

Math



Times

Department of Mathematics, Spring 2007

Merit Programs expand opportunities for students

Campus receives \$2 million MIST grant from National Science Foundation

by Jennifer McNeilly, Director of the Merit Program

Now in its 18th year, the Merit Program in the Department of Mathematics is excited to announce a new \$2 million, 5-year NSF grant to be shared with the Merit Programs in Chemistry and Integrative Biology. The Merit Program targets students with high potential who are members of groups that tend to be underrepresented in the areas of mathematics, science, and engineering. Ethnic minorities, women, and rural students are the focus of Merit. The grant, titled Merit Immersion Project for Students and Teachers (MIST), is an expansion of current programs. It will broaden the Merit student population, disseminate the Merit model, and create a consolidated online resource for instructors and students.

The Merit Program augments the large-lecture class. It utilizes a unique instructional style aimed at helping students develop the skills and confidence to educate themselves. Students enrolled in Merit commit 2 to 4 additional classroom hours a week. During Merit sessions, a teaching assistant's time is spent questioning and guiding students as they work together and educate each other, creating a community of scholars where students see the benefits of working with their peers.

Traditionally, only students with declared majors in mathematics, science or engineering have been invited to take the Merit option. The MIST project will expand the program to include general curriculum students who have not yet declared their major. When students have the chance to interact with other math, science, and engineering students in the Merit sections they will be more likely to choose a math, science, or engineering major.



Building on the success of the program at the University of Illinois, the NSF is funding the expansion of the Merit model to the secondary and community college levels. Beginning in the summer of 2008, the MIST project will host summer workshops for high school and community college educators who are interested in incorporating Merit in their classrooms.

MIST will create an extensive set of online resources. These will include resources for current Merit students (such as discussion boards and advising information), resources for teachers (such as basic information on the Merit teaching style and sample worksheets), and resources for prospective students. Among these resources will be a mentoring program where current students will be able to get advice from alumni of the program who are already out in the workforce.

The Merit Program is very excited about this project and looks forward to sharing developments and results in the future. You can help support the Merit Program through your contributions—see the giving form on page 11.

For more information about the Merit Program contact Jennifer McNeilly at jrmcneil@math.uiuc.edu or visit their website at www.math.uiuc.edu/MeritWorkshop.

Welcome, new readers!

This issue of the *Math Times* begins a new era of communication between the department and its alumni. We've sent it to all math alumni—some 7600 members strong! We'd like to hear from all our alumni. Send your news to mathtimes@math.uiuc.edu. In a future issue we'll begin a section *After Math* featuring alumni news.

Four mathematicians receive appointments in the Center for Advanced Study

Paul Schupp, Slawomir Solecki, Thomas Nevins and Christopher Leininger have received 2007-2008 appointments in The Center for Advanced Study (CAS) at Illinois. CAS Associates and Fellows are Illinois faculty members whose proposals are selected in an annual competition. This year there were 29 appointees campus-wide. These appointments grant one semester of teaching release time in order to pursue an individual scholarly or creative project. Associates, Professors and Fellows form the core of the Center for Advanced Study Community.

Paul Schupp has been appointed as an Associate in CAS. During the past few years, it has been discovered that “random” or “generic” groups have amazing algebraic, algorithmic and geometric properties. A random group is “hyperbolic”, meaning that its associated geometric structure, its Cayley graph, shares several of the properties of classical hyperbolic geometry discovered in the eighteenth century. Schupp’s recent work has centered around this topic. Schupp will try to extend some of the properties which hold for groups to other structures such as random finite automata and he will also investigate quantitative aspects of partial computability.

Slawomir Solecki has been appointed as an Associate in CAS. He proposes to investigate two mathematical problems related to metric structures, which at a first glance do not appear connected with each other. One is an old and fundamental problem on the existence of a notion of size of subsets of a compact metric space with the property that any two definable subsets A and B have the same size provided that points of A can be matched with points of B by a distance preserving matching; the other problem concerns algebraic properties of an important group of distance preserving permutations. Rather surprisingly, it appears that progress on both these questions will require settling a single problem with its roots in completely different areas of mathematics—finite combinatorics and finite model theory.

Thomas Nevins has been appointed as a Fellow in CAS. The principles of harmonic analysis have played an increasingly important role in algebra and algebraic geometry in recent years. Nevins will be applying those principles—or more precisely, their “categorified” version—to develop new tools for understanding the geometry of spaces that arise in the geometric Langlands program. He will then apply these tools to study some algebras that play an essential role in many aspects of geometry, representation theory, and mathematical physics, Cherednik’s “double affine Hecke algebras.”

Christopher Leininger has been appointed as a Fellow in CAS. His work develops and exploits an analogy between mapping class groups and Kleinian groups. Both of these topics are of central importance in low-dimensional topology and have influenced each other throughout the course of their existence. In recent years, a number of unexpected connections has produced some very surprising results. This has paved the way for new directions of research in these two fields which promises to have a profound impact.

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From the department chair

I'd like to welcome our many new readers to this issue of *Math Times*, which has just expanded its circulation to 7600! *Math Times* keeps you connected to current news about the Department of Mathematics at the University of Illinois at Urbana-Champaign and provides articles of interest to our readers. I trust that you will enjoy our newsletter and join the ranks of our loyal readers!

