



Math Times

Department of Mathematics — Spring/Summer 2014

Athreya and Hur receive NSF CAREER awards

Assistant Professors Vera Hur and Jayadev Athreya have each been awarded a five-year National Science Foundation (NSF) CAREER award. CAREER awards support career development plans that integrate research and education. They are among the NSF's most prestigious awards. Assistant Professor Kay Kirkpatrick received a CAREER award in 2013.

Vera Hur's project "Analysis of surface water waves" will address several issues in the mathematical aspects of surface water waves. She plans to develop new tools in partial differential equations and other branches of mathematics, and also extend and combine existing tools, to focus on:

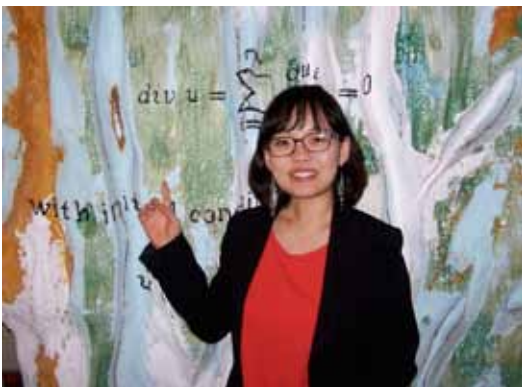
- Global regularity versus finite-time singularities for the initial value problem.
- Existence of traveling waves and their classification.
- Stability and instability of traveling waves.

Her project emphasizes large-scale dynamics and genuinely nonlinear behaviors, such as breaking and peaking, which ultimately rely on analytical proofs for an acute understanding. She will also emphasize the use of the Euler equations in hydrodynamics rather than simple approximate models.

Progress in Professor Hur's research is expected to help resolve several longstanding open problems in the area, while also

leading to applications in related, interfacial fluids problems and in numerical simulations and engineering.

Hur (PhD Brown Univ 2006) joined the department in 2009 after a three-year position as a C.L.E. Moore Instructor at MIT. She was named a Sloan Research Fellow in 2012.



Vera Hur, standing in front of an art display on the third floor of Altgeld Hall, discusses the Navier-Stokes equations.

Jayadev Athreya's project "Randomness in Geometry and Dynamics" involves using ideas from dynamical systems, probability theory and geometry to understand randomness in various geometric and dynamical contexts. Athreya is developing new measures of complexity for parabolic dynamical systems using spacing statistics and gap distributions, and using renormalization methods to compute these invariants. Athreya and his collaborators are also creating new notions of random geometric objects and structures, by placing appropriate measures on moduli spaces of geometric objects, and understanding properties of random objects by computing moments of various functions with respect to these measures.

The measures of complexity being designed in this project will help detect new types of chaotic behavior in the time evolution of physical systems, such as the motion of an electron on the Fermi surface of a metal in the presence of a magnetic field. Understanding the geometry and measure

theory of moduli space of geometric objects is being used by Athreya, mathematics department colleagues, A. Hirani and Y. Baryshnikov, and a team of engineers, in modeling and optimizing the performance of a lithium-ion battery.

Athreya (PhD Univ of Chicago 2006) joined the department in 2010 after a position as a Gibbs Instructor at Yale University. He is the Director of the Illinois Geometry Lab, which he co-founded in the spring of 2012.



IGL Director Jayadev Athreya works with students from Countryside Middle School at a workshop on platonic solids.

From the Chair

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Alumni and Friends,

The Department of Mathematics completed a new strategic plan in fall 2013. The plan identifies important new work we have to do and gives added momentum to work already under way. The plan is well timed: it complements the National Research Council's strategic plan for the profession "Mathematics 2025" and the University of Illinois campus strategic plan, both completed in 2013. You can read all three of these strategic plans at www.math.illinois.edu/strategic-plans-2013.html.

Our strategic plan and the NRC's Mathematics 2025 document both recognize the critical role mathematics plays in enabling interdisciplinary work in the sciences. For example, our plan calls for the graduate program to enhance the preparation of PhD students for nonacademic careers and to develop opportunities for internships with business, industry, and government. The PI4 grant from the National Science Foundation, awarded this winter (see p. 12), provides a great start in this direction.

For our undergraduate program, the plan calls for us to reconsider all aspects of our curriculum and to create new opportunities for undergraduate research. Here we were inspired not only by the power of mathematics but also by the great work and rewarding experiences of our undergraduates in various research communities already active in the department, including the Illinois Geometry Lab and the BioMath program.

The proposed renovation of Altgeld and Illini Halls, discussed in recent issues of the *Math Times*, is another essential part of our strategic plan. The renovation will provide dynamic, collaborative spaces for 21st century mathematics, where the lines between teaching and research, learning and discovery are increasingly blurred.

Our faculty, students, and alumni are doing great work: the department plays an important role in preparing the mathematical workforce and in solving the mathematical challenges of our time. With all that we have to offer, we should enable promising students to join us at Illinois. And so another important point in our strategic plan is scholarships and fellowships, both for undergraduate and graduate students.

To advance the work of the department and to carry on the tradition of excellence built over many years by my colleagues and our predecessors, we must recruit outstanding faculty. Once they are here, we must provide them with the facilities and resources to achieve their goals in both teaching and research.

