

Department of

Mathematics

Newsletter



With the support of the Office of the Dean of the College of Arts and Sciences, we are offering *Perspectives* in a new format which we hope our readers will find visually appealing as well as informative. Due to the changeover, this year's issue of *Perspectives* contains news from the 2003-2004 and 2004-2005 academic years. We hope that you enjoy the new format and appreciate your continued support and interest. Your comments are welcome!

Peter Perry, Editor
perry@ms.uky.edu

<http://www.math.uky.edu>

Inside

- Letter From the Chair2
- Faculty Update3
- Graduate Program.....6
- News From Alumni8

Letter from the chair

Greetings to alumni and friends of the UK Mathematics Department! I look forward to hearing from you and, I hope, meeting some of you in my new role as chair of the Department of Mathematics.

The University of Kentucky Mathematics Department continues to be a University leader in research, teaching, and service to the Commonwealth of Kentucky. This year, faculty member Peter Hislop held a University Research Professorship and pursued his research in the mathematical theory of disordered materials. Faculty member Richard Ehrenborg has assumed the editorship of the *Electronic Journal of Combinatorics*. Faculty member Qiang Ye has joined the editorials boards of the *Journal of Computational and Applied Mathematics* and *SIAM Journal on Matrix Analysis and Applications*. Please see what follows for more news about the research activities of our faculty.

New faculty member Rich Millman joined Paul Eakin, Carl Lee, and Ken Kubota in supporting the activities of the Appalachian Mathematics and Science Partnership, a National Science Foundation (NSF) funded, five-year initiative to improve mathematics and science teaching in 52 school districts in Kentucky, Tennessee, and Virginia. Rich is UK's first Mathematics Outreach Professor and is working closely with partner schools and colleges throughout the Appalachian region (see the AMSP website, www.appalmsp.org, for more information about their activities, and read on for some more recent developments).

The Mathematics Department is also participating in a \$2 million NSF-funded initiative to increase the number of Appalachian students pursuing mathematics, science, and engineering majors. Faculty member Carl



Eberhart is working to develop innovative approaches to Math 109, the first course in College Algebra, which serves as a “gateway” to Calculus and other pre-engineering courses. The National Science Foundation awarded only 13 other grants in this program in 2004, including ones to such prestigious institutions as the University of California at Los Angeles (UCLA), Virginia Polytechnic Institute and State University (Virginia Tech), and the National Academy of Sciences.

Finally, the Mathematics Department, building on its successful Mathematical Economics major, has recruited a new faculty member, Dr. Daniela Puzzello, who will join the Department (in a joint position with the Department of Economics) next fall. You can read more about Dr. Puzzello in the faculty news on page 3.

Our alumni and friends continue to help us enhance our teaching and research mission. Most recently, the J. C. Eaves Scholarship

Fund, honoring the memory of Mathematics faculty member J. C. Eaves, was endowed by Dr. Eaves' son, James C. Eaves, Jr., and his wife Mary. The Eaves endowment will fund scholarships for undergraduate majors in Mathematics. Dr. Eaves served UK's Department of Mathematics in many roles, including his chairship from 1953 to 1963.

The continuing support of our department's alumni and friends makes a real difference in our ability to provide quality education and a supportive atmosphere for our students. Your gifts help us to provide a quality educational experience for our students and support the research activity of our faculty. Of equal importance to our students is the knowledge that, as UK graduates, they will be connected to a supportive community of alumni in the academic world, business, and industry!

Richard Carey
chair@ms.uky.edu

Faculty Update

Retirements in 2004

Faculty members Raymond Cox and James Wells were honored on the occasion of their retirement at a post-Awards Day dinner and roast this past May.

Raymond Cox received his doctorate from the University of North Carolina in 1963. He came to the University of Kentucky in 1963 and was promoted to associate professor in 1969. He served the Department as Assistant Chairman from 1967 to 1972 and as Chairman from 1972 to 1975. He has also served the Department and College as Director of Graduate Studies, Associate Dean in the College of Arts and Sciences, chair of the Computer Science Department, and Director of Undergraduate Studies in Computer Science. For many years he has served as an officer in the University of Kentucky's chapter of Phi Beta Kappa.