This has been an exciting year in the department, with new faculty and postdocs hired, more being recruited as we go to press, new research and educational initiatives, new research grants, and new scholarships. You will read about some of these in this issue, as just a small sampling of the total activity that makes up our enterprise. I am very proud of our faculty, students, and staff, who together make the math department a vital place!

Sheldon Katz



Topology and sensor networks focus of \$8 million DARPA grant

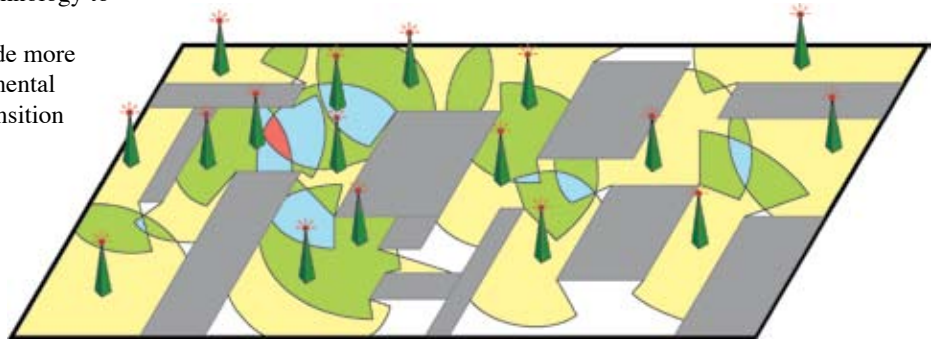
by Robert Ghrist, Associate Professor

Recent advances in sensor micro-fabrication and ad hoc wireless networking portend a near-term future where sensor-infused roads, carpets, walls, and windshields “wake up” and continuously sense their surroundings. One of the major concerns in this field (and many others) is “Will the mathematics to control the data exist when the technology to extract the data arrives?”

As sensors shrink in cost and size, they provide more focused, localized information. One of the fundamental problems of large-scale sensor networks is the transition from large quantities of local data to a global understanding of an environment. This is where mathematics becomes a crucial tool. Topology – the study of abstract spaces – is a rich field of mathematics which specializes in defining and extracting global invariants of spaces based on local information. A century’s worth of work in algebraic, differential, and geometric topology provides a dizzying array of mathematical tools, many of which are not only applicable but crucial to problems in sensor networks.

The University of Illinois Department of Mathematics is leading the way in developing mathematical tools for networked systems of sensors and actuators. The project “SToMP: Sensor Topology & Minimal Planning” is a 4-year, \$8,000,000 grant program funded by DARPA and led by Robert Ghrist of the Department of Mathematics at the University of Illinois. SToMP is a collaborative research effort of mathematicians, electrical engineers, and computer scientists from universities and research labs across the USA and Australia.

counts. Because the theory is topological, it does not require many of the usual rigid assumptions in sensor networks (such as identical target size/shape or convexity of impact domains); and because the theory is based on integration, the results can be computed quickly by the network hardware.



Other SToMP projects include applications of braid theory to robot navigation, applications of homology to network security and coverage, and applications of spaces of bounded curvature to pursuit/evasion problems. The latter project is joint work in progress with Professors Alexander and Bishop from the Illinois Department of Mathematics.

For more information and preprints, see <http://www.math.uiuc.edu/~ghrist/preprints/>.

The mathematical tools used in SToMP range from the classical to the cutting edge.

The mathematical tools used in SToMP range from the classical to the cutting edge. One of the challenges for which topological ideas are extremely effective is the following data aggregation problem. Assume that a number of targets (say, beacons) are located in a dense field of sensors. Each sensor, being very small, is extremely simple: the sensor can count how many targets are roughly nearby, with no information about target identity, distance, or bearing. Clearly, nearby sensors will lead to duplicate counts of beacons. Without being able to identify which beacons are being counted, how can one get an explicit count? Such enumeration problems are critical across many scales and fields, including retail (counting stock), agriculture (counting crops), bio-defense (counting pathogens), and border security (counting people/vehicles).

To solve this and other target enumeration problems, SToMP mathematicians have used the classical Euler characteristic—a combinatorial topological invariant of spaces—molded into a powerful integration theory. This allows one to get an accurate count of targets based on local sensor

Curiosities in math genealogy

Paul Gordan was a well-known mathematician in his time, although today, his name is less familiar. According to The Mathematics Genealogy Project website <http://genealogy.math.ndsu.nodak.edu/html/search.phtml>, he had no doctoral students for the first 44 years after receiving his own degree.

In the 45th year, two students received degrees under his supervision. One of these evidently had no mathematical offspring; but, nevertheless, Gordan has today 675 known descendents. The second student was Emmy Noether, who, through her own work and her mentorship of others, had a profound influence on 20th century mathematics.

Our thanks to Professor Emeritus Harold Diamond for sending in this genealogy note. If you have a bit of history to share, please e-mail it to mathtimes@math.uiuc.edu or send it to the department mailing address on page 2.