The strategic plan challenges us to do all these things and more. We are fortunate to have help. Our faculty are constantly innovating in teaching and research, and they continue to attract funding for their work. The university recognizes the central role we play in its mission. Our alumni continue to invest generously in the future of the department. Our Mathematics Development Advisory Board (see p. 16) is playing an important leadership role in helping the department to achieve its goals. We are grateful for the many ways in which you support our mission.

Matthew Ando
Professor and Chair
Department of Mathematics

Carla Savage

by Jim Dey

When Carla Savage finished her bachelor's degree in mathematics at Case Western Reserve in Cleveland, graduate school beckoned. "I didn't really know what was out there. But I loved going to school," she said.

Savage said she had no idea where she'd end up until she and her physicist boyfriend (now her husband) started looking for top-notch programs in their respective fields.

"The University of Illinois was great in both math and physics, and that's where we decided to go," she said, recalling that the UI was an outstanding choice for both of them.

On the social scene, Savage said she grew to love the UI's Krannert Center for the Performing Arts as well as the campus film societies, whose movies she regularly attended. As for academics, Savage found herself drawn to studying mathematics as it related to computer science, an interest she developed after taking a UI undergraduate class in automata theory—the study of abstract machines and automata, as well as the computational problems that can be solved using them.

Her doctoral advisor, UI Professor David Muller, also focused his research on the twin fields of math and computer science.

"(Muller) had the ability to turn all problems into math problems," Savage recalled. "Machines seem kind of scary. But to realize that you could think about them mathematically was pretty cool."

She has since turned her academic interest to combinatorics, which concerns the study of finite or countable discrete structures.

"There are a lot of things that aren't so easy to count," said Savage, who attended the UI four years, receiving her doctorate in 1977. She recalls that she "liked everything about" her time in Champaign-Urbana, particularly the income she generated as a graduate student teaching classes.

"That was the first time I was ever paid to do math, and I loved it," she said.

In 1978, Savage joined the faculty at North Carolina State University in Raleigh, where she is a professor of computer science. Her husband, Griff Bilbro, is a professor of electrical and computer engineering at NC State.

Savage has come a long way from her youth growing up in Baltimore, Md., where she was the oldest of four children (two boys and two girls). Her father was a steamfitter who worked for Honeywell. Her mother was a legal secretary and homemaker who loved learning and ultimately received her bachelor's degree late in life from Towson State by taking just a couple of classes at a time.



Carla Savage (PhD, 1977). Professor, North Carolina State University.

She said her parents' hard work and tenacity proved to be a great example for their children. "They appreciated hard work, good choices, family and the ability to stand on your own two feet," Savage said.

As a young girl, she recalled being interested in many subjects, but was particularly interested in mathematics. Like many math students, Savage recalled being intrigued by solving the

puzzles that math problems often pose.

"It's orderly and clean. It's like a language you can use to describe things," she said.

Although Savage has taught at NC State for more than 30 years, she said she has no plans to retire. Indeed, Savage recently took on new responsibilities as the Secretary for the American Mathematical Society, a 30,000-member organization based in Providence, R.I., that is this country's main organization for math research and scholarship.

Teaching graduate students, doing her own research and attending to her new duties for the mathematical society makes for a busy life, so busy that Savage jokes "that I forget what I like to do. I save my free time for family," she said.

In addition to her husband, Savage's two children also have doctoral degrees. Son Luke got a doctorate in physics from Johns Hopkins University and now works in private industry in Boston. Daughter Rebecca got her doctorate in English from the University of Illinois, specializing in writing studies. She is a Presidential Management Fellow for the U.S. Occupational Safety and Health Administration.

Still fond of both the UI and movies, Savage said "when my daughter was at the University of Illinois, I used to time my visits around Ebertfest," the annual Roger Ebert Film Festival held each April and sponsored by the UI's College of Media. But she said her greatest endeavor these days is her work with the AMS.

Noting that it was founded in 1888, Savage said she is just the organization's 10th secretary. She said her predecessors served an average of 13 years in office and that she might keep the job that long as well.

"My work is so interesting. In the morning, I never know what's going to be in my e-mail inbox," Savage said.

Jim Dey is a columnist and editorial writer for The News-Gazette in Champaign-Urbana.

Gone Fishing?

by Rui Loja Fernandes

As a field, geometry can be characterized as the study of manifolds, i.e., of objects that look like curves and surfaces, and their higher dimensional generalizations. Geometers usually consider additional structures on manifolds, so that they can measure precisely distances between points of the manifold, or how the shape of the manifold changes between different regions, or even how much different two manifolds can be. In Poisson geometry the extra structure is called a Poisson structure and it endows the manifold with a foliation, which one can think pictorially as a geological formation with infinite many layers, called *leaves*. The leaves can have an intricate behavior, twisting and wrapping around themselves. The leaves also come with their own geometric structure, called a *symplectic structure*. You can take, for example, a book, open it wide, and obtain a Poisson structure where the leaves are the pages as well as the points in the binding of the book. The symplectic structure on the pages of the book is basically the way one measures the areas of any figure in the page. One can start deforming smoothly the pages and make the foliation more and more complicated, or one may decide that the standard relative to which one measures areas varies from page to page smoothly. In this way, one gets more and more complicated examples of Poisson structures. The 3-sphere with the so-called Reeb foliation is one such example.

