

Math



Times

Department of Mathematics, Spring 2009

Record attendance at AMS meeting held on U of I campus

On March 27–29, 2009 the Department of Mathematics of the University of Illinois at Urbana-Champaign hosted a sectional meeting of the American Mathematical Society (AMS).

The meeting attracted an unusually high attendance. With 588 registered participants, it was the largest AMS sectional meeting ever and it has surpassed the previous record of 559 registered participants set by the 2005 Nebraska sectional meeting. The Erdős Memorial Lecture on Saturday, March 28, was delivered to a packed audience of about 230–250 people.

The meeting included 22 special sessions on a variety of mathematical topics as well as a contributed papers session. The special session talks were held in Altgeld Hall and in Noyes Lab. The meeting also included three AMS Invited Addresses, delivered by professors Akshay Venkatesh (New York University-Courant Institute), Gilles Pisier (Texas A&M University) and Jacob Lurie (Massachusetts Institute of Technology) as well as an annual AMS

Erdős Memorial Lecture, delivered by Jeffrey Lagarias (University of Michigan) and entitled *From Apollonian Circle Packings to Fibonacci Numbers*.

The Chancellor of the University of Illinois at Urbana-Champaign, Richard Herman, addressed the AMS meeting participants before the first plenary talk on Friday, March 27. The Mathematics Department hosted a reception for the participants of the AMS meeting on the evening of Saturday, March 28, in the South Lounge of the Illini Union.

The AMS meeting was immediately preceded by two conferences also hosted by

our department: the Illinois Number Theory Celebration (March 25–26) and the Illinois/Missouri Applied Harmonic Analysis Seminar (March 27).

The AMS Secretary for this meeting was Susan Friedlander and the local organizing committee consisted of Ilya Kapovich (Chair), Kim Whittlesey (logistics manager) and Jeremy Tyson.

Despite some challenges, such as the sudden closure of the Historic Lincoln Hotel three days before the start of the meeting, the AMS meeting at Urbana was quite a success and it helped raise the national profile of our department and the university.



Above: Jacob Lurie of MIT presents his invited lecture.



Left: A full house attends the Erdős Memorial Lecture given in 314 Altgeld Hall by Jeffrey Lagarias from the University of Michigan.

Photographs are used courtesy of Adam Coffman, Professor, Indiana University–Purdue University Fort Wayne.

University of Illinois at Urbana-Champaign



Department hosts three additional conferences this spring

Illinois-Indiana Symplectic Geometry Conference

The University of Illinois Department of Mathematics hosted the third Illinois-Indiana Symplectic Geometry Conference on the weekend of March 14–15. The six invited lecturers were researchers from around the country whose work is at the forefront of recent developments in the field. Their talks, which covered a broad range of topics from low dimensional topology to enumerative geometry and Hamiltonian dynamics, illustrated the breadth and depth of this active field.

The goal of this biannual meeting is to foster interactions between researchers and graduate students throughout the midwest, by bringing them together for a weekend of discussion and collaboration centered around the lectures of the speakers.

Support for the conference was provided by the National Science Foundation and the U of I Department of Mathematics. The conference organizers are Olguta Buse (IUPUI), Richard Hind (Notre Dame), Ely Kerman (U of I), Yi-Jen Lee (Purdue), Eugene Lerman (U of I), and Susan Tolman (U of I).

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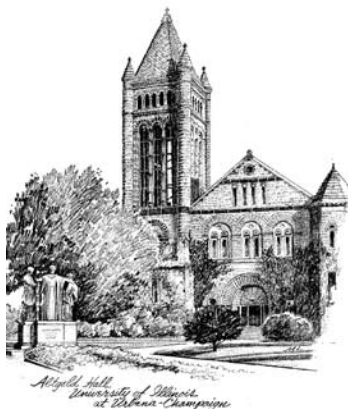
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Illinois Number Theory Celebration

On March 25–26, 2009, nearly one hundred mathematicians gathered on the campus of the University of Illinois at Urbana-Champaign for the Illinois Number Theory Celebration, a meeting to celebrate the 90th birthday of Paul Bateman and the 70th birthday of Bruce Berndt, two long-time faculty members at Illinois.

The meeting, organized by Professors Harold Diamond, Kevin Ford, and A.J. Hildebrand, featured twelve invited talks given by friends, colleagues, and former students of Paul and Bruce. It also served as a homecoming event for many former students of Paul, Bruce, and the other members of the Illinois number theory research group.

For more information about the Illinois Number Theory Celebration, visit the conference website: <http://www.math.illinois.edu/intc2009/>.

Illinois/Missouri Applied Harmonic Analysis Seminar

Each semester, harmonic analysts and signal processing engineers from the University of Illinois meet with colleagues from around the midwest at the Illinois/Missouri Applied Harmonic Analysis Seminar. Their purpose: to discuss current research and plan for the future.

This semester's meeting took place on March 27 and featured addresses by John Benedetto (Director of the Norbert Wiener Center at the University of Maryland), Emmanuel Candes (Ronald and Maxine Linde Professor, California Institute of Technology), and Yoram Bresler (Professor of Electrical Engineering at the University of Illinois).

The talk by Candes, for example, explained how to predict missing data in partially completed surveys or in rating problems like the Netflix Prize (worth a million dollars). The key is linear algebra—one must study large matrices of low rank, where “large” means perhaps a million rows and tens of thousands of columns, but only about thirty of the columns are linearly independent.

The Seminar series was founded in 2006 by U of I professors Richard Laugesen (Mathematics) and Minh Do (Electrical Engineering). Funding comes from the National Science Foundation and the Institute for Mathematics and its Applications.

From the department chair

Greetings to the alumni and friends of the Department of Mathematics! Please keep in touch and tell us what you've been doing. We'll keep you connected with current news and provide articles of interest.

In this issue, we inform you about awards, honors, and activities of current and past members of the department. Of particular note is Bruce Berndt's appointment as a Professor in the Center for Advanced Study, which is one of the highest forms of campus recognition bestowed on a faculty member. This issue also highlights other exciting departmental activities including the AMS meeting recently held on our campus with record-setting attendance.