Eight graduate students receive department top awards

Each spring, the department presents awards for outstanding achievement to graduate and undergraduate students. Funding for these student awards comes from generous donations from alumni and friends of the department. For more information about these funds and how you can contribute, please visit www.math.uiuc.edu/gifts/.

Bateman Prize in Number Theory

This year the Bateman Prize is shared by Samuel M. Kadziela and Maosheng Xiong. The Bateman Prize is awarded annually to a graduate student in number theory for outstanding research in number theory. The Prize is named after Emeritus Professor Paul Bateman, who served the Department of Mathematics as Head from 1965–1980.



Samuel Kadziela

Samuel Kadziela is a fifth-year graduate student, working under the direction of Iwan Duursma. In his work, Samuel studies arithmetic properties of curves by exploiting their p -adic uniformization. He describes effectively that hyperelliptic curves admit a p -adic uniformization and gives effectively computable maps to go back and forth between the curve and its uniformization.

Certain problems, such as testing whether hyperelliptic curves have isogenous Jacobians, become easier after translation into the p -adic world. He has accepted a three-year postdoc position at UC Irvine beginning in Fall 2007.



Maosheng Xiong

Maosheng Xiong is a fifth-year graduate student in number theory at Illinois, working with advisor Alexandru Zaharescu. Maosheng will graduate this May. He has already published three joint papers, one in the *Journal of Number Theory*, one in *Acta Arithmetica*, and one in the *Journal of Mathematical Analysis and Applications*.

Maosheng also has two joint papers accepted for publication, one in *Monatshefte für Mathematik* and the other in *Mathematical Research Letters*, and a couple more papers submitted for publication.

Irving Reiner Memorial Award



Shivi Bansal

Shivi S. Bansal received the Irving Reiner Memorial Award which is awarded to one or more graduate students in recognition of outstanding scholastic achievement in the field of algebra. Shivi graduated from the Indian Institute of Technology at Kanpur, India, with a major in computer science and engineering with a minor in mathematics. He came to Illinois in 2002, received his MS in 2003 and completed his prelims in 2006. He has been the recipient of a university fellowship and a Trijitzinsky fellowship. He has been writing a thesis on the

geometry of Lattice varieties under Professor William Haboush. Among other research accomplishments, he has computed the Weil zeta function of lattice varieties of small rank. This result will be the main component of a paper he is completing for publication.

Lois Lackner Mathematics Scholarship



Jana Marikova

Jana Marikova received the 2007–2008 Lois Lackner Mathematics Scholarship. Given for the first time in 2007 it is awarded to a female undergraduate or graduate student. Jana is a fourth year Ph.D. student working with Lou van den Dries in model theory. Jana is known as a very active seminar participant, and she recently published an article “Type-definable and invariant groups in o -minimal structures” in the *Journal of Symbolic Logic*. She published an earlier paper where she calculates the Grothendieck ring and dimension semiring for semilinear and semibounded sets. Currently she is working on measures in o -minimal expansions of real closed fields, and she has just submitted another paper, “The structure on the real field generated by the standard part map on an o -minimal expansion of a real closed field”.

Brahana TA Instructional Award



Timothy Kilbourn

Timothy Kilbourn and Melissa A. Simmons have been awarded the Brahana TA Instructional Award. **Timothy Kilbourn** is in his fifth year at the University of Illinois, studying applications of modular forms in number theory under Scott Ahlgren. His favorite course to teach is “A Mathematical World”, a course designed to show non-mathematics majors applications of mathematics including graph theory, coding theory, and voting theory.



Melissa Simmons

Melissa Simmons is a fifth-year graduate student studying number theory under the direction of Professor Bruce Reznick. She is currently working on generating functions and recursive sequences. Melissa loves to teach and has taught courses in Merit, traditional, and *Mathematica* formats. She received her Masters degree in the Teaching of Mathematics in 2004.

The Brahana TA Instructional Award was established in 2005 with funding from the H. Roy Brahana Fund. It is presented to graduate teaching assistants for exemplary teaching. A committee of faculty, graduate and undergraduate students determines the winners. Awards are based on classroom observation, comments from students, and a written report by the nominees describing their teaching goals.

Department TA Instructional Award



Eric Landquist

Eric J. Landquist and Samuel M. Kadziela have been awarded the Department TA Instructional Award. Scott Tichenor received an honorable mention. **Eric Landquist** is in his sixth year at the University of Illinois studying cryptography and computational algebraic number theory. For his thesis, he is studying the arithmetic and point counting methods of cubic function fields, and particularly in the bizarre unit rank 2 case,

under the direction of Professor Renate Scheidler of the University of Calgary and Professor Iwan Duursma locally. Eric enjoys teaching and has taught several different courses at Illinois, Virginia Tech, and a community college, both in the traditional and *Mathematica* formats, never failing to make his students, and Award Committee members, groan at his punny humor.

Samuel Kadziela is a fifth-year graduate student, working under the direction of Professor Iwan Duursma. He also received the Bateman Prize this year. His thesis is on rigid analytic uniformization of hyperelliptic curves. Samuel has accepted a three-year postdoc position at UC Irvine beginning in Fall 2007.

