 in Harrelson 330.

Newton Was an Alchemist

Newton had a secret interest in alchemy. His studies regarding alchemy (the making of gold and silver from a base metal) were kept secret, as it was a crime under an act of 1404. He recorded his studies in willfully cryptic language.

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 2009-2010 will be accepted until **April 30**, **2009**. <u>www.math.ncsu.edu/summer/STEM/index.php</u>

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 would like to celebrate the lives of two Emeritus Faculty members that we lost this semester: Prof. Kwangil Koh Prof. LeRoy Martin You will be missed



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