I am very proud of our faculty, students, staff, alumni, and friends, who together make our math department a vital place. We have accomplished much individually and together. Thank you for your support of the Department of Mathematics!

Sheldon Katz
Chair, Department of Mathematics
University of Illinois at Urbana-Champaign



Alumnus Profile: David Hays

By Jim Dey

When David Hays enrolled as a freshman at the University of Illinois way back in 1974, he thought he had his academic future all figured out.

But he recalls that “one class in chemistry” disabused him of the idea that he would be a chemical engineer, prompting him to look elsewhere. Math and teaching interested him, so Hays majored in teaching math in secondary education with a minor in accounting.

He taught high school for two years after his 1978 graduation, but a chance opportunity prompted him to take his mathematics background to a job in the actuarial department at State Farm Insurance in Bloomington. Nearly 30 years later, the 53-year-old Hays is vice president and actuary for State Farm, overseeing a department of 100-plus employees charged with doing the work necessary to determine what the company charges for automobile, homeowner’s and commercial insurance.

“It’s been a very rewarding career,” he said. “It’s challenging. It’s been good to me, and I’ve been good to it, I hope.”

Hays jokes that he bleeds “Orange and Blue,” and it’s no surprise given his geographic and family closeness to the University of Illinois.

He grew up in Monticello, a small Piatt County community roughly 20 miles from the U of I, as the youngest of eight. His parents and six of the eight kids in his family have U of I degrees, as does his wife, Pamela, an accountant who graduated from the U of I’s College of Commerce.

Hays said it was “pretty well determined” that he would go to the U of I, just as his two sons, Alexander and Allen, would as well. Alexander graduated from the U of I with a degree in engineering and works for Caterpillar in Peoria while Allen is a senior majoring in finance.

“A degree from the University of Illinois not only opens doors, but it was a bargain, 30 years ago and today for my children,” he said.

Hays recalled that he enjoyed teaching and “wasn’t actively looking to leave it.” But he said a tip from a friend prompted him to interview for a position as an actuarial trainee at State Farm. He said his math background was helpful to being hired, as was being interviewed by another U of I alum who liked him and ultimately became his mentor.

Hays said that his math education taught him “critical thinking and problem solving” and that his other LAS studies boosted his communications skills. He described the training to be an actuary and passing the necessary tests as difficult and sometimes humbling, but “I stuck with it, finished and I haven’t looked back since.”

Hays said his work as an actuary at State Farm involves “applying mathematics concepts to business problems.” If that sounds complicated, he said his job boils down to answering the question, “How much do I charge for an insurance contract?”



David Hays

Education: B.S., Mathematics, 1978,
University of Illinois at Urbana-Champaign

Career: Vice President and Actuary,
State Farm Insurance, Bloomington, Illinois

“You need to have the resources to fulfill that promise to pay,” he said. “You may pay a loss. You may not. You don’t know what the value of a claim may be.”

He calls it “predictive modeling,” a concept that can be applied to a variety of subjects including insurance. A former high school baseball coach, Hays said “predictive modeling” can also be used to evaluate baseball talent, as was discussed in one of his favorite books, “Moneyball” by Michael Lewis.

Hays has made it a point since his graduation to stay close to the University of Illinois. He is a member of two corporate advisory boards—actuarial science and insurance—to the U of I faculty and is scheduled to join the LAS Alumni Board in May.

Hays said one of his proudest achievements came in 2005 when he helped open the State Farm Research Center, which is located at the U of I’s Research Park southwest of the Assembly Hall.

Hays said the center is a place where State Farm employees and U of I students work together to support company programs with high-level research. The center’s state-of-the-art tools are intended to encourage innovation and complement traditional classroom studies. He said it also is a valuable tool in recruiting U of I students to come work for State Farm.

Hays described the research center, like his other U of I activities, as “mutually beneficial” to the U of I as well as his employer.

“I bleed Orange and Blue. But I also bleed Red and White for State Farm,” he said.

Awards

Campus and College of Liberal Arts and Sciences Awards

Bruce Reznick received the 2008–2009 LAS Dean’s Award for Excellence in Undergraduate Teaching, as well as the Campus Award for Excellence in Undergraduate Teaching. Reznick (Ph.D. 1976, Stanford) is a professor who joined the mathematics faculty at the University of Illinois in 1979. His research interests involve combinatorial methods in algebra, number theory, analysis and geometry. He has taught courses at all levels and is responsible for the development of the highly successful honors seminar on undergraduate research, MATH 496. Bruce is highly praised by his students for his efforts, having appeared 37 times on the List of Teachers Ranked as Excellent. Reznick has also contributed to undergraduate education beyond the U of I mathematics department. He has served as a mentor for the LAS Teaching Academy, he was a member of the AMS and MAA Committee on Teaching Assistants and Part-Time Instructors, and has periodically done consulting for the MAA’s “Project NExT”, a professional development program for new or recent Ph.D.s in the mathematical sciences.

Kathy Wahl has received both the LAS Dean’s Award and the Campus Award for Excellence in Undergraduate Teaching by Instructional Staff. An instructor in our department for thirty years, Kathy became the math coordinator of the Transition Program in 1986. The Transition Program annually enrolls approximately one hundred students with good academic potential who are at risk because of having attended high schools that do not provide adequate preparation for the rigors of University of Illinois courses. Kathy’s welcoming personality, patience in explaining new concepts, and the genuine pleasure she experiences from her students’ success all lead to a sense of accomplishment and self-confidence in her students. Their positive reaction to Kathy is reflected in her 32 appearances since 1997 on the List of Teachers Ranked as Excellent, the most of any instructor in the math department. For having made a genuine difference in the lives of many of her students, Kathy is most deserving of the awards she has received.