Scott Tichenor graduated in 1998 from Illinois with a Bachelor's degree in mechanical engineering. He worked as an engineer at Woodward Aircraft Engine Systems in Rockford, Illinois, for four years before deciding he wanted to teach mathematics for a living. In the fall of 2003, Scott returned to Illinois to enter the graduate program in mathematics. While enjoying the opportunity to teach several Calculus classes,

Scott has discovered an interest in differential geometry and looks forward to working with professors in the field, such as Stephanie Alexander. Outside of graduate school, Scott enjoys spending time with Stacy, his wife of 6 years, and their 22-month-old son Alexander.

The TA Instructional Award was established in 1979. It is presented to graduate teaching assistants for exemplary teaching. Awards are based on classroom observation, comments from students, and a written report by the nominees describing their teaching goals.

Bateman Fellowship in Number Theory



Sun Kim

Sun Kim was awarded the 2007–2008 Bateman Fellowship in Number Theory. Sun is currently a third-year graduate student in number theory at Illinois, where she has been the best student in almost all (or possibly all) of the several graduate courses in number theory that she has taken. She is a graduate of Korea University in Seoul, where her advisor was Youn-Seo Choi, the recipient of the first Bateman Prize in Number Theory. Sun has recently submitted her first paper for publication under the direction of her advisor, Professor Bruce Berndt. She is also currently preparing a paper for publication under the direction of Professor Kevin Ford.

Sun Kim is the sixth recipient of this award which is given to a graduate student actively working on his/her thesis. The Bateman Fellowship is named for Emeritus Professor Paul Bateman, who joined the Illinois Department of Mathematics in 1950. Bateman served as department head from 1965–1980.

Ando and Pahlajani receive LAS Excellence in Teaching Awards



Matt Ando received the 2006–2007 LAS Dean's Award for Excellence in Undergraduate Teaching. Matt (Ph.D. 1992, MIT) is an associate professor who joined the mathematics faculty at Illinois in 1999. Matt was recognized for his highly successful work with the "gateway" course Math 347

Fundamental Mathematics, as well as his efforts to develop new curriculum material for Math 213 Basic Discrete Mathematics and Math 198 Freshman Seminar. Student comments from ICES forms and letters of support praise his warm and caring personality, humor and strong rapport with his classes. He has appeared eight times on the Incomplete List of Teachers Ranked as Excellent since 2000 for undergraduate and graduate courses, including four times for Math 347.



Chetan Pahlajani was awarded the 2006–2007 LAS Award for Excellence in Undergraduate Teaching by a Graduate Student. Chetan came to Illinois in 1999 and completing his Ph.D. under the direction of Richard Sowers in the area of probability. Chetan was recognized for his success as an instructor in various

settings, especially for his work as the primary lecturer for large sections of Business Calculus (Math 234). Students past and present remember his classes fondly and give strong testimonials to the preparation which they received for later classes. He has appeared four times on the Incomplete List of Teachers Ranked as Excellent, including once with an "outstanding" rating.

Undergraduate students receive top awards

H. Roy Brahana Prize in Mathematics



David Edward Grayson received the H. Roy Brahana Prize in Mathematics which is awarded to a graduating senior in any discipline with a distinguished undergraduate career in mathematics. Though David will continue at Illinois for another year to earn his degree in Engineering Physics, he has already done the mathematics necessary to earn a degree in mathematics with essentially an A or better in every course. David has completed all of the honors sequence courses where he repeatedly distinguished himself as one of the most impressive students seen in years.

Major Award in Actuarial Science



Timothy Carl Goodson received the Major Award in Actuarial Science. In addition to graduating with distinction this May, Tim has already passed four professional actuarial exams, a significant achievement. He has done actuarial science internships with three different companies, and is also doing research on the state pension and retirement system with Illinois finance

professor Jeff Brown. Tim will be starting an actuarial position with Towers Perrin, a consulting firm, after graduation.

Major Award in Mathematics



Jack S. Scheff received the Major Award in Mathematics. Jack has received an A (or A+) in every math course he took at Illinois including most of the honors courses and a graduate course. He has also taken courses in physics, Chinese and music while earning a degree in math in the graduate prep option. He was a winner of the Bennett Scholarship in mathematics last year and was a finalist

for the Math Olympiad team. His instructors write that Jack has the ability to earn a Ph.D. at an excellent research university.

Major Award in Mathematics and Computer Science



Charles A. Blatti III received the Major Award in Mathematics and Computer Science. Charles is a senior in Mathematics and Computer Science. Charles entered as a Chancellor's Scholar, is a James Scholar, and has been on the Dean's List every semester at Illinois. Among other activities, Charles volunteers for the Champaign County Habitat for Humanity.

Major Award in Teaching of Mathematics



Jason Laurence Mead received the Major Award in Teaching of Mathematics. Jason has earned all A's in his 400-level math courses. He has won several awards including an Illinois Council of Teachers of Mathematics Scholarship, a University of Illinois College of Education William Chandler Bagley Scholarship and a James Newton Matthews Scholarship. He's also written an article on Game Theory and the Second Iraqi War published in *Defense and Security Analysis*.