James Wells received his doctorate from the University of Texas in 1958. Before coming to the University of Kentucky, he held assistant professorships at the University of North Carolina, Chapel Hill and the University of California at Berkeley. He was hired as an associate professor at UK in 1962 and promoted to full professor in 1968. Jim served as chair of the Department of Mathematics in 1969-1972 and again in 1989-1992. He also chaired the Department of Computer Science from 1982 to 1986. He has graduated nine doctoral students and published research papers in functional analysis, real analysis, and matrix theory.

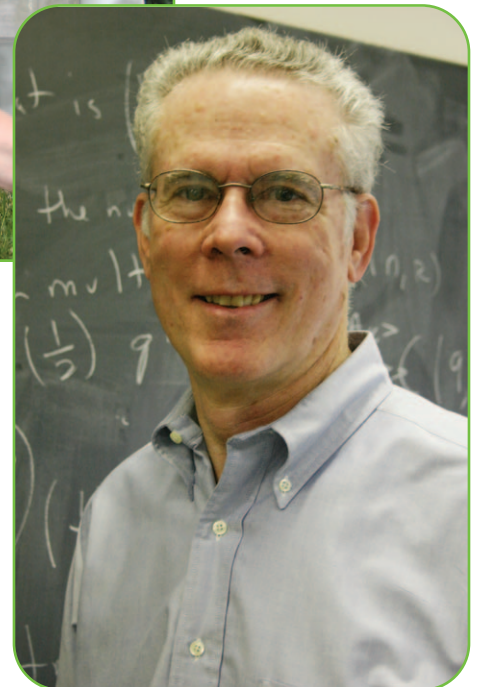
Richard Millman joins UK as Professor of Mathematics Outreach

In a pathbreaking appointment designed to support the Department's federally funded outreach activities in Mathematics and Science education, the Department of Mathematics hired Richard Millman to be UK's first Mathematics Outreach Professor. His appointment is supported in part by the Appalachian Mathematics and Science Partnership (AMSP) grant from the National Science Foundation.



Left: Raymond Cox (seated) and James Wells.
Below: Richard Millman

Rich is overseeing pre-service and in-service teacher training activities at UK and work with colleagues in the public school system and at the AMSP's regional university partners to improve the quality of mathematics instruction and teacher training throughout the Commonwealth. A differential geometer by training and author of a standard text in the subject, Rich was most recently a program director at the National Science Foundation. He brings a wealth of educational and administrative experience to his new position.



Daniela Puzzello joins UK in joint appointment with Department of Economics

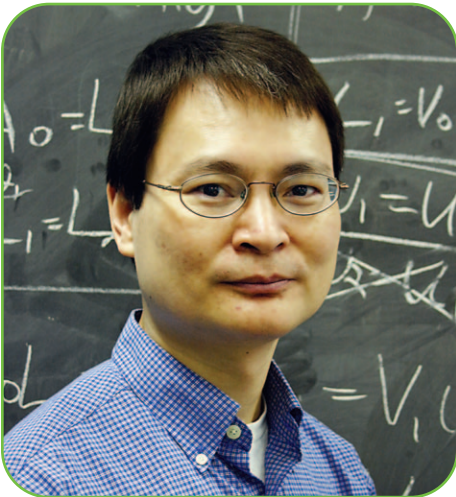
Dr. Daniela Puzzello, a 2005 doctoral graduate of Purdue University, will begin a joint

continued on page 4

faculty updates continued from page 3



Richard Ehrenborg



Qiang Ye

appointment in Mathematics and Economics in fall 2005. Dr. Puzzello's research lies in the area of Mathematical Economics. Her position is funded in part by a TRUE grant from the Office of the Provost and will support UK's Mathematical Economics major.