Alison Ahlgren has received both the LAS Academic Professional Award and the Chancellor’s Academic Professional Excellence Award (CAPE). Alison has been an academic professional in the department for six years, serving initially as the Coordinator of Quantitative Reasoning Courses. In this role she advises, mentors, observes, and regularly meets with the teaching assistants for Math 012, 119, 181, and 124 to develop their teaching skills, build classroom rapport, and create effective assessment tools: homework assignments, group projects, quizzes, exams, etc. At this time, Alison supervises approximately 25 TAs per year. She is also responsible for the content and the implementation of technology innovations in these courses. Over the past two years Alison has been overseeing the creation of the ALEKS Math Placement Exam now being used by the university and has taken on the additional role of Coordinator of the U of I Math Placement Program. Alison’s diligence, indeed some would say tenacity, in implementing and maintaining this program has brought praise to the department from many on this campus. Due to Alison’s efforts the University of Illinois is now viewed nationally as a leader in the area of math placement.

Department of Mathematics Awards

Each spring, the department presents awards for outstanding achievement to faculty, instructional staff, graduate students and undergraduate students. Funding for these 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.illinois.edu/gifts/.

FACULTY AND INSTRUCTIONAL STAFF AWARDS

N. Tenney Peck Teaching Award in Mathematics

M. Burak Erdogan has been awarded the 2008–2009 N. Tenney Peck Teaching Award in Mathematics. Erdogan (Ph.D. 2001, Caltech) has been an assistant professor in the University of Illinois mathematics department since 2004. While at the U of I he has taught a variety of intermediate and higher level courses including Linear Algebra, Real and Complex Analysis, and Differential Equations as well as graduate courses in analysis, his research area. Erdogan’s devotion to teaching is evident in his well-prepared lectures and his availability to his students outside the classroom. This has resulted in two well-deserved appearances on the List of Teachers Ranked as Excellent.

The N. Tenney Peck Teaching Award in Mathematics is named for N. Tenney Peck, who joined the U of I Department of Mathematics in 1968 and remained on the faculty until his death in 1996. Peck was a pioneer in the field of functional analysis, specializing in non-locally convex spaces. He was also a dedicated teacher with an open door for students and active in curriculum development. The award is given to tenure-track faculty in the Department of Mathematics for exemplary teaching.

Distinguished Teaching Award in Mathematics for Tenured Faculty

C. Ward Henson has been awarded the 2008–2009 Distinguished Teaching Award in Mathematics for Tenured Faculty. Henson (Ph.D. 1967, MIT) is a professor who joined the mathematics faculty at the University of Illinois in 1975. His research interests are in logic, and he has played a major role in developing and maintaining the department’s Ph.D. program in Logic since joining the department. Henson places equal importance on undergraduate education. He was on the team that developed the current honors sequence in mathematics, and was also one of the first to bring the “active learning” approach to calculus at the U of I. Henson is a popular teacher who has appeared on the List of Teachers Ranked as Excellent eight times since 1997.

The Distinguished Teaching Award in Mathematics for Tenured Faculty was established by the Department of Mathematics in 2007. It is given to tenured faculty in the Department of Mathematics for exemplary teaching. A committee of faculty and students determines the winners based on classroom observation, comments from students, and a written report by the nominees describing their teaching goals.

Distinguished Teaching Award in Mathematics for Non-Tenure-Track Faculty

Jennifer McNeilly has received the Distinguished Teaching Award in Mathematics for Non-Tenure-Track Faculty. Jennifer has recently taught lecture sections of Math 115, Preparation for Calculus, Math 220, Calculus, and Math 012, Algebra. These courses are traditionally difficult ones in which to receive high student evaluations, yet Jennifer has appeared on the List of Teachers Ranked as Excellent eight times. Jennifer played a key role in the development of Math 115 and has taught the course every semester since its creation with one exception. She also serves as Director of the Math Merit Workshop program and is a co-Principal Investigator on an NSF grant supporting that program.

The Distinguished Teaching Award in Mathematics for Non-Tenure-Track Faculty is given to instructors in the Department of Mathematics for exemplary teaching. A committee of faculty and students determines the winners based on classroom observation, comments from students, and a written report by the nominees describing their teaching goals.

UNDERGRADUATE AWARDS

H. Roy Brahana Prize

Established in 1961, the H. Roy Brahana Prize is the department's longest running and most prestigious undergraduate award. It recognizes the student with "the most exceptional undergraduate mathematics career." Many former Brahana Prize winners have moved on to illustrious careers, both within and outside of mathematics.

This year's Brahana Prize was awarded to **Richard A. Moy**, a junior in mathematics and recipient of the "Most Outstanding Major in Mathematics" award in 2008. Richard has a perfect 4.0 GPA, earning a grade of A+ in nearly all of his courses, a performance that is all the more remarkable as his courses include the most challenging courses available in the undergraduate curriculum. In addition to his exceptional course work, Richard is also establishing himself as a formidable problem solver. A member of the U of I Putnam Team, he received the second highest score among local participants in the 2008 Putnam Contest.

Most Outstanding Major Awards

Established in 1996, these departmental awards recognize outstanding undergraduate students in each of the four majors offered by the department.

Most Outstanding Major Award in Actuarial Science

Kathy Y. Gu and Laura P. Zahn received the award for the most outstanding major in Actuarial Science.

Kathy Y. Gu has passed four professional actuarial exams, had two company internships, served as a research associate with Professor Rick Gorvett on the mathematics and economics of public pension financing, and has been the vice president of company relations for the Actuarial Science Club. Kathy is a Chancellor's Scholar and was a recipient of the national Casualty Actuarial Society Trust Scholarship. After graduating this May, Kathy will be working as an actuary at Zurich Insurance in Schaumburg.

Laura P. Zahn has a 4.0 GPA and has passed four professional actuarial exams. She has also had two company internships, been an officer in the Actuarial Science Club, and served as a research associate with Professor Rick Gorvett on neuroeconomics and its potential applications to actuarial science and risk management. After graduating in May, Laura will be working as an actuary at Northwestern Mutual.

Most Outstanding Major Award in Mathematics

The award for the most outstanding major in Mathematics was given jointly to Esther Chiew and Ying Li.