Elizabeth R. Bennett Scholarship in Mathematics



Adam M. Hughes and Yui Hei Alfred Au have received the Elizabeth R. Bennett Scholarship in Mathematics which is awarded to one or two sophomores or juniors in mathematics based upon a student's GPA and strength of courses.

Adam Hughes is a math major who already has junior standing in his first year at Illinois due to proficiency credits. He has received A's in all of his math courses while taking the most demanding curriculum available to him. Adam is an active member of the Illinois Alpha Chapter of Pi Mu Epsilon, the national mathematics honor society.



Yui Hei Alfred Au is a junior actuarial science major. He is a James Scholar, and has passed two professional actuarial exams. He has worked as an actuarial intern for HSBC Insurance (Asia) Limited, where he analyzed life insurance and mortgage products. Alfred is on schedule to graduate in May 2008, after just three years at Illinois.

Emily Mann Peck Scholarship in Mathematics



Heather Ann Johnson received the Emily Mann Peck Scholarship in Mathematics which is awarded to outstanding undergraduate students majoring in mathematics based not only on high academic achievement but also for demonstrating characteristics that exemplified Dr. Peck's life and career: high personal standards of ethics, passion for teaching, well-rounded eclectic interest in life and a passion for the arts.

Heather is graduating with distinction in math after spending time as both an actuarial science student and in the teaching education program. She has been a highly active and effective member of the undergraduate math club MATRIX and an officer in Pi Mu Epsilon. This year she is also serving as the student representative in the department's Undergraduate Affairs Committee.

Actuarial Science Program continues success at Illinois

By Rick Gorvett, Assistant Professor

The University of Illinois' Actuarial Science Program, long one of the nation's premier programs, has been tremendously active over the last few years. The largest academic actuarial program in the United States, our program has grown significantly, with approximately 300 current graduate and undergraduate students.

Our students continue to be an impressive group, in much demand by both companies and consulting firms. A number of our students have passed three or four professional actuarial exams, experienced multiple internships, and performed outstandingly in the classroom. A recent development is an enhanced effort to get our students involved in research—several students have recently co-authored research papers with actuarial science faculty, in areas such as enterprise risk management.

One exciting opportunity for our students is the recent establishment and growth of the State Farm Research Center, which is located in the University of Illinois Research Park. This Center has already provided internship opportunities for dozens of our actuarial science students during the Fall and Spring semesters, as well as during summers. We have also contributed to the development of a new master's degree program in statistics, with a concentration in modeling and analytics.

Our thanks to our many alums and others who generously support our actuarial program. Donated funds have been used for such things as scholarships to some of our newer undergraduates, and for student gradership positions. You can help support the Actuarial Science Program through your contributions—see the giving form on page 11.

About the author: Rick Gorvett is the Director of the Actuarial Science Program, and the State Farm Companies Foundation Scholar in Actuarial Science, at the University of Illinois at Urbana-Champaign.

Graduate program holds first graduate preview day

by Steven Bradlow, Director of Graduate Studies

For the first time, the department organized a Graduate Preview Day. Intended for prospective new students in our M.S. and Ph.D. programs, the event showcased the range of opportunities available in our department and introduced the visiting students to our faculty and graduate students. The goal was to improve our success rate in attracting the best applicants and to ensure that those who accept our admission offers are well-suited to our graduate programs—thus destined for success.

This year we received 305 applications for fall admission to our Ph.D. program. We expect the incoming class to be a diverse and talented group.



Students attending Graduate Preview Day take a tour of the Altgeld Hall chimes tower.

Illinois places 27th in the 2006 Putnam competition

A total of 3640 students participated in the 67th annual William Lowell Putnam Competition, held December 2, 2006. The team contest was won by Princeton, followed by Harvard, MIT, the University of Toronto, and the University of Chicago. The University of Illinois Putnam team, consisting of **Sander Parawira, David Grayson, and James Arnemann**, placed 27th among the more than five hundred participating colleges and universities. This is the highest ranking of an Illinois Putnam team since 2002, higher than the U.S. News and World Report ranking of the University of Illinois (41st), and much higher than the end-of-season rankings of the Illinois football and basketball teams (108th and 50th, respectively).

The Putnam contest, which has been called by Time Magazine the "World's Toughest Math Contest", consists of 12 challenging problems, to be solved over 6 hours. Each problem is graded on a 0–10 point scale, for a maximal total score of 120 points. Eleven Illinois students participated in the Putnam. The top scorers among the local participants were Sander Parawira, James Arnemann, David Grayson, Benjamin Kaduk, Matthew Krafczyk, and Aaron Wittrig.

Kaduk wins 2007 U of I Undergraduate Math Contest

Nineteen students participated in this year's U of I Undergraduate Math Contest, which took place April 14. The winner was **Benjamin Kaduk**, a Senior in chemistry and mathematics, with 55 out of a possible 60 points. **Walter Faig**, a Senior in mathematics, was second, with 45 points. **Sander Parawira**, a Junior in electrical engineering and winner of last year's contest, and **David Ho**, a Freshman in electrical engineering, tied for third place, with 32 points each.

