

# PERSPECTIVES

UK Department of Mathematics

Summer 2002

## *Letter from the chair.*

Greetings to alumni and friends of the UK Mathematics Department! This past year, four graduate students received their doctoral degrees, and nine graduate students received their masters' degrees. Congratulations to our graduated students! I received a kind letter from one of our doctoral graduates, **Drew Sills**, who spoke of the "openness, mutual respect and encouragement, and a genuine love of mathematics" which characterized his experience here. Our challenge is to sustain and enhance that atmosphere here at UK.

Visit the website [mathclass.org](http://mathclass.org) to see how our faculty are working to improve mathematics education in the Commonwealth and beyond. This site offers on-line testing for Kentucky's high school students to determine their level of preparation for College work, on-line homework for Math 123 and selected upper-division Mathematics courses, and instructional resources for Mathematics teachers across the Commonwealth. Professors **Carl Eberhart**, **Paul Eakin**, and **Ken Kubota** worked with faculty from Northern Kentucky University to develop the online mathematics test, and have developed, tested, and refined software tools for web-based homework. Professors **Eberhart**, **Eakin**, and **Lee** are working with the Morgan County Center for Teaching and Learning in Mathematics in a Department of Education-sponsored program to enhance the teaching and learning of mathematics in a 12-county region of Eastern Kentucky. Professor **Carl Lee** is working with the Appalachian Collaborative Center for Learning, Assessment, and Instruction in Mathematics (ACCLAIM), which is developing doctoral-level teacher training in mathematics education and particularly targets rural education. The ACCLAIM project is funded by a five-year, \$10 million grant from the National Science Foundation and involves universities and colleges in Kentucky, Tennessee, Ohio, and West Virginia.

I am very pleased to announce generous gifts from **Norma Edwards** and **Wimberly** and **Betty Royster** to establish named professorships in Mathematics. These professorships will allow us to reward and retain our most outstanding faculty and contribute to the quality of our program for many years to come.

Mrs. Edwards earned her bachelors' degree with honors in 1933 and her Masters' from the University of Michigan in 1934. Her husband, Ralph, also earned his degree from the University of Michigan. She and her husband were the first husband-wife combination to be members of the Society of Actuaries. Wimberly and Betty Royster are long-time friends and generous supporters of the Mathematics Department: this past June, Wimberly was presented with an honorary degree

by UK, and the Department hosted a reception in their honor to mark the occasion.

The support of our alumni—whether by your contributions, by commending our program to future students, or by your good advice—is crucial to our efforts to advance mathematics research and education. I enjoy hearing from alumni and would also be happy to meet with you at anytime.

Peter Perry, Chair  
chair@ms.uky.edu

## *Faculty news.*

*Wimberly Royster honored.* At the spring 2002 commencement, Emeritus Professor **Wimberly Royster** received an honorary doctorate from the University of Kentucky to thank him for his many years of service to the University and to the Commonwealth of Kentucky. Wimberly's career at UK began in 1946 when he entered graduate school. He later returned to the UK Mathematics Department and served as chair. He became Dean of the College of Arts and Sciences, then Dean of the Graduate School and finally Vice President for Research and Graduate Studies. After retiring from UK, he served as Director of the state Experimental Program to Stimulate Competitive Research (EPSCoR) and worked with the Kentucky Science and Technology Council. Throughout his career, he has worked tirelessly to advance research and education in the sciences in Kentucky.



Wimberly and Betty Royster

*New faculty.* This year, the department was fortunate to hire three outstanding new faculty members, despite tight budgetary conditions on campus.

**Marion Anton** comes to Kentucky from the University of Sheffield in England. He did his undergraduate work and received a Master's degree from the University of Bucharest in Rumania. He earned his Ph.D. in Notre Dame writing a thesis under the direction of William Dwyer. After a year as a post-doctoral fellow at Notre Dame, he went to the Max

Planck Institute in Bonn for a year. Anton's research is in algebraic topology and  $K$ -theory.

**Sung Ha Kang** is a recent graduate of the University of California in Los Angeles where she worked under Tony Chan on problems related to computer processing of color images. Her research interests include image processing, applied differential equations and level-set methods. During the spring 2002 semester, she completed an internship developing software for image processing and computer vision.