Esther Chiew is a senior in mathematics with a concentration in Operations Research. She maintained a near perfect GPA through her undergraduate career and will be graduating this May. This fall she will be going to graduate school at Cornell University.

Ying Li, a junior in mathematics, is also concentrating in Operations Research. While taking courses in the rigorous Math Honors program, she has managed to maintain a perfect 4.0 GPA.

Most Outstanding Major Award in Mathematics and Computer Science

Matthew D. Michelotti, a junior, received the award for most outstanding major in Mathematics and Computer Science. Matthew has a perfect 4.0 Math/CS GPA, and received a grade of A+ in twelve of his Math/CS courses.

Most Outstanding Major Award in the Teaching of Mathematics

The award for most outstanding major in the Teaching of Mathematics was given to **Jeffrey Allen Mudrock**. Jeff is a junior who has maintained a perfect GPA while taking on a challenging course load that includes several honors level courses. He participated in two REU (Research Experience for Undergraduates) programs at Illinois State University, and he presented original research resulting from these programs at the 2009 Joint Mathematics Meetings in Washington, DC.

Emily Mann Peck Scholarship

Established in 2002 in honor of Emily Mann Peck, a former mathematics faculty member and LAS Associate Dean, the Emily Mann Peck Scholarship recognizes a student in mathematics who, in addition to academic excellence, displays a well-rounded personality with eclectic interests and a passion for the arts.

This year's award went to **Brent Nelson**, a junior with a double major in Mathematics and Physics. Brent was a recipient of the Elizabeth Bennett Scholarship in 2008. He is a member of the Campus Honors Program and has maintained a perfect GPA, while taking on a rigorous course load. Outside the classroom, Brent has served as a tutor for the past six years on subjects ranging from geometry to differential equations. He believes he has inherited his passion for teaching from his grandfather, who was a high school math teacher. A self-taught guitarist for five years, Brent began this year to take formal guitar lessons at Allen Hall. He has been drawing and painting since his youth, and has taken formal art classes both in high school and at the University of Illinois.

Awards

Elizabeth R. Bennett Scholarship

The Elizabeth R. Bennett Scholarship, established in 1972, recognizes outstanding students at the junior level and below. This year's award was given jointly to Justin Kopinsky, Ainul Shafiqah Shafie, Ken Stalkfleet, and Stephen Theis.

Justin Kopinsky, a Math/CS major, is among the most exceptional undergraduate students we have had in mathematics in the past few decades. Even though this is only his first year at Illinois, Justin has already covered much of the required course work in mathematics, earning top grades in all courses he took, and he has started to take graduate level classes. In addition, Justin has been dominant on the math contest scene, winning every local contest he entered and earning the highest score among local participants of the 2008 Putnam Contest.

Ainul Shafiqah Shafie is majoring in Actuarial Science. In addition to a near-perfect GPA, Ainul has passed her first professional actuarial exam. She will be doing an actuarial internship at the Phoenix Life Insurance Company this summer.

Kenneth Stalkfleet and **Stephen W. Theis** are both majoring in Mathematics. Stephen has a perfect 4.0 GPA and earned a grade of A+ in all but one of his math courses. Ken also received grades of A+ or A in nearly all of his math courses. Having completed all of the undergraduate courses in real and complex analysis, Ken is currently enrolled in a graduate course in complex analysis.

Dr. Lois M. Lackner Mathematics Scholarship

The most recent addition to the list of departmental awards, the Dr. Lois Lackner Scholarship was established in 2007 through a generous gift by Dr. Lois Lackner, a University of Illinois alumna with degrees in the teaching of mathematics and in education.

Danielle E. Tomasek was chosen as the third recipient of this scholarship. Danielle is a sophomore in mathematics. She has a near perfect GPA, is an Edmund J. James Scholar, and has been on the Dean's List since Fall 2007. Danielle has a passion for teaching and plans to become a mathematics teacher after graduation. Outside the classroom, she has served as a tutor for Urbana High School and is involved in fundraising activities for St. Jude Children's Research Hospital.

2009 U of I Undergraduate Math Contest

Justin Kopinsky, a freshman in Math/CS and the winner of the 2008 U of I Mock Putnam Exam, won this year's U of I Undergraduate Math Contest with a near-perfect score of 59 out of 60 points. In second place was **Yi-Wei Chan** with 53 points. Chan is a transfer student from Taiwan and newcomer to the local contest scene, but has extensive contest experience, including a gold medal at the 2006 International Mathematical Olympiad. **Michael Nasti**, a sophomore in mathematics, took third place, with 51 points, repeating his performance from last year.

The U of I Undergraduate Math Contest is a locally organized contest, held annually during the spring semester. It is similar in format and content to the infamous Putnam Exam, the "world's toughest math test." This year's contest took place March 7, 2009, and was organized by Professors A.J. Hildebrand, Jeremy Rouse, and Sujith Vijay. For more information visit the U of I Math Contests webpage, www.math.illinois.edu/contests.html.

GRADUATE AWARDS

Bateman Prize in Number Theory

Byungchan Kim is the recipient of this year's Bateman Prize in Number Theory. The Prize is given annually to a graduate student in number theory for outstanding research. Byungchan, a graduate of Seoul National University, is currently a fourth-year graduate student being co-advised by Bruce Berndt and Scott Ahlgren. Byungchan is writing a thesis in the theory of partitions and has demonstrated unusual breadth in his research tools, with modular forms, combinatorics, and analytic and elementary approaches being prominently employed. He has written a total of seven papers as a graduate student at the University of Illinois.

The prize is named after Emeritus Professor Paul Bateman who served the Department of Mathematics as Head from 1965–1980.