There are several reasons one is interested in studying Poisson manifolds, i.e., manifolds with Poisson structures. One important reason is quantum mechanics: a famous theorem in Poisson geometry, due to Fields medalist Maxim Kontsevich, states that every Poisson structure admits a deformation quantization. Another

important reason, which historically is how Poisson structures appeared, is that it is precisely the structure on a manifold that one needs to set up conservative dynamics, also known as Hamiltonian dynamics. This is the kind of dynamics that appears everywhere in Nature, e.g., in the time evolution of mechanical systems, such as the motion of the planets or satellites around the Sun, or in the population dynamics of ecosystems. One famous set of equations describing population dynamics is the Lotka-Volterra equations. By exploring their Poisson geometry, together with my collaborators, we were able to show that an important class of such systems, called stable dissipative Lotka-Volterra systems, has a global attractor and that the dynamics on the attractor are Hamiltonian. We have also shown that ecosystems with only four species can exhibit chaotic behavior!

In studying Hamiltonian systems one must pay careful attention to the underlying Poisson structure. In general, it is very hard to find explicit solutions, i.e., to integrate explicitly a Hamiltonian system. There are a few notable exceptions to this general rule, namely the so-called completely integrable systems (CIS). Although CIS are very rare, they have a very rich and beautiful geometry. For non-degenerate CIS we know exactly how this geometry behaves. But the most interesting CIS, also the ones that appear in nature, usually have singularities. Some of my ongoing research consists in trying to understand and classify singular CIS.

Another facet of a Poisson manifold appears if one decides to ignore the intrinsic geometry of the leaves, and looks rather at the set of leaves. These leaf spaces are not manifolds anymore and one needs to get into another world that fascinates me: the differential geometry of singular spaces. We still don't know much about the geometry of such spaces, but it is becoming clear that it is best described using mathematical gadgets known as Lie groupoids, or better, differentiable stacks, and their infinitesimal versions, called Lie algebroids. For example, we understand well the passage from the global picture (Lie groupoids) to the infinitesimal picture (Lie algebroids), which amounts essentially to differentiation. The inverse integration procedure is much more difficult and it is not always possible. The precise obstructions were found a few years ago in a joint work I did with my long-time collaborator Marius Crainic, from the University of Utrecht, in the Netherlands. This and other works in the last decade have paved the way to understand the differential geometry of singular spaces. Still there are many open problems and much more to be learned!



Rui Loja Fernandes is the Lois M. Lackner Professor of Mathematics. He is a differential geometer who has made fundamental contributions to Poisson geometry, a generalization of symplectic geometry, which has applications to such diverse fields as generalized complex geometry, quantization, integrable systems, gerbes and higher geometry, non-commutative geometry, cluster algebras or representation theory. Before joining the mathematics faculty at Illinois in 2013, he was Professor and Head of the Department of Mathematics at the Instituto Superior Técnico in Lisbon, Portugal.

Website: www.math.illinois.edu/~rui Loja/.

Author's Note: The title of this piece derives from the designation "Poisson structure." These structures are named after the French mathematician Simeon Denis Poisson. But "poisson" in French also means fish. Every year there is a meeting of the Poisson geometers working in North America which is called "Gone Fishing."

LAS AND CAMPUS AWARDS

Campus Award for Excellence in Undergraduate Teaching by Instructional Staff



Jennifer McNeilly joined the department in 2001 and a year later was appointed Director of the Mathematics Merit Workshop Program, an innovative instructional program aimed at improving the success rates of underrepresented and underserved student populations in STEM (science, technology, engineering, and mathematics) disciplines.

Jennifer McNeilly

In the 12 years Jennifer has been Director of the Mathematics Merit Program, the program has grown from 7 Merit sections with 115 students to 28 Merit sections with well over 500 students. The program has attracted over \$2 million in grant funding to support its work.

McNeilly's campus teaching award caps a distinguished list of honors she has received for her teaching, both within the university and outside. Her previous awards include the Distinguished Teaching Award in Mathematics for Non-Tenure-Track Faculty (2009), the Illinois Council of Teachers of Mathematics Post-Secondary Mathematics Teaching Award (2011), and the LAS Dean's Award for Excellence in Undergraduate Teaching by Instructional Staff (2012).

LAS/Campus Award for Excellence in Undergraduate Teaching by Graduate Teaching Assistants



Katherine Alexander Anders received both the LAS and Campus Award for Excellence in Undergraduate Teaching by Graduate Teaching Assistants. Anders received a BS in Mathematics from Baylor University. She entered our graduate program in 2008 and received her PhD in May 2014 with a thesis in combinatorial number theory under the direction of Professor Bruce Reznick.

Katherine Anders

During her time at Illinois, she has taught a broad range of classes, from traditional calculus recitation sections to Merit discussion sections, technology-based Calculus & *Mathematica* courses, and stand-alone courses. A winner of the Mathematics department's 2013 TA Instructional Award, Anders stands out for her superb student evaluations that have earned her an astonishing eleven appearances on the List of Teachers Ranked as Excellent. Students praise the lively classroom atmosphere she creates, and her approachability and generous availability beyond the classroom. One student writes in a letter supporting her nomination: "Katie is by far the greatest teacher I have ever had at this university [...] She has inspired me as a student and continues to inspire students every day." Anders will be an assistant professor of mathematics at the University of Texas at Tyler this fall.

LAS Dean's Award for excellence in Undergraduate Teaching

Nathan Dunfield received his PhD in 1999 from the University of Chicago. Following faculty positions at Harvard and Caltech, he joined the Department of Mathematics at Illinois in 2007 as an Associate Professor. His research is on the topology and geometry of 3-dimensional manifolds.