**Uwe Nagel** received his Ph.D. in 1990 from the University of Paderborn in Germany and has been an Assistant Professor at Paderborn since 1997. In 1992-93, he was a research visitor to Queen's University in Canada and the University of California in Los Angeles. His area of research is algebraic geometry. In recent years, he has been a regular visitor to Torino, Italy and Notre Dame.

*Research professorship for Chi-sing Man.* During the past year, **Chi-sing Man** has held a University Research Professorship. This award has allowed him to bring several research collaborators to the Mathematics Department. Among the visitors is **Roberto Paroni** of the University of Sassari, Italy who received his doctoral degree from UK under Man's direction. During the past year, Man has continued his research on the elastic properties of metals and textured materials.

*Retirement.* **David Johnson** retired from the Department of Mathematics at the end of the spring 2002 semester. David came to Kentucky in 1970 after finishing his doctoral degree at the University of Virginia. While at Kentucky, David held visiting positions at Oxford University and the University of Manchester. His research in algebraic topology led to 19 publications during his career. In addition, David provided valuable service to the department serving as Director of Undergraduate Studies in 1981-1984 and Director of Graduate Studies from 1999-2002. The editor of this newsletter learned that David maintains close contact with his former students as he regularly provided news about them for the newsletter.

### ***Conferences and Lectures.***

*Conference in honor of David Adams, Ron Gariepy and John Lewis.* The department hosted the 49<sup>th</sup> Midwest Partial Differential Equations Seminar on 15-17 March 2002. This seminar was held to honor the accomplishments of **David Adams**, **Ron Gariepy** and **John Lewis** on (a good approximation to) their sixtieth birthdays. The conference featured twelve lectures by friends and collaborators of the honorees. Two former Kentucky students were invited to speak, **Hi-Jun Choe** and **Andy Vogel**. Choe was a student of Ron Gariepy and Vogel was a student of John Lewis, both received their degrees in 1989. In addition, many former students and friends attended the conference and banquet.

The conference received support from the Institute for Mathematics and its Applications, The National Science

Foundation, via the NSF's support of the Midwest Partial Differential Equations Seminar and McGraw-Hill.

*Conference on inverse spectral geometry.* The department hosted the first Dartmouth-Kentucky conference on inverse spectral geometry on 20-28 June 2002. This conference was funded by the National Science Foundation, the Vice-President for Research and Graduate Studies at the University of Kentucky and Dartmouth College. The conference began with a three-day workshop which featured short courses designed particularly for graduate students. Short course lecturers included Steven Zelditch (Johns Hopkins), Richard Beals (Yale), Tanya Christiansen (Missouri) and **Peter Perry** (Kentucky). Graduate students from UK, Dartmouth College, Yale, and Johns Hopkins University participated. These introductory courses were followed by lectures on recent research in spectral geometry.

The topic of the conference, inverse spectral geometry, was popularized in Mark Kac's question: Can you hear the shape of a drum? In other words, does the sequence of natural frequencies of a drumhead allow us to determine the shape of a drum? A rigorous formulation of this question was posed in 1966 and finally answered in 1991 when two regions with the same families of eigenvalues were exhibited. Generalizations of these constructions are still an active area of investigation.

*Truesdell conference.* The Department of Mathematics, in conjunction with the Society for Natural Philosophy held a Symposium on Recent Advances and New Directions in Mechanics, Continuum Thermodynamics and Kinetic Theory. This symposium was held at Virginia Tech and was dedicated to the memory of Clifford A. Truesdell III. **Chi-sing Man** of Kentucky was the principal organizer. Among the speakers were UK graduate **Roberto Paroni**, and UK faculty members Chi-sing Man and **Michel Jabbour**. The conference received support from the National Science Foundation.

*Second Hayden-Howard lecture.* The second Hayden-Howard lecture was given by **Craig Evans** of the University of California at Berkeley. Craig is a former UK faculty member and expert on partial differential equations. Craig's lecture discussed a variational principle arising in Hamiltonian mechanics. In addition to Evans's expertise in elliptic partial differential equations, the lecture drew on ideas from linear programming that Evans first learned while teaching business math at the University of Kentucky.