Irving Reiner Memorial Award

Jason McCullough, a sixth-year graduate student working with Professor Sankar Dutta, is the recipient of this year's Irving Reiner Memorial Award. From his early days here, Jason has been recognized as one of our top graduate students. He was awarded an NSF VIGRE Fellowship from 2003–2005 and a University Fellowship in 2005–2006. Before he started working with Professor Dutta, Jason had already published two papers in applied commutative algebra. For his thesis work, Professor Dutta gave him one of the most difficult problems in commutative algebra, the "Vanishing Maps of Tor Conjecture" due to M. Hochster and C. Huneke. Jason proved several important special cases of this conjecture. He also introduced an equivalent form of this conjecture in terms of solutions of a certain class of polynomial equations with integral coefficients. One paper based on this work has already been accepted for publication in the *Proceedings* of the AMS, and a second paper is in preparation.

The Irving Reiner Memorial Award is named after Professor Irving Reiner (1924–1986), a long-time member of the University of Illinois Department of Mathematics and a leader in the field of integral representation theory. The award is given in recognition of outstanding scholastic achievement in the field of algebra.

Kuo-Tsai Chen Award in Mathematics

Mercredi Chasman received the Kuo-Tsai Chen Prize for her work at the interface of geometry and analysis. Mercredi is a sixth-year student, working under the direction of Professor Richard Laugesen. Her doctoral thesis answers the following question: Which shape of vibrating plate with unconstrained edges will vibrate with the highest fundamental tone? The answer—as with so many geometric maximization problems—is that the plate with the highest fundamental tone should be circular. Mercredi succeeds in extending to plate theory a result proved more than fifty years ago for membranes (vibrating drums). Mercredi's methods are a delightful blend of analysis, for studying the mathematical physics of vibrating rigid plates, and geometry, for studying the influence exerted on the frequencies of vibration by the edges of the plate. Mercredi mentions that maximization problems of this type date back to Queen Dido, who is reputed to have solved the problem of maximizing the area enclosed by a rope of oxhide, by forming that rope into a circle. Dido founded Carthage upon the area so enclosed.

The Kuo-Tsai Chen Prize is named after Professor Kuo-Tsai Chen, a member of the Illinois faculty from 1967–1987. It is awarded to a graduate student for research at the interface between geometry and analysis or between algebra and analysis.

Brahana TA Instructional Award

Recipients of the Brahana TA Instructional Award are William R. Green and Jason McCullough.

William Green is a fourth-year graduate student working with Professor M. Burak Erdogan in harmonic analysis, mathematical physics and partial differential equations. He is a graduate of Albion College in Albion, Michigan. He has enjoyed the various classes and formats he has been able to teach in the department.

Jason McCullough is a graduate student working in commutative algebra under the direction of Professor Sankar Dutta. Jason has taught a variety of courses in Linear Algebra and in the Calculus sequence. His favorite class to teach is Vector Calculus from U of I's Calculus and Mathematica sequence, because Mathematica enables students to visualize and manipulate the mathematical objects they are studying, like surfaces and vector fields. Jason received his Masters in the Teaching of Mathematics in the Fall of 2008.

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 and students determines the winners based on classroom observation, comments from students, and a written report by the nominees describing their teaching goals.

Department TA Instructional Award

Recipients of the Department TA Instructional Award are Michael Dewar and Gregory A. Kelsey. Ao Chen received an honorable mention for this award.

Michael Dewar is a fifth-year graduate student working with Professor Scott Ahlgren in number theory. Michael enjoys teaching because of the interactions with his students.

Gregory A. Kelsey is a fourth-year graduate student working with Ilya Kapovich on geometric group theory. He has greatly enjoyed teaching here at the U of I, especially in the Merit program and in Math 181. If you've taught Math 181 before, let him know your favorite projects and/or activities!

Ao Chen is a fourth-year graduate student working with Professor Renming Song in probability theory. He has enjoyed teaching many classes, including Calculus II, III, Business Calculus, Finite Mathematics, and Methods of Mathematics.

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

Bateman Fellowship in Number Theory

Dimitrios Koukoulopoulos is the recipient of the 2009 Bateman Fellowship in Number Theory. The award is given annually to an outstanding graduate student working in number theory and is generously funded by former Department Head Paul Bateman and his wife Felice. Dimitrios graduated from the Aristotle University of Thessaloniki, Greece, and is now in his third year of graduate studies at the University of Illinois. He is advised by Kevin Ford and has been working on difficult problems about factorizations of integers. His work mixes combinatorial, probabilistic and analytic arguments. In particular, he has determined precisely, for any k , the number of distinct integers which can be written as the product of k numbers, each less than N . He has a 35-page paper submitted, and three additional papers in preparation.

Dr. Lois M. Lackner Mathematics Fellowship

Ida Kantor has been awarded the 2008–2009 Dr. Lois M. Lackner Mathematics Fellowship, established by the department through a generous gift by U of I mathematics alumna Dr. Lois Lackner. Ida passed the Preliminary Exam in Spring of 2008 and will graduate in 2010. She has published a paper (joint with J. Nešetřil) in the *SIAM Journal on Discrete Mathematics* concerning graph homomorphisms and another one submitted on product dimension of trees where she used algebraic methods. In the last year, Ida, with the help of her advisor Professor Zoltán Füredi, has also been working to extend her research area in combinatorics to apply probabilistic and geometric methods. Recently she has prepared two manuscripts on graph representations and list colorings; both are central topics of combinatorics. She is a graduate of Charles University, Prague, Czech Republic, and was a recipient of a University of Illinois Fellowship in 2004.



Department News

U of I team places 30th in 2008 Putnam competition

The 69th annual William Lowell Putnam Competition was held December 6, 2008 with 3,627 students from 545 colleges in the U.S. and Canada participating in the contest. The top four teams were the same as last year, in the same order: Harvard, Princeton, MIT, and Stanford. Not surprisingly, those institutions also took most of the top spots in the individual contest; MIT alone accounted for one in every four of the top 200 individuals.

The U of I team, coached by Professors A.J. Hildebrand, Jeremy Rouse and Sujith Vijay, placed 30th among the more than five hundred colleges and universities fielding a Putnam team. The top local scorers were **Justin Kopinsky**, who earned 32 out of 120 points and placed 279th overall, **Richard Moy** (30 points, 335th), **E. Sakulbuth** (24 points, 435th), and **Meng Guo** and **Michael Nasti** (20 points, 619th).