Peter Hislop receives University Research Professorship

Peter Hislop was one of four faculty members University-wide to be awarded a University Research Professorship for academic year 2004-2005. These awards allow faculty with outstanding research programs to spend their appointment year working full-time on their research. Professor Hislop is a mathematical physicist who studies the effect of random impurities on material properties such as electrical conductivity.

The University of Kentucky established the University Research Professorship program in 1976 to honor faculty with outstanding achievement in research. Recipients are selected from a University-wide pool of applicants by a faculty committee under the auspices of the Vice President for Research. Professor Hislop is the thirteenth faculty member from our department to be so honored.

Richard Ehrenborg receives Royster Professorship

By the unanimous recommendation of a departmental search committee and with the approval of the Board of Trustees, Richard Ehrenborg received the first Wimberly and Betty Royster Research Professorship in Mathematics for a three-year term. The Royster Professorship honors associate professors with outstanding research achievement.

The Royster Professorship is made possible by a generous gift of Wimberly and Betty Royster. Wimberly has served the University of Kentucky as chair of Mathematics, Dean of the College of Arts and Sciences, Dean of the Graduate School, and Vice-President for Research and Graduate Studies.

Mathematics Department supports state assessment efforts in K-12 education

Professors Paul Eakin and Ken Kubota have received a \$200,000 grant from the Kentucky Department of Education to develop an online testing and instructional support system for K-12. The system is intended to evaluate the feasibility of an initiative through which UK assumes responsibility for the state education accountability testing program and moves it from a paper to a primarily online testing environment. Professors Eakin and Kubota are drawing on their extensive experience developing online materials for the Appalachian Mathematical Sciences Partnership (AMSP). They are working with partnering teachers in middle school reading at Lexington Traditional Magnet School (Lexington), and Bondurant Middle School (Frankfort) and with high school algebra teachers at West Jessamine High (Nicholasville) and Woodford County High (Versailles) both to develop the online materials and to evaluate the overall system.

Faculty promoted

Qiang Ye was promoted to Full Professor as of July 1, 2004. Qiang joined the department as an associate professor with tenure in the fall of 2000. He is an expert in numerical linear algebra, the subfield of numerical analysis concerned with the solution of matrix equations. His research focuses on algorithms for large matrix problems, eigenvalue computations, and their applications including circuit simulation, groundwater modeling, and stochastic analysis.

Uwe Nagel was promoted to the rank of Associate Professor as of July 1, 2005. Professor Nagel joined the University of Kentucky faculty as an assistant professor in August 2002. He works in Commutative Algebra and Algebraic Geometry and his research is related to the fields of combinatorics and symbolic computation.

Vassily Gorbounov was promoted to the rank of Full Professor as of July 1, 2005. Professor Gorbounov, a topologist by training, has in

recent years pursued research related to Quantum Field Theory and String Theory. You can read more about his recent research activity below.

Faculty visit research institutes

Professor Sung Ha Kang spent the fall semester of 2004 as a Visiting Researcher at the University of California, Los Angeles. Professor Kang works in mathematical approaches to image processing and computer vision.

Professor **Michel Jabbour** spent the fall semester at the Institute for Mathematics and its Applications (IMA), a national research institute supported by the National Science Foundation, together a consortium of universities and corporations including the University of Kentucky. Professor Jabbour, a specialist in mathematical modeling of materials, participated in the IMA's special year on Mathematics of Materials and Macromolecules.

Professor **Vassily Gorbounov** visited the Fields Institute for Research in the Mathematical Sciences in 2004-2005. Professor Gorbounov participated in a special year at the Institute on String Theory, the physical theory thought to hold out the best hope for unifying Einstein's general theory of relativity and the quantum theory. The study of string theory has brought mathematicians and physicists into a closer working relationship and its challenges have produced interesting new mathematics and physics. You can read about more the special year at the Fields Institute in the January 2005 Fields Institute Newsletter, "Fieldsnotes" available online at www.fields.utoronto.ca.