Craig Huneke of the University of Kansas has agreed to give the third Hayden-Howard lecture during the 2002-2003 academic year. Craig is a leading figure in commutative algebra. Visit the department's web page at [www.math.uky.edu](http://www.math.uky.edu) for up-to-date information on the time and date of this lecture.

*Inaugural van Winter lecture in Mathematical Physics.* The first Clasine van Winter lecture in mathematical physics was delivered by Elliot Lieb of Princeton University in September 2002. In this lecture Lieb discussed an axiomatic formulation of entropy and the third law of thermodynamics. This lecture series is sponsored by the Department of Mathematics and

Department of Physics and is supported, in part, by an endowment.

Clifford Taubes of Harvard University is scheduled to deliver the second van Winter Lecture on Monday, 18 November 2002.

### **Graduate program.**

*Masters degrees awarded.* During the past academic year, the following students received Master's degrees: **Justin Hamilton, Emil Jacob, David Harness, Pat Quillen, Jennifer Rice, Hong Song, Darren Tapp, Molly Wesley** and **Ling Wu**.

*Ed Enochs fellowship.* The first Edgar Enochs prize in algebra was awarded to **Alina Jacob**. Alina is completing her third year of graduate study at UK. She is a doctoral student working under the supervision of Ed Enochs.

*Doctoral degrees awarded.* During the past year, four students received Ph.D. degrees in Mathematics from UK. The student's name is followed by the advisor's name and the area of research.

**Sharon Sullivan** (David Leep, Algebra) is now teaching at Catawba College in North Carolina.

**Christopher Morgan** (Ted Suffridge, Complex Analysis) is now teaching at the University of Evansville in Indiana.

**Anna Davis** (Tom Chapman, Topology) will begin at the University of Nevada in Reno in fall of 2002.

**Drew Sills** (George Andrews of Penn State University, Algebra) will be Visiting Assistant Professor at Penn State for the coming year.

*Annual meeting of the AMS.* The UK gathering at the annual meeting of the American Mathematical Society took place in San Diego California in January of 2002. The next annual meeting will take place in Baltimore, Maryland and the UK gathering is scheduled for Thursday evening, 16 January 2003.

*Awards.* The Wimberly Royster award was given to **Alina Jacob** and **Pat Quillen**. The Ray Rishel award for the outstanding thesis in applied mathematics was given to **Mojia Huang** who will finish his Ph.D. under the direction of **Chi-sing Man** in the summer of 2002.

*New Director of Graduate Studies.* With the retirement of David Johnson, **Russell Brown** began as Director of Graduate Studies in May of 2002. Russell is looking forward to working with our graduate students and meeting alumni at the annual meeting of the AMS in Baltimore in January of 2003. **Rebecca Novak** who has been the staff assistant for the graduate program will leave in August of 2002 to begin studies at UK's law school.

### **Undergraduate program.**

*Applicable algebra.* A recent addition to the undergraduate program at UK is a course titled Applicable Algebra. **Richard Ehrenborg** has taught this course for the past two falls and attracted an enthusiastic group of students. The course

introduces the basic notions of abstract algebra, but with an eye to applications. Among the applications considered are cryptography, error correcting codes and the fast Fourier transform.

*Math club.* This year's math club program included talks by several alumni. **Jody Fast** who is now working as an actuary at Southern and Western Life Insurance Company spoke to a group of 50 undergraduate and graduate mathematics students about opportunities for mathematics students as actuaries. A recent graduate from our undergraduate program, **John Scoville** and **Kathy Sharrow** spoke about opportunities for undergraduate in programs for Research Experiences for Undergraduates. UK Mathematics faculty, **Jim Brennan, Richard Ehrenborg** and **David Leep** provided talks on topics ranging from the mathematics of juggling to complex numbers. The final talk of the year was a lecture by Frank Morgan of Williams College who spoke about soap bubbles and especially the recent solution of the double-bubble conjecture regarding the surface of minimum area which encloses two fixed volumes.