Also of local interest is the performance of **Alex Zhai**, a former student of University High School, who is now a student at Harvard University. Alex had won the 2008 U of I Undergraduate

Math Contest in dominating fashion as a high school student. Participating in his first Putnam, Alex was one of the three highest scorers from Harvard, placed in the top sixteen overall, and earned a \$1,000 prize for this performance.

The Putnam contest, which has been called by *Time* magazine the “World’s Toughest Math Test,” consists of 12 challenging problems, to be solved over 6 hours. Each problem is graded on a 0–10 point scale, for a maximum total score of 120 points. An indication of the difficulty of the contest is the fact that a score of 73 out of 120 points was enough to place in the top 1 percent of all participants; 30 points was enough to place in the top 10 percent; and 10 points (corresponding to a single problem correctly solved) guaranteed a place among the top third of all participants.

For more information visit the U of I Math Contests webpage, www.math.illinois.edu/contests.html.

Career highlights...

- **Mathew Johnson** (Advisor Jared Bronski) will complete his Ph.D. this spring. He has received an NSF Mathematical Sciences Postdoctoral Research Fellowship at Indiana University, Bloomington, where he will be working with Kevin Zumbrun. Johnson will also be named a Zorn Research Postdoctoral Fellow.
- **Jeremy Rouse**, currently a J. L. Doob Research Assistant Professor in the department, has accepted a position in the math department at Wake Forest University beginning in Fall 2010.
- **Valerie Peterson** (Advisor Robert Ghrist) will complete her Ph.D. this spring. She has accepted a tenure-track assistant professor position at the University of Portland, Oregon, beginning in Fall 2009. Peterson received the department’s Brahana TA Instructional Award in 2008.
- **Isaac Goldbring** (Advisor Lou van den Dries), who will complete his Ph.D. this spring, has accepted a postdoctoral position at UCLA. He was co-organizer (with Sylvia Carlisle) of the 10th annual Graduate Student Conference in Logic held on the Urbana-Champaign campus April 18–19, 2009. In 2008 he received the department’s Irving Reiner Memorial Award in Algebra.
- Congratulations to **Robert Clark** who received honorable mention in the Computing Research Association Outstanding Undergraduate Award competition for his project concerning applied automata theory on which he was advised by Professor Madhusudan Parthasarathy of the Computer Science Department. Robert graduated from the U of I in December 2008 with a major in mathematics and a minor in computer science. Robert is now working at the University of Illinois National Center for Supercomputing Applications investigating how to record provenance information about data in a scientific workflow.
- **Natella O’Bryant** (Ph.D. 2002; advisor Richard Sowers) took a position as Assistant Vice President with the Credit Risk Management, HSBC Bank USA, N.A., after graduating from the U of I. She recently received a promotion to Senior Financial Analyst.
- **Panki Kim**, a 2004–2006 J. L. Doob Research Assistant Professor at Illinois, was recently promoted to associate professor at Seoul National University.
- **Heng Huat Chan** (Ph.D. 1995; Advisor Bruce Berndt) has been awarded a Hitachi Research Fellowship which will allow him to conduct research at Nagoya University. Chan is currently a Professor of Mathematics at the National University of Singapore.
- **Andre Kundgen** (Ph.D. 1999, Advisor Zoltán Füredi) was recently promoted to Associate Professor at California State University–San Marcos. He is the Managing Editor of the *Electronic Journal of Combinatorics*. He will spend spring 2010 on sabbatical with Carsten Thomassen in Denmark.
- **Radhika Ramamurthi** (Ph.D. 2001, Advisor Douglas B. West) was promoted to Associate Professor at California State University–San Marcos this past fall. Beginning this summer, she will also serve as Director of Faculty Center, a university-wide office that supports faculty development through workshops, mentoring and limited grants.
- **Seog-Jin Kim** (Ph.D. 2003, Advisor Douglas B. West) was promoted to Associate Professor at Konkuk University, Seoul, this spring.
- **Michael Pelsmajer** (Ph.D. 2002, Advisor Douglas B. West) was promoted to Associate Professor at Illinois Institute of Technology this past fall. He organized three conferences in the past year.
- **Dhruv Mubayi** (Ph.D. 1998, Advisor Douglas B. West) was promoted to Full Professor at the University of Illinois at Chicago this past fall. He serves as Associate Editor of *Discrete Mathematics*, and serves on the editorial boards of *Order* and the *Journal of Combinatorial Theory (A)*. He received a 2005–2007 Sloan Fellowship.

Mathematics faculty honored by Center for Advanced Study

Berndt elected CAS Professor

Bruce Berndt has been elected as a Professor in the University of Illinois Center for Advanced Study (CAS) pending approval by the University Board of Trustees. CAS Professors are permanent members of the Center, selected from the faculty on the basis of their outstanding scholarship. These appointments are among the highest forms of campus recognition. This appointment is being made in recognition of Bruce's many significant contributions to his field.

Berndt's primary interests are in theta functions, q -series, partitions, continued fractions, Eisenstein series, Dirichlet series, and character sums. Since early 1974, almost all of his research has been devoted to proving the claims left without proof by the famous mathematician Ramanujan in his three notebooks and in his "lost notebook." The three notebooks contain approximately 3300 results. With the help of several other mathematicians, he completed his work on the notebooks in 1998. An account of Berndt's work can be found in his five books, *Ramanujan's Notebooks*, Parts I–V, published by Springer-Verlag in the years 1985, 1989, 1991, 1994, and 1998.

Since the mid 1990s, Berndt has been attempting to find proofs for many of the claims left by Ramanujan in his lost notebook, which was written in the last year of Ramanujan's life and contains approximately 650 assertions without proofs. Berndt and George Andrews, who found the lost notebook in 1976, are publishing volumes on the lost notebook analogous to those prepared by Berndt on the three earlier notebooks. The first two volumes appeared in 2005 and 2009. Twenty-five students have completed doctoral theses under Berndt's direction. He is currently advising 8 doctoral students.