Grayson, Pillay, Robinson and Ullom retire from department



Anand Pillay studied mathematics and philosophy at Balliol College, Oxford, went on to do a M.Sc. in pure mathematics at King's College, London, and subsequently a Ph.D. in 1978 at Bedford College, London, in the area of model theory. After postdoctoral and visiting appointments in Paris VII, Manchester and McGill, he went to the University of

Notre Dame as an Assistant Professor in 1983. In 1996, he moved to the University of Illinois at Urbana-Champaign as a Swanlund Chair in the mathematics department.

Pillay has worked on model theory (a branch of mathematical logic) for all of his career. He began his research in "pure" model theory. His thesis was around the number of countable models of countable theories. He then worked in stability theory, influenced by the Parisian school, and over the years played a role in the foundations of geometric stability theory, o-minimality, and simple theories. He has also pursued connections between model theory and other parts of mathematics, including Nash manifolds and groups, differential algebra (or the algebraic theory of differential equations) in the style of Ellis Kolchin, diophantine geometry, and more recently the classification of compact complex manifolds. He has published around 150 papers, written three books, and edited several others. He spoke at the International Congress of Mathematicians in 1994, and was awarded the Humboldt Stiftung Research Prize in 2001.

Pillay has had eleven students completing their Ph.D. under his supervision, including five at Illinois.

In 2005, Pillay returned to England. He is based at the University of Leeds where he holds a Marie Curie Chair (2005–2008) supported by the European Union.



Derek Robinson received his B.Sc. from Edinburgh University, where he was awarded the Napier Medal in 1960, and his Ph.D. from Cambridge University in 1963, working under the supervision of Philip Hall. He held a postdoctoral position at Illinois and was then a Lecturer at the University of London. In 1968 he joined the Department of

Mathematics at Illinois where he has been Professor since 1973.

Professor Robinson's research area is the theory of groups and its connections with other branches of algebra; in particular he has made many contributions to the theory of infinite solvable groups. He has also been a pioneer in the use of homological methods to solve problems in group theory. He has published more than 100 research articles and 5 books. He has supervised the dissertations of 11 Ph.D. students.

Professor Robinson was awarded the Sir Edmund Whittaker Prize by the Edinburgh Mathematical Society and a Senior Scientist Award by the Alexander von Humboldt Foundation. He has been a Beckman Scholar and was twice named an Associate at the Center for Advanced Study at Illinois. He was W.W. Boone Distinguished Research Professor in the Mathematics Department at Illinois 2003–2005. He is a founding editor of the *Journal of Group Theory* and is an editor of *Ricerche di Matematica*. He was a co-editor, with Professor P.A. Griffith, of the Reinhold Baer Centenary volume, published by the *Illinois Journal of Mathematics* in 2003.

Professor Robinson has been a visiting faculty member at the Universities of Florence, Freiburg, Naples, Padua,

In memoriam

Frank B. Knight—1933–2007



After receiving his Ph.D. from Princeton University in 1959, Frank Knight joined the mathematics department of the University of Minnesota. In 1963, he was hired by Illinois and served on its faculty until his retirement in 1991. He died on March 19, 2007.

Frank Knight's contributions to probability theory are numerous. One example is his introduction and development of what he called the prediction process. The American Mathematical Society's MathSciNet lists over 100 papers in response to the phrase Ray-Knight.

The Ray and Knight compactifications are important pillars of modern probability theory. In addition to his research papers and books, he wrote at least 22 book reviews. These he reprinted in *Collected Book Reviews by F. B. Knight in Probability Theory*, 53 pages in all.

Frank married Ingeborg Belz on July 30, 1970. She survives as do their three children, Marion, Ellen, and Mark; their granddaughter, Chloe; and Frank's younger brother, Charles Knight of Boulder, Colorado, who often joined his older brother on hikes in the Rocky Mountains.

Frank was an avid mountain climber in North and South America and the Alps, including the Matterhorn and some of the highest mountains in Peru. He was also a regular Saturday

Valencia, Warwick and Wurzburg, and also at the National University of Singapore and at Queen Mary and Westfield College, University of London.

Professor Robinson has served on numerous committees in the Department of Mathematics, including the Executive Committee, Promotion and Tenure, Undergraduate Affairs, Graduate Affairs and, most recently, the Committee to select the Department Chair in 2006.



Stephen Ullom joined the Illinois Department of Mathematics in 1970 and was promoted to full professor in 1978. He did his undergraduate work at American University and received his Ph.D. from the University of Maryland in January, 1968. His thesis in algebraic number theory was written under the direction of Sigekatu Kuroda. He held a

one-semester postdoctoral position at Maryland followed by an NSF Postdoctoral Fellowship (1968–1969) at University of Karlsruhe, Germany, and King’s College, London, where his mentors were W. Leopoldt and A. Fröhlich, respectively. This was followed by a year as member of the Institute for Advanced Study at Princeton. His research there was influenced by lectures of K. Iwasawa and G. Shimura. Ullom spent valuable sabbatical leaves from Illinois at King’s College, London, and Cambridge University with a shorter visit to the University of Arizona.