*Awards.* This year, the Carolyn Bunyan award for outstanding undergraduates in mathematics was given to **Jack Challis, Ryan Gabbard** and **Justin Young**. The Sallie Pence award for outstanding majors who will enter teaching was given to **Sarah Lucas** and **Sulma Badrudduja**.

*Mathematics resource center.* A collaboration between the Department of Mathematics, the Mathematical Sciences Computing Facility and Information Systems has built Mathskeller, a new center for students in mathematics courses. Mathskeller opened in January of 2002 with a visit by President Lee Todd who participated in a formal dedication ceremony and stayed around to help out with mathematics tutoring.

Mathskeller provides students with large tables for group study, whiteboards and chalkboards for informal lectures, computers to provide access to web resources (such as WHS, the web-based homework system developed at the University of Kentucky), small seminar rooms for group study, geometric models, mathematical puzzles and games such as chess and go. The center is staffed by mathematics graduate students and faculty who take advantage of the informal atmosphere for office hours. In addition the mathematics department and other units on campus provide tutors for drop-in tutoring. For more information on Mathskeller visit [www.mathskeller.org](http://www.mathskeller.org).

*Bachelor's degrees awarded.* The following students earned bachelor's degrees in mathematics from summer 2001 to spring 2002. **Lauren Black, Constantine Budovsky, Courtney Burch, Dwight Burton, Michael Clayborne, Chris Cunliffe, Bobby Eickhoff, John Eifler, Douglas Fee, Margaret Jones, Ayse Lunsford, Curtis Manning, Carrie Minnick, Charlotte Ochanine, William Pierce, Wayne Wesley Punnett, Ken Sebesta, John Scoville, Patricia Swiderski, William Thomas, Jr., Zachary Underwood, and Ian Welch**.

### ***Problem.***

The following problem was taken from the Mathematical Sciences Research Institute's newsletter of 2001. A solution will be posted on the Department's web page by early 2003.

Five cards are drawn from a standard deck of cards, Mathematician A looks at the cards and selects four of them to place face up in a row on the table. The fifth card is placed face down. Mathematician A leaves the room and Mathematician B enters and examines the cards on the table, taking particular note of the order in which they appear. After a moment Mathematician B announces the name and suit of the fifth card. How can this be done? (Of course, mathematicians are honorable people and would not resort to using skills in the audience or communicating outside the room.)

### ***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](mailto:rbrown@uky.edu)

**Greg Dobbins**, Ph.D. 1969, retired from NCR Corporation, Server Systems, after 17 years service. Currently, he is on the faculty in the Department of Computer Science and Engineering at The University of South Carolina in Columbia. Recently, he received a U.S. Patent for a Software Engineering Testing Methodology he helped to develop at

NCR. Greg lives with his wife Susan and youngest daughter Betsy in Columbia.

**Greg Gunn**, M.A. 1995, has been teaching at The Lexington School in Lexington, Kentucky since graduating from UK. He is the proud father of twin girls, Aedon and Nolan, born on 23 April 2002.

**Jill Hardin**, B.S. 1996, received her Ph.D. from Georgia Tech in 2001. She is now an assistant professor in the Department of Statistical Sciences and Operations Research at Virginia Commonwealth University.

**Wei Hu**, Ph.D. 1997, was promoted to associate professor at Houghton College in the spring of 2002.

**Mike McCraith**, M.A. 2000, teaches at Joliet Junior College in Joliet, Illinois. He may be reached at [mmcraith@jjc.cc.il.us](mailto:mmcraith@jjc.cc.il.us).

**Roberto Paroni**, Ph.D. 1998, is Associate Professor at the University of Sassari, Italy. After graduation he completed a one year of post-doctoral work at Carnegie Mellon University, one year at Oxford University, and he has been Assistant Professor at the University of Udine. Roberto's research is related to the mathematics of continuum mechanics. Roberto visited Kentucky for the spring of 2002.

**Mary Jo Zervas**, M.A. 1999, is a software engineer at CSTech in Schaumburg, Illinois. She may be reached at [mjzervas@cstech.com](mailto:mjzervas@cstech.com)

Department of Mathematics  
University of Kentucky  
715 Patterson Office Tower  
Lexington, KY 40506-0027