Balogh, Kostochka and Merenkov receive 2009–2010 CAS appointments

Three mathematics faculty have received 2009–2010 appointments in U of I Center for Advanced Study: **József Balogh** has been appointed a Fellow, **Alexandr Kostochka** as an Associate, and **Sergiy Merenkov** as a Beckman Fellow. These appointments provide an incentive to pursue the highest level of scholarly achievement and provide faculty members with an unusual opportunity to explore new ideas and demonstrate early results.

Balogh works in probabilistic and extremal combinatorics. Recent results of his include determining the critical probability of the 3-dimensional bootstrap percolation. Another area of his interest is describing the structure of almost all graphs not containing a fixed small graph as a subgraph.

The aim of Kostochka's project is to study several extremal problems on packing of (hyper)graphs and on minors in graphs. An important instance of combinatorial packing problems is that of graph packing. Many basic graph theory problems and concepts can be expressed in a unified (and sometimes more natural) form using the language of graph packing. Another "embedding-like" topic is that on finding specific minors in graphs. He will also spend a semester at the Institute for Pure and Applied Mathematics (IPAM) at UCLA, working to involve students as much as possible in these studies.

Merenkov will continue his studies of quasisymmetric geometry of fractal metric spaces such as Sierpiński carpets or surfaces with no smooth a priori structure. These spaces appear in

many contexts, notably in complex dynamics as Julia sets of rational maps and in the geometric group theory as boundaries at infinity of hyperbolic groups. From the geometric point of view the most fundamental questions to understand about metric fractals are those of uniformization and rigidity. In complex dynamics, an important question is that of quasisymmetric conjugacy of Julia sets for various families of rational maps. The two most famous conjectures in the geometric group theory addressing these questions are Cannon's and the Kapovich–Kleiner conjectures predicting that hyperbolic groups with sphere or Sierpiński carpet boundaries are Kleinian.

Also in the news...

- **Thomas Nevins**, Assistant Professor, has been named as a 2009–2010 Helen Corley Petit Scholar by Phil Best, Associate Dean of the College of LAS. The endowment that funds this position was created to develop scholarship and teaching of young faculty members in the College. Dean Best cites Dr. Nevins's extraordinary record in bestowing this honor upon him. Nevins received his Ph.D. in 2000 from the University of Chicago. Before coming to the U of I, he was an NSF Postdoctoral Fellow at the University of Michigan. In 2006 Nevins received an LAS Dean's Teaching Fellowship. In 2007–2008 he was a Beckman Fellow in the U of I Center for Advanced Study. In 2008 he was an NAS-Cinvestav Lecturer in Mexico City. Nevins's research lies at the interface between algebraic geometry, noncommutative algebra, and integrable systems.
- Professor **Susan Tolman** was honored at the Provost's Bookplate Reception this past December for her exceptional promotion and tenure case. The Provost asked the Campus Promotion and Tenure Committee to identify exceptionally impressive cases during their review process last year. This is the first year of this new recognition, and the Provost's plan is to continue it in subsequent years. Tolman's dossier was recommended to Provost Katehi for special recognition, based on the scope, quality and impact of her scholarship, teaching, and engagement efforts. Tolman's accomplishments stood out as particularly remarkable in a context where virtually all of the cases reviewed were excellent. The Bookplate Reception was the formal event where these individuals were recognized. In addition to public recognition, the Provost's Office will provide a discretionary fund of \$3,000 to support Tolman's scholarly activities.
- Co-PIs **Steven Bradlow** and **John D'Angelo**, both professors in the department, have been awarded an MCTP (Mentoring Through Critical Transition Points) grant from the National Science Foundation. The funding from this grant will make it possible for the department to run a large REGS (Research Experiences for Graduate Students) program for several years beginning this summer.
- **Kevin Ford**, Associate Professor, has been invited to spend the next academic year at the Institute for Advanced Study in Princeton for a special year in Analytic Number Theory.

Retirements

Stephanie Alexander

Although born in Los Angeles, **Stephanie Alexander** grew up with her Canadian parents in Vancouver and London, Canada. Her mother received a Ph.D. in chemistry from Berkeley and took a faculty position at the University of British Columbia, where her father had a position in Finance. After the war, her mother's position was terminated, along with all female faculty married to male faculty, and her promising research career ended—a formative event in Alexander's life.



Alexander received her undergraduate degree from Mount Holyoke College at the age of 19. She received her Ph.D. at the University of Illinois at Urbana-Champaign under the direction of Richard L. Bishop, who became a career-long collaborator. She is married to Ralph Alexander, Professor Emeritus of Mathematics at the U of I, whom she met when she was a graduate student and he was a newly arrived faculty member.

As a student, Alexander was aware that beautiful geometry was being done behind the Iron Curtain by the A.D. Alexandrov School, but information was frustratingly difficult to obtain. She could scarcely imagine that in 1997 she would be telling this story to Alexandrov himself in St. Petersburg, and a while later would be the leader of the U.S. team in a cooperative grant program with

the Steklov Institute of St. Petersburg. She has worked extensively in geometry, including classical, Riemannian and Alexandrov geometry. She was awarded the 2004–2006 Kuo-Tsai Chen Distinguished Mathematics Research Award. Alexander's research is in full swing, with a total of six current collaborators, and her retirement was triggered by the urgency of her research agenda. She recently returned from a conference on Alexandrov geometry as a guest of the Chinese government, and in July 2009 will make her second "Research in Pairs" visit to the Mathematisches Institut in Oberwolfach with two younger coauthors of a forthcoming book.

Alexander's teaching career has been a quest for ways to communicate the beauty and power of geometry. She received the Alpha Lambda Delta Outstanding Teacher of Freshmen Award in 1986, and the Luckman Distinguished Undergraduate Teaching Award and the Prokasy Award for Excellence in Undergraduate Teaching in 1993. Alexander has directed six Ph.D. theses: William Taber, Nadine Menninga, Robert Currier, Anton Petrunin, Chaiwat Maneesawarn, and Jeremy Wong. She currently has two Ph.D. students.