Nathan Dunfield

In the classroom he is noted for his exceptionally clear lectures, his passion for teaching and dedication to his students, and an unsurpassed ability to bring abstract concepts in vector calculus to life through geometric visualizations and artful drawings. He helped revitalize our vector calculus course by redesigning its syllabus and creating course materials that are now used by other instructors. Outside the classroom, he has an outstanding track record of mentoring undergraduates. Dunfield is the co-author of *SnapPy*, a software tool for research in topology and geometry that is already being used in undergraduate research projects.

LAS Academic Professional Award

Sandee Moore joined the department in 2004 as Assistant to the Chair. Her work included managing the human resources in the department—supervising a remarkable number of searches, especially as the department grew in the last few years. She also advised the Executive Committee and others on matters of departmental and campus policy. She retired in November 2013 and is now travelling with her husband and two dogs.



Sandee Moore

LAS Lynn M. Martin Award for Distinguished Women Teachers

Neha Gupta, a native of India, came to our department by way of Oxford University. She is currently a fourth-year graduate student studying geometric group theory under the direction of Professor Ilya Kapovich.



Neha Gupta

Gupta has been on the List of Teachers Ranked as Excellent in every single semester in which she has taught, and was recognized last year as a winner of the department's Brahana TA Instructional Award. She especially loves interacting with students from different backgrounds and mathematical perspectives.

Honors and Awards

FACULTY AND STAFF DEPARTMENT AWARDS

N. Tenney Peck Teaching Award in Mathematics



Pierre Albin

Pierre Albin received his PhD in 2005 from Stanford University and has been an Assistant Professor at Illinois since 2011. His research is in geometric and microlocal analysis, emphasizing analysis on non-compact and singular spaces, heat kernels, Dirac operators and spectral geometry. A major focus of his instructional activity at Illinois to date has been on the graduate curriculum in geometric analysis. His devotion to student learning led him, in one semester, to offer two simultaneous versions

of a single graduate course in geometric analysis: a traditional lecture course on complex algebraic geometry, as well as an individualized reading course on linear analysis on manifolds.

This award is named for N. Tenney Peck who was a pioneer in the field of functional analysis, specializing in non-locally convex spaces, and was also a dedicated teacher with an open door for students.

Distinguished Teaching Award in Mathematics for Tenured Faculty



Jared Bronski

Professor Jared Bronski received his PhD in 1994 from Princeton University and has been at Illinois since 1998. His research is at the interface of dynamical systems, mathematical physics, and partial differential equations. He is known for using physical models to bring mathematics to life in creative and innovative ways. Examples include a brachistochrone and various other curves to show, by rolling marbles,

which provides the quickest path; a forced inverted pendulum powered by a reciprocating saw to show how periodic forcing can stabilize an otherwise unstable physical configuration; and a circuit-board model of a random walk on a graph to show that the voltage drops are a solution of the graph Laplacian.

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

Javid Validashti earned a PhD in Mathematics in 2007 from Purdue University, with a thesis in Multiplicities of Graded Algebras. He joined the department as a Visiting Assistant Professor in 2011, teaching a variety of courses in calculus, differential equations and linear algebra. In all classes, Javid's teaching evaluations have been superb, placing him in the top 10% of instructors at the university. Javid enjoys interacting with students and considers teaching an opportunity to share his passion for mathematics with them, and to observe them in the process of learning and intellectual growth. Students appreciate Javid's enthusiasm and steady style of working through lecture examples, and feel comfortable both asking questions and making mistakes. This can be attributed to Javid's teaching philosophy, where improving a student's mathematical thinking is more important than simply obtaining the correct numerical answer.



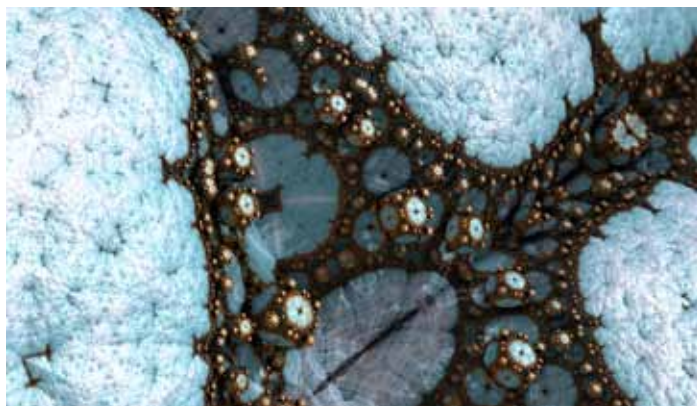
Javid Validashti

Exceptional Merit Award in Mathematics for Non-Instructional Staff

Patryk Szuta, an E-Learning Information Technology Specialist in the department since 2010, has been instrumental in the department's adaptation of WebAssign and Learn@Illinois (a.k.a. Moodle). Pat has been involved in all aspects of the use of WebAssign, from tutoring staff on the basics, to offering tips on advanced features, to creating courses. Pat handles student requests for help on technical issues quickly and in a friendly and personal manner. Pat has provided similar support for Learn@Illinois, assisting faculty with in the creation of courses, grade items and weight distributions, as well as the intricacies of adding TAs and graders with different editing rights.



