MATHEMATICS NEWSLETTER

NEWS FOR THE UNDERGRADUATE

Meet Professor Erich Kaltofen ...

Professor Kaltofen grew up in Austria and received his M.S. and Ph.D. in Computer Science at Rensselaer Polytechnic Institute. He began teaching MA 410 this spring but regularly teaches MA 305 (spring), MA 351 (fall), MA 522, taught with other symbolic computation colleagues, and a Special topics course on the C/C++/ Java Programming Languages. All courses are successfully completed by undergraduates. Dr. Kaltofen has always enjoyed teaching undergraduate courses, but thrives on the one-on-one interaction in undergraduate research supervision, where students and professors experience a learning relationship not achieved in the classroom.

Dr. Kaltofen has supervised a number of undergraduate research projects. His most recent undergraduate research students were Mark Lavin, Dmitriy Morozov, and C. Ryan Vinroot. Mark and Dmitriy successfully completed Dr. Kaltofen's MA 351. Mark's research was in computational number theory, Dmitriy's with the LinBox project [www.linbox.org], and Ryan's in pure number theory. All three students continued on to graduate school (NYU, Duke and Stanford). During his research, Dmitriy traveled to the LinBox meetings in Delaware and Waterloo, Canada. Both Mark and Dmitriy are co-authors of research papers.

Dr. Kaltofen emphasizes that research is a creative activity, and though an original contribution is difficult to achieve in the limited time, it is still quite possible. Moreover, the direct relationship is an invaluable career experience. Dr. Kaltofen encourages students interested in areas of symbolic computation to visit and discuss their research interests. Dr. Kaltofen's research area is symbolic computation, including computer algebra, number theory and cryptography. You can find out more about Dr. Kaltofen at www.math.ncsu.edu/~kaltofen/index.html or google 'Kaltofen'.

Advanced Math Courses

SUMMER 2005

MA	341	Applied Diff. Equations I
MA	401	Applied Diff. Equations II
MA	405	Intro. to Linear Algebra & Matrices
MA	421	Intro. to Probability
MA	513	Intro. to Complex Variables

FALL 2005

MA	351	Intro. to Discrete Math. Models
MA	401	Applied Diff. Eq. II
MA	402*	Comp. Math: Models, Methods & Analysis
MA	407	Intro. to Modern Algebra for Math. Majors
MA	408	Foundations of Euclidean Geometry
MA/ST	412*	Long-Term Actuarial Models
MA	421	Intro. to Probability
MA	426	Math. Analysis II
MA/CSC	427	Intro. to Num. Analysis I
MA	430*	Math. Models in the Physical
MA	493R	Putnam Seminar
MA	518	Intro. To Manifold Theory
MA	520	Linear Algebra
MA	522	Computer Algebra
MA	523	Linear Transformations & Matrix Theory
MA/OR	531	Dynamic Systems & Multivariable Control I
MA	532	Ordinary Diff. Equations I
MA	534	Intro. To Part. Diff. Equations
MA	535	Stability & Time Optimal Control Of Hered. Systems
MA	551	Intro. to Topology
MA/CSC	580	Num. Analysis I
MA	584	Num. Sol. of Part. Diff. Eq. -Finite Difference Methods
MA	591I	Intro. to Continuum Mech. of Elastic & Viscoelastic Sol.
MA	591G	Computational Algebraic Geometry

*These classes may be used for the math modeling requirement for AMA majors (OPT 001).

Class times are listed at www.math.ncsu.edu/Courses/Fall05.txt

Inside this issue

The mathematician's patterns, like those of the painter's or the poet's, must be beautiful, the ideas, like the colours or the words, must fit together in a harmonious way.

~Godfrey H. Hardy 1877-1947, A Mathematician's Apology

Summer 2004 Graduates

Mathematics

Kane William Hamer
Elizabeth Marie Smith

Applied Mathematics

Ornella J Darlington-Turner
Nathaniel A Lewallen
Kenneth David Running II*
Franklyn Jonas Wilson III

Fall 2004 Graduates

Mathematics

Rachel Dominique Chaves
Charles McEwen Ellison III
Jonathan Blake Graham
Lauren Elizabeth Huntley
Sara Elizabeth Idol
Douglas David Marks
Jason Craig Pintuff
Christopher John Rogus

Applied Mathematics

Francisco Aguilar
Kristin Shae Beacham
Emily Diane Carter
Kristen Kirk Cox
Richard Andrew Helle
Mahmoud Y. Yousef

* completed Math Honors program

Fall 2004 Senior Awards

The PAMS Senior Awards recognizes outstanding graduating seniors in three categories: Scholarly Achievement, Research, and Leadership. The following students were nominated by the Math Department. Francisco Aguilar was awarded the College Senior Award in Leadership.

Scholarly Achievement Nominee
Douglas Marks
Leadership Nominee
Francisco Aguilar
Research Nominee
Christopher Rogus

Student News

Charles Rogers presented his Summer Research project at the Joint Biomathematics/ Statistics/Bioengineering Seminar. The "Stability and Equilibrium Analysis of Vaccination Models" poster is available for viewing outside HA 255. You can email Charles at crrogers@unity.ncsu.edu.

Virginia Tech Regional Math Contest results Two students on the NC state team received exceptional scores. Brian A Pike, a Computer Science/Applied Math double major, and Charles Yu, an English major, both received a score of 40. The highest score was 60 points by Lingren Zhang from Duke. 7 contestants scored above 50 and 14 contestants scored from 40 to 49. Among the contestants who scored above 40, one was from UNC-Asheville and eight were from Duke. The problems are posted outside HA 313.