In the 1970’s Ullom’s research centered on the properties and computation of the projective classgroup of the integral group ring of a finite group. He wrote a series of articles (several with Irv Reiner) that combined representation theory with algebraic number theory. Ullom settled a question of Kervaire and Murthy on the classgroup of the group ring of a cyclic p -group by an application of Iwasawa theory. Since then Ullom and some of his students have studied the Galois group of p -extensions of

number fields with restricted ramification. Presently Ullom with Marcin Mazur (former Doob Assistant Professor) is classifying the Galois module structure of the units in some particular extensions.

Five students completed their thesis under Ullom’s direction, the last two of which were coadvised by Nigel Boston.

After retirement Ullom will continue his research in number theory. On the nonmathematical side, he has a garden with his wife in the Organic Gardening program at Meadowbrook Park, Urbana.



Daniel R. Grayson, Professor of Mathematics, received his B.S. and M.S. in Mathematics from the University of Chicago in 1972, received his Ph.D. from MIT in 1976, served as a Ritt Assistant Professor at Columbia University 1976–1981, and joined the Illinois Department of Mathematics in 1981. His main research interest is algebraic K -theory (basically the study of

very large matrices of polynomials via combinatorial topology) and especially its connection to algebraic geometry, motivic cohomology, and number theory. He also develops mathematical software: he was one of the original eight authors of *Mathematica* in 1988, and he and Michael Stillman have developed software called “Macaulay 2” that supports research experiments in algebraic geometry. His research has been funded continuously by the National Science Foundation, and he has been active in organizing mathematics conferences. He has advised six Ph.D. graduates. He won the College of LAS Prokasy Award for Excellence in Undergraduate Teaching in 1990 and was appointed University Scholar by the campus 1985–1988. He has served on the executive committee of the department, on the promotion and tenure committees of the department, college, and campus, and as chair of the department.

hiker, along with Doob, Haken, and others. Frank was a good pianist, playing mostly in his home. The concerts that he enjoyed the most were those devoted to baroque music. A more detailed obituary is available on the web at http://www.math.uiuc.edu/People/knight_memoriam.html.

Eberth Alarcon—1966–2006

Eberth Alarcon died September 26, 2006. He received his Ph.D. under the direction of Kenneth Stolarsky at Illinois in 1995. After teaching for a year at St. Mary’s College of California, he joined the faculty at the University of Wisconsin at Eau Claire. He taught mathematics at all

levels, but especially enjoyed his work in the summer Bridge program at the university, an interdisciplinary program designed for new students at high risk of academic failure. Loved and admired by colleagues and students alike, Eberth was described as the kind of teacher who could explain abstruse mathematical theories in words most students could understand.

He is survived by his wife, Asha Sen; his parents, Matilda and Eberth Alarcon, Sr.; and his sisters, Bianca Alarcon and Jessica Pace. A scholarship in his name has been established at the UW-EC Foundation at the University of Wisconsin-Eau Claire.

Accessing the Illinois experience through online math courses

by Debra Woods, Director of NetMath

“Increase and excel in distance learning” is one of the strategic goals of our campus. The good news is that the math department has a strong presence in the online community—the math department at Illinois has been involved in online learning since 1991. However, we also have the need to increase our efforts. We might begin by making ourselves knowledgeable of existing programs and the need for expansion. Here are some frequently asked questions.

Q: What courses are taught online?

A: Undergraduate: Math 016 Algebra and Trigonometry, 220 Calculus, 225 Introductory Matrix Theory, 231 Calculus II, 234 Calculus for Business (both with and without *Mathematica*), 241 Calculus III, 380 Advanced Calculus, 385 Intro Differential Equations, 415 Linear Algebra and 461 Probability Theory.

Graduate: Math 488 Math Methods in Engineering, Math 446 Applied Complex Variables (new), and about fifteen Math Teacher Link mini-courses (Math 490). There are also two new courses under development by Tony Peressini for the Online Engineering Education program: Math 484 Nonlinear Programming and 587 Optimization by Vector Methods.

Q: What online programs does the math department have?

A: NetMath and Math Teacher Link are the online programs in the math department.

Q: Do all of the online courses use *Mathematica*?

A: No. Currently the undergraduate courses use *Mathematica* because the *Calculus&Mathematica* courses lend themselves to being excellent tools for teaching and learning in an online environment. Math 488 Math Methods in Engineering and Math 446 Applied Complex Variables either don't use *Mathematica* or have minimal use of the software depending on the instructor. There are fifteen Math 490 Advanced Topics in Math courses for teachers of which only three use *Mathematica*.

Q: Who is currently involved in online learning in the math department?

A: Tom Anderson, Tom Carty, Rick Gorvett, Tony Peressini, Jerry Uhl and Debra Woods in addition to a team of graduate students and undergraduates who grade and do online tutoring.

Q: How is online math involved in the Global Campus Initiative?

A: This is still unclear. The NetMath team is currently investigating possible collaboration with the Global Campus.

Q: How is online math affiliated with other campus online initiatives?

A: Some of the courses are offered through the Office of Continuing Engineering Education (OCEE) in the College of Engineering. OCEE offers online master's degree programs in most engineering fields. Debra Woods is on the Online Advisory Committee through Academic Outreach, the Committee on Extended Education and External Degrees (CEEED) and the Symposium on Online Education Planning Committee.