Patryk Szuta



Graduate student Dan Schultz's work in number theory was recently accepted for publication in one of the leading math journals in the world. In this paper, he gives a complete description of Ramanujan's cubic theory of theta functions begun by Ramanujan almost 100 years ago. The image at left is related to an IGL project with Nishant Nangia and Jeremy Tyson from the Spring of 2012. The fractal itself is defined as the prisoner set of some three dimensional iteration, in a similar fashion to the ordinary Mandelbrot set. Trillions of calculations involving ray tracing and lighting bring out the striking details of this set.

GRADUATE DEPARTMENT AWARDS

Bateman Prize in Number Theory

Dan Schultz completed his doctoral studies this spring under the direction of Professor Bruce Berndt. Dan has published two papers, has another paper accepted for publication, and has submitted two further papers. A referee of one paper wrote, "I was impressed by the breadth and depth of the results. In short, this is one of the most interesting and impressive papers I have ever read." Dan is also active in the Illinois Geometry Lab. He will take a position this fall as a Postdoctoral Research Associate at Pennsylvania State University.

Irving Reiner Memorial Award

Dominic Searles is working under the direction of Professor Alexander Yong on his thesis research in Schubert calculus. His work utilizes a combination of algebraic, topological, geometric and combinatorial tools and methods to develop the framework of root-theoretic Young diagrams. Dominic is also the recipient of a Dissertation Completion Fellowship for 2014-15 awarded by the University of Illinois Graduate College. He expects to graduate in 2015.

This award is named after Professor Irving Reiner, a long-time member of our department, who was a leader in the field of integral representation theory.

Kuo-Tsai Chen Prize

Vyron Vellis is studying with Jang-Mei Wu, and has made an impressive contribution to the understanding of a well-known, difficult problem in geometric analysis: the characterization of quasispheres and quasisymmetric spheres. He has identified new geometric conditions on a planar Jordan curve ensuring that the level sets of its signed distance function are quasicircles with uniform data. He has also discovered criteria for topological spheres built by graphs of functions to be quasisymmetric spheres. Vyron defended his PhD thesis this spring and will start a postdoctoral position at University of Jyväskylä, Finland in August.

Brahana TA Instructional Award

Meghan Galiardi is a third-year graduate student working with Lee DeVille studying stochastic dynamical systems. Meghan entered our graduate program in Fall 2011 and since has taught traditional learning, active learning, and Merit recitations. She has appeared on the List of Teachers Ranked as Excellent every semester in which she had taught. Meghan enjoys teaching Merit recitations because of the close interaction with the students, but wishes to teach a stand-alone course soon.

Benjamin Reiniger is a fifth-year graduate student working with Alexandr Kostochka in combinatorics. He has taught calculus in several formats at Illinois, including technology-blended. His teaching emphasizes understanding the underlying ideas ("the pictures") of a subject as much as possible.

Department TA Instructional Award

Michael Santana is a third year PhD student in combinatorics working with Professor Alexandr Kostochka. His current research interests involve structural and extremal graph theory, and he has spoken about his results at several conferences. His love for teaching began in Belize, where he taught junior high and high school mathematics at a private Christian school over the span of four years. He has taught a wide variety of courses at Illinois as well as at CSU San Marcos, where he received his B.S. and M.S. in Mathematics. He is currently finishing his M.S. in the Teaching of Mathematics and was recently awarded a Ford Foundation Fellowship.

Sineenuch Suwannaphichat completed her PhD this summer working with Professor Aimo Hinkkanen in complex analysis. She was born and raised in Thailand, and earned her bachelor's degree in mathematics from Silpakorn University, Thailand. She has taught a variety of Calculus classes including traditional and active learning discussion sections. This fall she will take a position as a Lecturer at Silpakorn University in Thailand.

Bateman Fellowship in Number Theory

Arindam Roy is currently a fifth year graduate student working with Professor Alexandru Zaharescu. Arindam has published four papers, and has five other papers submitted for publication. He also has five papers in preparation. He is active in the Illinois Geometry Lab, and is the main organizer of the Graduate Student Number Theory Seminar. In 2013 Arindam received a Hohn-Nash Fellowship, which is given in recognition of outstanding scholarship and promise in applied mathematics.

Honors and Awards

UNDERGRADUATE AWARDS

H. Roy Brahana Prize

Daniel Hirsbrunner is one of our most decorated undergraduates, as last year he received both the Vincent O. Greene Scholarship and Emily Mann Peck Scholarship. He essentially completed the department's undergraduate curriculum, and was taking graduate courses this past year. He has conducted research both via Mathematics 496 and the Illinois Geometry Lab, and also serves on the Department of Mathematics Undergraduate Affairs Committee. He will be a graduate student at Penn State University this fall.

Most Outstanding Major in Actuarial Science

Sarah Manuel has had an unusually large influence on the Actuarial Science program during her four years at the University of Illinois. She is the president of the Actuarial Science Club, and has had actuarial internships at CNA Insurance, Deloitte Consulting, and the State Farm Research and Development Center at the Research Park on campus. She was the instructor for three semesters of our Math 370 course which helps students prepare for the professional actuarial exam covering Financial Mathematics. She is a James Scholar, and was the first recipient of the Bradley M. and Karen A. Smith Scholarship. Sarah has passed four professional actuarial exams, and will be working for Deloitte Consulting as a property-casualty actuary after graduation.

Chris Zajeski is a James Scholar and has passed three professional actuarial exams. He has been the Treasurer and the Company Presentations chair of the Actuarial Science Club, and a grader for actuarial science courses. He minored in business, and has had an internship in client analytics at BlueCross BlueShield of Illinois. After graduation, Chris will be returning to BlueCross BlueShield of Illinois as an actuary.