Professors **Richard Ehrenborg** and **Margaret Readdy** spent one month at the Mittag-Leffler Institute in Djursholm, Sweden, as a part of that institute's spring 2005 program on algebraic combinatorics, organized by Anders Björner (Swedish Royal Institute of Technology) and Richard Stanley (MIT). Richard's current graduate student, Michael Slone, also spent three months at the Mittag-Leffler Institute during this special program.

Conference and Lectures

Alumni in the region are always welcome to attend the Department's special lecture series as well as our ongoing seminars and colloquia.

Fourth Annual van Winter Lecture in Mathematical Physics.

Professor Maciej Zworski of the University of California at Berkeley gave the fourth annual van Winter Memorial Lecture in Mathematical Physics on September 8, 2004. Professor Zworski is an expert on nonlinear wave propagation and on the theory of resonances in quantum theory. He lectured on "Quantum Resonances for Chaotic Open Systems."

Fourth Annual Hayden-Howard Lecture in Mathematics.

Professor Gang Tian of MIT gave the fourth annual Hayden-Howard lecture in Mathematics on October 22, 2004. Professor Tian has been the Simons Professor of Mathematics at MIT since 1996 and has held visiting positions at the Institute for Advanced Study in Princeton and the Institut des Hautes Études Scientifiques among other international centers for research in Mathematics. Professor Tian is an expert in nonlinear differential equations and geometric analysis. He lectured on "The Geometry of Einstein Four-Manifolds."

Please see our website, www.math.uky.edu, for up-to-date information on department activities.

Faculty member assumes editorship

Richard Ehrenborg became editor-in-chief of the *Electronic Journal of Combinatorics*. Visit www.combinatorics.org to find out more about this online journal.

Faculty visitors for 2004-2005

Siu-Hung Tang visited the Department of Mathematics in 2004-2005. Professor Tang's research area is spectral theory and partial differential equations. He is working with Peter Hislop and Peter Perry.

Sergey Kitaev visited the Discrete Mathematics group in fall 2004. Professor Kitaev is a 2003 doctoral graduate of Goteberg University in Sweden and will be working with Professors Richard Ehrenborg and Margaret Readdy. He also was a visitor in 2003-2004. He studies enumerative combinatorics, formal languages, graph theory, and coding theory.

Graduate Program

UK Math Graduate Program cited for high percentage of female doctoral graduates

In the August 2004 issue of *Notices of the American Mathematical Society*, our graduate program was cited for its high percentage of female doctoral graduates, ranking comparably in this category to Stanford University.

Graduate students participate in national research programs

The University of Kentucky is an institutional member of the Mathematical Sciences Research Institute (MSRI) in Berkeley, California and the Institute for Mathematics and its Applications (IMA) in Minneapolis, Minnesota. These institutional memberships allow our graduate students to participate in advanced summer research programs with graduate students from around the country.

This summer, Rachelle Bouchat will participate in the AMS-IMS-SIAM Summer School in Commutative Algebra at Snowbird, Utah. David Watson will participate in the summer program “CR Geometry: Complex Analysis meets Real Geometry and Number Theory” at MSRI. Carlos Nicolas will participate in the summer graduate program “Integer Point

Enumeration in Polyhedra” at the Banff International Mathematics Research Station in Alberta, Canada, which is partially supported by MSRI and the National Science Foundation. Josh Steinbeck and Wei Zhang will attend the summer program on “Stochastic Partial Differential Equations and Environmental and Geophysical Modeling” at the University of Wyoming. This program is sponsored by IMA. Finally, Skyler Speakman will participate in the workshop “Mathematical Modeling in Industry” at the IMA in August of 2005.

Edgar Enochs Fellowship

The Edgar Enochs Fellowship for 2004-2005 was awarded to Michael Slone, a doctoral student of Professor Richard Ehrenborg. The Enochs scholarship for 2005-2006 was awarded to Sonja Petrovic, a doctoral student of Professor Uwe Nagel. The Enochs Fellowship is made possible by generous donations from former students and friends of Professor Edgar Enochs.