Q: What plans does the department have for future online programs?

A: Our marketing analysis has shown a need for online master's programs in applied math. Possibilities include actuarial science, applied math for teachers and applied math for engineers.

Q: Who takes our online courses?

A: Students from all over the world. There are students from industry, other universities, UIUC, the armed services and various high schools.

Q: How many students are taking online math courses in math?

A: So far since September, there have been over 380 enrollments in math online courses. There will be a substantial number of new enrollees in the summer session.

Did you know?

A few facts about online math students

- ▶ There are currently students from 35 different states and 6 different countries taking online math courses through University of Illinois at Urbana-Champaign. About 1/10th of the online students are in the military.
- ▶ There is an online student taking Math 241 on a nuclear submarine in the western Pacific.
- ▶ A former Netmath student graduated with a Ph.D. in aerodynamics from MIT and invented a flying car.
- ▶ One homebound Netmath student currently mentors other online students as a NetMath employee in Montana.
- ▶ A professional baseball player with the Texas Rangers is taking a NetMath class.
- ▶ Several online math students are taking courses while on active duty in Iraq and Afghanistan.
- ▶ Five high school and community college math teachers have completed one or more Math Teacher Link short courses while they were on leave for maternity or to care for terminally ill parents.
- ▶ Four students serving with the military in Iraq and Afghanistan during the last two years completed Math 488 through OCEE and one of these students completed his masters program in mechanical engineering last semester.



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Graduate students play vital role

Our graduate students continue to play a vital role in both the teaching and the research agendas of our department. Recent noteworthy achievements include:

- ▶ Number theory student **Tim Huber** spoke at the joint AMS/MAA meeting in New Orleans in January.
- ▶ **Jennifer Paulhus** participated in an invitation-only workshop on Explicit Methods for Rational Points on Curves held in February at the Banff International Research Station.
- ▶ **Jana Marikova** gave an invited talk at the Association for Symbolic Logic Annual meeting, and spoke in the Logic Seminars at Notre-Dame and at the University of Illinois in Chicago. Her second paper appeared in the March issue of the *Journal of Symbolic Logic*.
- ▶ Analysis student **Ana-Maria Popa** gave an invited talk at the Great Plains Operator Theory Seminar (GPOTS) at the University of Iowa.
- ▶ **Isaac Goldbring** spoke at the Graduate Student Conference in Logic held at the University of Wisconsin, Madison.
- ▶ Logic student **Ayhan Gunaydin** spoke at the European Model Theory network (MODNET) meeting in Antalya, Turkey and published a paper with his thesis advisor, Professor Lou van den Dries, in the *Proceedings of the London Mathematical Society*.
- ▶ **Eric Landquist** gave talks at the Midwest Number Theory Conference for Graduate Students held here in Champaign, and at a Cryptography workshop at the University of Wyoming.
- ▶ Applied topology student **Valerie Peterson** published a paper with her thesis advisor, Professor Robert Ghrist, in the *Journal of Advances in Applied Mathematics*.
- ▶ **Evan VanderZee**, a 2006–2007 Computational Sciences and Engineering (CSE) Fellow, presented his research in invited talks at the 2007 University of Illinois CSE Annual Research Symposium and at the 2007 Society for Industrial and Applied Mathematics (SIAM) CSE Conference.
- ▶ First-year number theory student **Atul Dixit** had a dual-author paper accepted for publication in the *Journal of Mathematical Analysis and Applications*.

The Math Times

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***Illinois Journal of Mathematics* publishes special volume in honor of Joseph Doob**

The *Illinois Journal of Mathematics* has published a special volume of invited articles to honor the memory of Joseph Leo Doob (1910–2004). As a founding editor of the IJM, Doob was instrumental in getting the journal started in 1957 at Illinois and acquire a reputation as one of the leading mathematics journals of the time.

The Doob volume, edited by Illinois Professor Emeritus Donald Burkholder, contains 31 invited articles by leading figures in probability, analysis, and other areas to which Doob has made lasting contributions.

To ensure broadest circulation, the volume is made available in three forms: as four regular journal issues comprising the entire 2006 volume of the IJM; as a standalone book, published in March 2007 under the title *Joseph Doob: A Collection of Mathematical Articles in His Memory*, ISBN 0-9746986-1-x, and made available for purchase by individuals and libraries; and in electronic form at the IJM website, where the articles can be freely downloaded, in pdf and ps formats (<http://www.math.uiuc.edu/ijm/>).

In keeping with the tradition of the *Illinois Journal of Mathematics* as a low cost leader in mathematical publishing, the standalone version of the Doob volume is being sold at cost at \$50 for the 1000 page book. The Doob volume is the second in a new series of standalone books published by the IJM. The inaugural volume in this series, *The Mathematical Legacy of Reinhold Baer* (Phillip Griffith and Derek Robinson, Editors, 2004; ISBN 0-9746986-0-1), features a collection of invited articles in group theory and allied areas to mark the centenary of the birth of Reinhold Baer (1902–1979), a co-founder of the IJM. A third volume, dedicated to Phillip Griffith, is scheduled to appear later this year.