Most Outstanding Major in Mathematics

Shiladitya Bhattacharyya is a junior in the grad prep concentration and has already completed the honors sequence. He has now moved on to graduate courses, especially in number theory. Last year Shiladitya was one of the winners of a Vincent O. Greene Scholarship and the Salma Wanna Memorial Award.

Xueqi Wang is a junior in mathematics, who entered the University of Illinois in Spring 2013 as a transfer student from Beijing Forestry University. She is pursuing an applied math concentration in Mathematics and is also majoring in Statistics.

Most Outstanding Major in Mathematics & Computer Science

Robert Weber is a Chancellor and James Scholar. Last year he demonstrated his eclectic side by winning an award for Outstanding Student in German. Currently, in addition to pursuing his studies, he is working as an Undergraduate Teaching Assistant for CS 173. He was also a course assistant for CS 125 for two semesters—computer science instructors invite only the best students to apply for this position.

Most Outstanding Major in Teaching of Mathematics

Elizabeth Denz is a senior in mathematics with a minor in Teacher Education in Secondary School Teaching. This is a demanding program with the last semester dedicated to practical student teaching. Liz received a Vincent O. Greene Scholarship last year as a junior. She is student teaching Algebra 1 and 2 at Mather High School on the north side of Chicago.

Salma Wanna Memorial Award

Cheng Ni is a senior in Mathematics with a minor in Computer Science and Applied Mathematics.

Elsie Thomas Fraser Scholarship

Nina Tandle is a freshman math major with sophomore standing. She has participated in the Merit Program for Emerging Scholars both semesters and is planning to pursue a career teaching mathematics at the high school or middle school level. Nina is an initiate to the Epsilon Delta teaching organization and a member of the Phi Eta Sigma Honor Society. She was a member of the Illinois Rowing Team this year and is also a member of the LAS 101 Freshmen Advisory Council in the College of LAS.

Emily Mann Peck Scholarship

Yifei Li is a sophomore with junior standing, who is double majoring in mathematics and engineering physics. His passion for the arts lies in a love of traditional Chinese theater, especially the Beijing Opera. One of his favorite hobbies is storytelling, and while travelling in Japan he learned the Japanese tea ceremony.

Dr. Lois M. Lackner Mathematics Scholarship

Yujia Liu is a senior with a double major in mathematics and in finance. After completing her finance courses her interest in mathematics prompted her to pursue a second degree in mathematics. She is working as a Research Assistant on mathematical aspects of a multi-institute business study project. Her volunteer activities range from work in a nursing home to teaching mathematics to over 400 students in rural China.

Elizabeth R. Bennett Scholarship

The 2014 recipients of this scholarship are Muye Chen, Yuxi He, Wentian Huang, Feng Liang, run Madappat, Jesse Tu, Matthew Welch, and Elizabeth Wortman. These eight students are officially from our junior and senior classes, but most have advanced standing. This group really encompasses two freshmen (Arun and Matt), two sophomores (Elizabeth and Muye), three juniors (Feng, Jesse and Yuxi) and one senior (Wentian). Muye and Wentian are in fact due to graduate this year. Both are double majors, one with statistics and the other economics. Three of the group (Arun, Elizabeth and Jesse) are in our Actuarial Science program. Matt is a member of MATRIX and one of our Merit Scholars this year.

Bradley M. and Karen A. Smith Scholarship

Shu Zhang is double-majoring in mathematics and computer science. Just completing her third year here at Illinois, she has already passed the first five professional actuarial exams. Shu is a grader for the Actuarial Science program, and has been a teaching assistant for the UI Computer Science department. She is a James Scholar, and has had a risk control internship at the Ping An Insurance Company of China.

Illinois Mathematics Excellence Scholarship

The 2013-2014 recipients of this scholarship are Timothy Barnett, Mario Cannamela, Kimberly Hirschhorn, Chloe Marshinski, Nicholas Salm, Kelly Sharpe and Maggie Wang. While each of these seven students are freshmen, they all are actually either sophomores or juniors in standing. All are James Scholars. Kimberly and Chloe are also Chancellor Scholars. Three of them, Chloe, Nicholas and Timothy, are in our Actuarial Science program, and Chloe is also a member of MATRIX.

Math Contests

This year's math contest season got off to a fantastic start, with record participation levels in the UI Freshman Math Contest and the UI Mock Putnam Exam held in September 2013. A combined total of 71 students participated in these contests, easily beating last year's record.

The UI Freshman Math Contest provides freshmen an opportunity to show their problem solving skills in direct competition against their peers. Haidong Gong, a Freshman in Mathematics, and Xinglun Li, a Freshman in Physics, both earned a perfect score and shared the top prize in this year's edition of this contest; Tong Li, a Freshman in Chemistry, was the runner-up.

The UI Mock Putnam Exam is a local version of the Putnam Exam, a nationwide math contest dubbed the "world's toughest math test". This year's winner was Luvsandondov Lkhamsuren, a sophomore in computer science and the runner-up in last year's Freshman Math Contest. In second place was Yijun Cheng, a senior in mathematics. Haidong Gong and Moon Lee, a senior in mathematics, tied for third place.