Rishel Prize in Applied Mathematics

The Rishel Prize, awarded in alternate years by the departments of Mathematics and Statistics, was awarded in 2004-2005 to Gareth Bendall. The Rishel Prize for 2005-2006 was awarded to James Money, a doctoral student of Rencang Li and Sung Ha Kang. The Rishel Prize honors the contributions of Ray Rishel, emeritus professor of Mathematics.

Doctoral degrees awarded, 2003-2004

The following students received doctoral degrees during the academic year 2003-2004. Wataru Ishizuka (advised by Larry Harris and Changyou Wang) and Robert Riehemann (advised by Carl Lee) received their doctorates in 2003. Gareth Bendall (François Margot) Mary Goodloe (Ted Suffridge), Istvan Kovacs (Larry Harris), Matt Menzel (Carl Lee), and Stacey Mueller (Ted Suffridge) received their doctorates in 2004.



Doctoral Degrees awarded 2004-2005

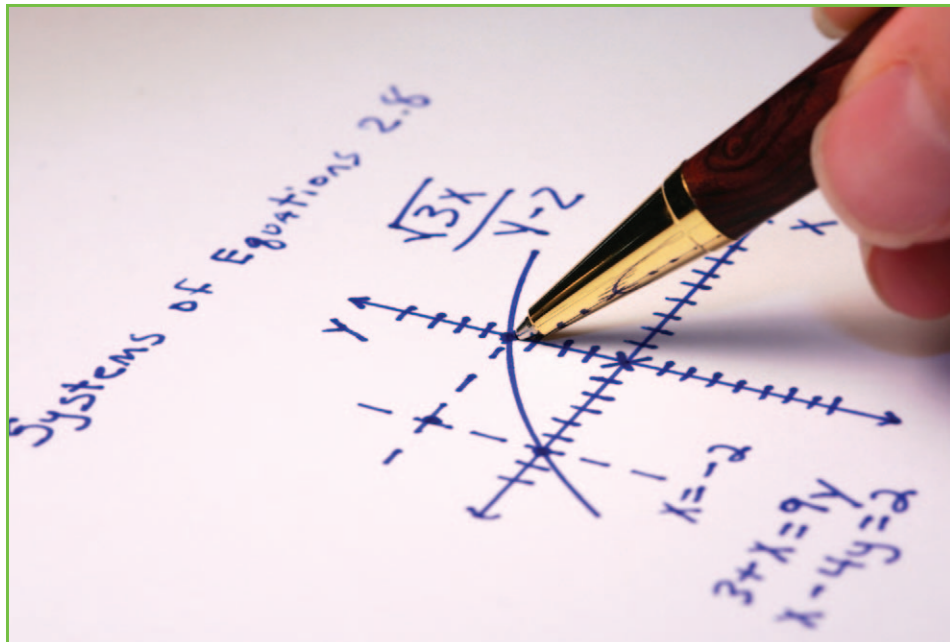
The following students received doctoral degrees during the academic year 2004-2005. Michael Dobranski (advised by Russell Brown), Leonard Hoffnung (advised by Qiang Ye) and Istvan Kovacs (advised by Larry Harris) received degrees in summer 2004. Zhiqiang Cai, Leigh Noble, and Xiang Yu (all advised by Chi-Sing Man) received their degrees in December 2004. Matt Ragland (advised by James Beidleman), Steve Elliot (advised by Thomas Chapman), Katherine Pinzon (advised by Edgar Enochs), and Molly Wesley (advised by Edgar Enochs), received their degrees in June 2005.

Masters' Degrees awarded 2003-2004

Haley Abel, Christopher Cunliffe, John Eveland, Jenny Hawley, Bruce Manley, James Money, Mary Neu, Jennifer Rowe, Jack Schmidt, Michael Slone, Deiveekarajan Vishnuvardhan, Ronald Williams, Yu Xiang, Dan Xu, and Wei Zhang received Masters' degrees in December 2003. Matthew Brown, Constantine Budovsky, Pat Cain, Jessica Cunningham, Adam Feldhaus, Scott Godefroy, Thalya Hamilton, Olga Mendoza, Daniel Pinzon, Ying Xu, Yujun Wu, and Yun Yang received Masters' degrees in May 2004.