Early in their marriage, Stephanie and Ralph moved to a cabin on the Sangamon River where they still live. They have come to love the Sangamon Valley and its birds, wildlife and plant life, and they have a small prairie restoration. Stephanie enjoys daily sunrises, working in her garden, and evening walks.

Paul Schupp

by Ilya Kapovich

Paul Schupp was born on March 12, 1937 in Cleveland, Ohio. He was an undergraduate student at Case Western Reserve University in 1955–1959 where he became interested in mathematics. After graduating from Case Western in 1959, Schupp entered the graduate program in mathematics at the University of Michigan, where he worked under the direction of Roger Lyndon. Schupp obtained a Ph.D. from Michigan in 1966 with the dissertation entitled *On Dehn's Algorithm and the Conjugacy Problem*. His doctoral thesis dealt with the study of small cancellation groups, a topic that was to become a signature subject of Schupp's research for years to come.



After graduating from Michigan, Paul Schupp was an assistant professor at the University of Wisconsin-Madison for the 1966–1967 academic year. He then spent the 1967–1968 academic year at the University of Illinois at Urbana-Champaign, at the invitation of William Boone, as a visitor for the special year in Combinatorial Group Theory. At the conclusion of that special year, Schupp became an Assistant Professor at Illinois where he remained a

faculty member until his retirement in August 2008. Schupp was promoted to Associate Professor in 1971 and to Professor in 1975.

While at Illinois, Paul Schupp held many visiting appointments including those at the Courant Institute (1969–1970), University of Singapore (January–April 1982), University of London (April–September 1982), USSR National Academy of Sciences in Moscow (September–December 1982), University of Bordeaux (1984 and 1996), University of Paris–VII (1984–1992), and Université Marne-la-Vallée (June 1997 and June 1999).

He was awarded the John Simon Guggenheim Fellowship for the 1977–1978 academic year.

Schupp was the thesis advisor of twelve Ph.D. students, including Leo Comerford (1973), Judith Seymour (1974), Richard Hurwitz (1974), David Jackson (1978), Robert Haring-Smith (1981), Claude Anderson III (1981), Peter Lindsay (1984), Maximiliano Garzon (1984), David Peifer (1992), Karin Johnsgard (1993), Paul Gies (1995) and Gareth Rohde (1997).

From the beginning of his mathematical career, Schupp's interest lay in the area of combinatorial group theory as well as its interactions with complexity theory and computer science. His work profoundly influenced this subject. In particular, Paul's early work, individually and jointly with Roger Lyndon, on the development and applications of the small cancellation theory, was a crucial precursor for the birth of geometric group theory as a distinct subject in the late 1980s. The 1977 book by Roger Lyndon and Paul Schupp

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Combinatorial Group Theory quickly became the main and defining text in the subject and it remains widely influential today. The book was deservedly reprinted by Springer in 2001 in its “Classics in Mathematics” series.

Schupp’s work on automata theory in the 1980s and 1990s also broke new ground. His famous theorem, from a 1983 paper with David Muller, on characterizing virtually free groups as exactly the finitely presented groups with context free word problem remains an important foundational result at the juncture of group theory and complexity theory.

In recent years Paul Schupp explored the notions of generic-case complexity and genericity in group theory. His work in that direction introduced many new ideas to the subject, including the notion of generic-case complexity, and resulted in the discovery of new and fascinating phenomena such as isomorphism rigidity and algebraic incompressibility of random one-relator groups.

Schupp has a son, Jerome, who is currently studying at ENSAI, the Ecole Nationale de la Statistique et de l’Analyse de l’Information in Rennes, France, where Paul is currently visiting. Paul enjoys doing tai-chi, listening to music (particularly Gregorian chants, which he claims is the greatest music to listen to while cooking), and reading about history and philosophy. He belongs to the Greek Orthodox Church.

Join us for homecoming this fall!

Mark your calendars for the Department of Mathematics homecoming party to be held on Saturday, October 10, 2009. The football game at Memorial Stadium will be Illinois vs Michigan State. The time and location of our event will be posted on our website at www.math.illinois.edu/homecoming/. We look forward to seeing many of our alumni again this fall!



Photo by Kalev Leetaru.

Math Times

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Illinois Journal of Mathematics

New process makes galley correction
process more efficient for authors

In the Fall 2008 edition of *Math Times*, the *Illinois Journal of Mathematics* (IJM) announced that an agreement had been reached between IJM and VTEX Mattson Publishing Services that would provide production services for IJM. A modest increase in annual subscription fees was required for this purpose. Currently, Vol. 52, Nos. 1 and 2 are in production with the new typesetter. The new process incorporates a “delta file” for authors, making the galley correction process more efficient.

As a result of IJM’s new partnership with Project Euclid, there will be an “electronic only” subscription option in the near future. The subscription requirement will apply to the most recent 5 years of current and back issues. Beyond the 5-year “moving wall”, all back issues of IJM will be available without charge through Project Euclid’s website.

IJM is happy to announce that William Haboush and Richard Sowers, both professors in the mathematics department at Illinois, have taken positions on the IJM editorial staff.

UI Histories website highlights math model collection

Visit the new UI Histories Project at <http://uihistories.ncsa.uiuc.edu/>. At this website you can read about the founding years of the University, early milestones and student life of yesteryear, the histories of nearly 300 buildings, major class gifts, or simply spend some time reading through the more than 70,000 pages of digitized maps, course catalogs, building dedications, and booklets from the past century and a half. Also featured at this site is the Department of Mathematics math model collection where you can view 13 model catalogs and more than 2,500 images of math models taken by Kalev Leetaru in 2005.



Photo by Kalev Leetaru.

The Department of Mathematics math model collection is the largest of its kind on public display, second only to that in Göttingen, Germany. More than 380 of these historically and mathematically significant sculptures are on display in Altgeld Hall.