Twenty-one students participated in the 2014 UI Undergraduate Math Contest, held February 15, 2014. This contest has been held annually for over forty years. The First Prize winner was Haidong Gong who achieved a perfect 60/60 score while finishing the contest 30 minutes early. The runner-up was Pufan Liu, a freshman in material science, with a score of 41 points.

The contests and weekly training sessions were organized by Professor A.J. Hildebrand and graduate student M. Tip Phaovibul.

Department launches career services

The Department of Mathematics is proud to announce the launch of a new career services program. This past fall, Shannon Schwarb joined our department to help build career services and a corporate connections program within the department.

Since the launch, she has completed two successful career events for our students: the Department of Mathematics Annual Corporate Forum in fall 2013, and the Alumni Career Panel & Round Table Discussion this past spring. Six different companies participated in the first forum: Akuna Capital, Caterpillar, Epic, the FBI, John Deere, and Wolfram Research. At least five student interviews and one full-time hire occurred as a result of the event. Next fall, eight companies are lined up to attend. New connections are being made in different industries with the help of the Mathematics Development Advisory Board (read more about the board on the back cover of this issue). Additionally, John Deere and Caterpillar are providing projects for our undergraduate students to research in the Illinois Geometry Lab.

The department has also started working with different companies to allow students to job shadow. This school year students were able to shadow employees at Boeing, Ploughman Analytics, and Belvedere Trading. Next year, our goal is to double the companies involved and even take students to Chicago to tour companies around the area.

If you or your company are interested in developing a partnership with the department, please contact Shannon Schwarb at shanliz@illinois.edu.

Technology and online education theme for MAA Missouri Sectional meeting

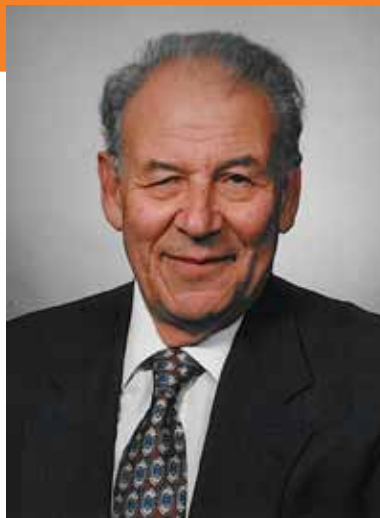
The Spring MAA Missouri Sectional meeting was held in St. Louis in March 2014. The feature theme for the meeting was technology and online education. The plenary address was given by Randy McCarthy, Director of the department's Netmath program.

In addition to the plenary lecture there was a five-member panel discussion on online education. Three of the panel participants were University of Illinois mathematics PhD graduates: Bruce Carpenter (1995), currently a lecturer in our NetMath Program; Marc Harper (2009), recently at UCLA and a consultant with ALEKS; and Bart Snapp (2007), currently at Ohio State University and creator of a successful calculus MOOC's course using MOOCulus, an adaptive online calculus homework system he helped develop.

The panel discussion was well attended and covered a wide range of topics about online education today and where it might be evolving to tomorrow. One theme that was clear, however, is that Illinois' influence in this space remains considerable not only through its students but via the experiences it offers to those students and visitors whom it employs.

Heini Halberstam 1926-2014

Heini Halberstam died at home in Champaign, Illinois on January 25, 2014 at the age of 87. He had a mathematical career extending over 60 years and had been active until the last months of his life. Heini was an internationally known figure in number theory, particularly for his work in sieve theory. In addition to his scholarship, Heini was treasured for his encouraging and optimistic manner, beautiful writing, energy, and his interest in people.



Heini Halberstam

Heini was born in 1926 in Brux, Czechoslovakia, where his father was the rabbi of the Orthodox congregation. When he was ten years old, his father died, and he and his mother, Judita, moved to Prague. After the German invasion of Czechoslovakia, Heini's mother arranged for him a place on a Kindertransport train to London. He never saw her again, as she died after being deported to a Nazi work camp. After several placements in England, Heini had the good fortune to come under the care of Anne Welsford, who recognized his ability and encouraged and supported him through his university studies.

At the University of London, Heini studied mathematics and earned his PhD degree in 1952 under the direction of Theodor Estermann. After holding faculty positions in Exeter and Royal Holloway College, Heini was appointed in 1962 to a named professorship at Trinity College, Dublin. From there he moved to the University of Nottingham, where he served at various times as Head of Department and Dean of the Faculty.

Soon after Heini secured a position in Exeter, he married Heather Peacock. They had four children, two of whom live in the U.S. and two in Britain; Heather was tragically killed in a road accident in 1971. Heini subsequently married Doreen Bramley, who has two children residing in Britain. They have eight grandchildren.

Heini came to the Illinois Department of Mathematics in 1980, served as Department Head 1980–1988, and retired as Emeritus Professor in 1996. To mark Heini's retirement, the Illinois Math Department held an international conference on number theory in his honor. During his career, Heini held visiting positions at Brown, Michigan, UC-Berkeley, Syracuse, Ohio State, Paris, Ulm, Scuola Normale Superiore at Pisa, Tel Aviv, York, Hong Kong, and Matscience (India).

Heini's research ranged over several areas of analytic number theory, including Waring's problem, mean value theorems, probabilistic methods, combinatorial number theory, and small and large sieves. Some of his research collaborators were Harold Davenport, Peter Elliott, Klaus Roth, Hans-Egon Richert, and Harold Diamond. His conjecture with Elliott about the distribution of prime numbers in arithmetic progressions is of great interest and remains one of the outstanding problems in this area.