Students interested in the VTRMC or the Putnam competition should contact Dr. Lin xblin@math.ncsu.edu.

Eamonn, Brandyn, David, and Don in Budapest.

Honors News

Will Davis has returned from the Budapest Semesters in Mathematics and Brandyn Lee, David Roberson, Eamonn Tweedy and Don Warren (above) are currently studying in Budapest and having a great time. Ben Perryman is participating in the Math in Moscow Program.

Last semester two students, Jessica McCoy and Brian Pike presented results of their research/independent study to math faculty and students. Jessica's presentation, "Introduction to Linear Programming: A Foray into the Simplex Algorithm and Duality" was a result of her work with Prof. Medhin. Brian talked about "Optimal Racing Strategies", based on his REU at Florida State. We expect several students to present their research this semester. Times and places will be announced.

New students in the honors program include Ralph (Patrick) Abbey, Ashley Martenson, Meghan McIntyre, Elizabeth Ransome, Ashley Roof, Douglas Stefanski, and Travis Tomlinson. There are currently thirty-five Math Honors students. Invitations to join the program are extended during pre-registration. Students interested in more information about the program should contact Dr. Paur at sopaur@math.ncsu.edu or check out the honors program web site; http://www.math. ncsu.edu/honors.

Q: Why do truncated Maclaurin series fit the original function so well?

SUM Club Activities

PIZZA & MOVIE SUM Club members enjoyed free pizza and 'The Manchurian Candidate', starring Denzel Washington and Liev Schreiber in February. A few events like this are hosted by the SUM Club every semester.

Undergraduate and graduate social. Come mingle and discover more about the differences between undergraduate and graduate studies. Details will be announced later.

Derek Ramirez, Charles Rogers, De Shane Spears, Danielle Speller, and **Daniela Valdez-Jasso** will represent NCSU undergraduates at The 29th Annual Society for Industrial and Applied Mathematics Southeast Atlantic Section (SIAM/SEAS) Meeting in Charleston, S.C. on March 25-26, 2005. SIAM/SEAS is held at the Citadel and the College of Charleston. There are speakers, minisymposia, short courses, a jeopardy contest, and a social.

Watch your email for notices on events like these.

Course Advertisements

Mathematics is an independent world created out of pure intelligence.

~Ludwig Wittgenstein, 1889-1951

MA 493S: Game Theory
Prereq: MA 231 or MA 242
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, shown in the film *A Beautiful Mind*, game theory has emerged as a basic language for the social, behavioral, and economic sciences, and even 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." The prerequisites are minimal, but the demands on your reasoning ability are more substantial. 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.

MA 591G: Computational Algebraic Geometry
Prereq: undergraduate algebra course
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 this course 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.

MA 591I: Intro. to Continuum Mechanics of Elastic & Viscoelastic Solids
Prereq: MA242 and MA341
Instructor: M. Haider

Continuum models have been widely employed in describing the mechanics of many solid and solid-like materials. In these models, appropriate kinematic quantities (vectors, tensors etc.) are introduced to quantify deformation in the material relative to an undeformed reference state. For a specific application, constitutive laws are then formulated to relate the kinematic quantities to forces inside the material. Finally, balance laws are employed to enforce conservation of mass, momentum and energy, resulting in a closed system of governing equations. This course will introduce the student to both linear and nonlinear continuum mechanics models for elastic, viscoelastic and poroelastic materials. Applications will be included, with an emphasis on continuum modeling in biomechanics. Students will be encouraged to formulate and complete projects based on individual research interests.

A: Because they are "Taylor" made.

Professor H. Kristian Jenssen earns NSF Career Award

Professor Jenssen, assistant professor of mathematics, received a NSF Faculty Early Development Award. The NSF Career Award is granted to young science and engineering faculty. The five-year grant was awarded to Dr. Jenssen for his proposal titled, "Large and Multi-Dimensional Solutions of Conservation Laws" which outlines research in non-linear PDEs, resulting in a better understanding of fluid flow and its applications in areas such as gas dynamics, elasticity, and meteorology.

Dr. Jenssen received his master's degree in math from the University of Oslo, Norway and his Ph.D. in math from the Norwegian University of Science and Technology.

FACULTY: You can help SUM Club continue fund events like **PIZZA & MOVIE, socials,** and **SIAM/SEAS meetings** by donating your unused textbooks. In 2004, SUM was able to raise over $600 with book sales. If you have unused textbooks and would like to donate them to SUM, please bring them to Bisa Meek in HA 255.

Todd Fuller High School Math Competition

The Todd Fuller Wake County High School Math Competition was held on October 16, 2004. Leesville Road High School placed 1st among ten competing high schools. Enloe High School placed second and Raleigh Charter High School Placed Third.

Individual participants were also recognized. Andy Tan from Enloe placed first, Jeremy Diepenbrock from Enloe placed second, Meredith Newmark from Raleigh Charter placed third, and Gavin Bruss from Apex placed fourth in a tie with Eric Shiue from Leesville Road.

Phi Beta Kappa
Fall 2004 initiates

Lucas Bilbro
Andrea Hernandez
Kelli Jeffries
Paul Stewart Smith
Eamonn Tweedy

North Carolina State University

Mathematics Newsletter
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