Masters' Degrees awarded 2004-2005

Hongying Dai received a Masters' degree in summer 2004. Dilek Alogoz, Zhiqiang Cai, Kelly McKenzie, and Daniel Pinzon received Masters' degrees in December 2004. Rachelle Bouchat, Phillip Busse, Julia Chifman, Christopher Frayer, Scott Godefroy, Katherine Kohrs, Tricia Muldoon, Erik Stokes, David Watson, and Ying Xu received Masters' degrees in Spring 2005.



Masters' in Applied Mathematics Program

The Master of Science in Applied Mathematics degree is intended for students interested in pursuing a career in business, industry or government service. Beginning this year, Robert Molzon is serving as Director of the Masters' in Applied Mathematics Program.

Annual meeting of the AMS and upcoming alumni dinner

Nearly 40 UK alumni attended our annual UK dinner at the Annual Meeting of the American Mathematical Society this past January in Atlanta, Georgia. Next year's alumni dinner will take place at the San Antonio Meeting, January 12-15, 2006, on Thursday, January 12. Please contact Peter Perry (perry@ms.uky.edu) if you would like to attend.

News from Alumni

Please send notes for this section to Russell Brown, Department of Mathematics, University of Kentucky, Lexington, KY 40506-0027 or to rbrown@uky.edu

Dilek Alagoz (M.S.A.M. '05) died tragically early this spring after receiving her Master of Science in Applied Mathematics (MSAM) in January of 2005. She was honored at a memorial service sponsored by the Turkish Community at the University of Kentucky on March 31, 2005. We are grateful for having had the chance to know her and share in her life and extend our heartfelt sympathy to her friends and relatives worldwide.

Evelyn Brown Christensen (M.A. '73) has been taking a couple of years off from teaching elementary school to work on her writing. She's had 12 math activity/puzzle books (ranging in difficulty level from K to adult) published by MindWare in the past two years. Her daughter and son each co-authored one of them with her.

Michael Dorff (Ph.D., '97) received tenure at Brigham Young University in 2004. In 2005, Michael received a \$160,000 grant from the National Science Foundation to conduct a summer REU (Research Experiences for Undergraduates) program at Brigham Young University. To find out more about the summer program, see the link "BYU Summer REU" on the Brigham Young Math department's homepage, www.math.byu.edu. Michael will be spending 2005-2006 in Poland on a Fulbright fellowship.

David S. Harris (BA, math, '68) retired from 30 years as a computer programmer to become a teacher at Ocean Township High School in New Jersey.

Jill R. Hardin (BS, math, '96) is an Assistant Professor of Statistical Science and Operations Research at Virginia Commonwealth University. For two summers, Jill participated in undergraduate REU programs at the University of Kentucky.

Shawn Molohon (BS, math, '04) was accepted into the Sears National Management program.

Jennifer Moore Mangum (MA, math, '96) is in her 6th year teaching at the Louisiana School for Math, Science, and the Arts.

Jakayla Robbins (MA, math, '99; Ph.D., math, '03) has accepted a tenure-track assistant professorship at the University of Montana. Jakayla is currently finishing up a visiting scholar appointment at the University of Mississippi. This year, Jakayla presented two tutorials on her research at the 2004 Barbados Undercurrent Workshop entitled "Polyhedra, Convex Geometry, and Optimization." The workshop was held at the Bellairs Research Institute of McGill University.

Lydia Wells Sledge (BS '65 and MA in Ed. '71 Math) recently retired from the Kentucky Department of Education.



UNIVERSITY OF KENTUCKY
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Department of Mathematics
University of Kentucky
715 Patterson Office Tower
Lexington, KY 40506-0027
www.math.uky.edu

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