Heini was an author of several influential research monographs. One, with Roth, *Sequences*, served to make accessible research in several areas of number theory, particularly sums of integers from given sequences and the probabilistic method of Erdős and Renyi. Another, *Sieve Theory*, with Richert, provided accounts (some for the first time) of important work of Brun, Selberg, Rosser-Iwaniec, and J.-R. Chen. Also, his long-time collaborations, first with Richert and then with Diamond, led to the book *A Higher Dimensional Sieve Method*. The last project was supported by computational work of several of Diamond's students, particularly William Galway.

Heini supervised 14 PhD students and many masters students and postdocs. Several of his students went on to distinguished careers, among them Kevin Ford of the Illinois Department of Mathematics. Heini also had a life-long passion to improve mathematical instruction. At Nottingham, he helped start the Shell Centre for Mathematical Education, was a director of the Centre, and was a member-at-large of the International Commission on Mathematics Education, 1979–1982. He continued work in mathematical education after coming to the U.S. and published several articles on this subject.

Heini was a member of the London Mathematical Society for 59 years, and he served as an LMS Vice President and secretary of the LMS Journal. He was a member of the American Mathematical Society for 57 years. In addition, he was a member of the editorial board of several journals, and he wrote over 150 Mathematical Reviews. Further, Heini served as an editor or co-editor of some 10 volumes of collected mathematical papers and conference proceedings.

He was elected to the Royal Irish Academy in 1963 (resigned 1966) and was a Fellow of University College, London, from 1967 onward. Heini gave an invited one-hour lecture at an American Mathematical Society annual meeting in 1980, and was named a Fellow of the AMS in 2012.

Over the years, Halberstam held research grants from the U.S. Army, NATO, and the National Science Foundation. A gifted writer, Heini was frequently called upon for expository articles, obituaries, and book reviews. An example of Heini's talent is provided by his review in the *AMS Notices* of *The Indian Clerk*, a fictionalized account of the interaction between the celebrated mathematician Ramanujan and his patron, G. H. Hardy.

One of Heini's post-retirement projects was to visit Prague and follow his mother's path of deportation. More recently, he participated in a reunion organized by the Kindertransport Association, and he gave talks in Champaign and elsewhere in Illinois on the Holocaust and his personal experiences in the Kindertransport.

Irma Reiner 1922-2014

Irma Ruth Moses Reiner, 92, died on April 4, 2014. Born March 3, 1922, in Newburgh, NY, to Marie Alderman and Michael Moses, J.D., she had resided for 66 years in Urbana. She earned her undergraduate degree and both her Master's and PhD degrees from Cornell University and was inducted into Phi Beta Kappa in her junior year.

She taught briefly at Temple University before joining the faculty at Illinois in 1948, where she was a highly respected professor of mathematics. She consistently demonstrated enthusiasm for teaching with her thoughtful and considerate nature.

After her official retirement in 1992 she served as a volunteer tutor in the math department for many years.

Irma was married to Irving Reiner (1924-1986), a long-time

faculty member of the mathematics department. When he died Irma established the Irving Reiner Memorial Award with a generous gift. The prize is awarded annually to a graduate student chosen by the math department in recognition of outstanding scholastic achievement in the field of algebra. Recipients receive a substantial cash award and their choice of one of the many books written by Irving Reiner. It was Irma's great pleasure to meet with the winners and hear about their lives as students here and their plans for the future.

In lieu of other expressions of sympathy, the family requests donations be given to the Irving Reiner Memorial Fund through the University of Illinois Foundation.



Irma Reiner



Anton Lukyanenko, doctoral student, co-founder of Illinois Geometry Lab.

Anton Lukyanenko

by Jim Dey

Anton Lukyanenko really gets around. A doctoral student in mathematics at the University of Illinois, the 29-year-old was born in Saint Petersburg, Russia, moving to the United States at age 10 when his father got a job at Texas Tech University in Lubbock.

Now in his sixth year at the UI and on the verge of graduation, Lukyanenko is headed to the University of Michigan

in the fall of 2014 for three years of post-doctoral work and then, if his plan succeeds, a career as a math professor at a major university. "It's been a good ride," said Lukyanenko. "I feel like I've had a lot of support from a lot of people."

His academic journey has been fueled by his love of math and interest in sharing that fascination with those who haven't heard about it yet. Just as Lukyanenko was helped by a geometry research lab at the University of Maryland, where he got his bachelor's and master's degrees, he and a colleague, Assistant Professor Jayadev Athreya, helped start one at the UI.

Now undergraduates work with professors and graduate assistants on a variety of math research projects that give them a new perspective on the subject. "From the classroom, you don't get a chance to see what a mathematician does," he said.

Lukyanenko's parents both are biologists, and he considered a variety of subjects for his college major. He ultimately chose math because he "ended up deciding that was the class I would miss most" if he could never study it again.

"Once you know something in math, you know it," he said. "The certainty of math is very appealing to me."

He and his wife, Cindy, who is studying psychology, both are doctoral students at the UI. Lukyanenko said they decided to come to Champaign-Urbana in 2008 because the UI's math department "had a very friendly feel" and living in the Midwest would be easier than attending universities in Los Angeles, their other option.

"It's great here," he said. "There's lots to do in the community. It's not as bustling as Baltimore, but that might be good for graduate students."

As a doctoral student, Lukyanenko teaches undergraduate classes and does research. His work is focused on Heisenberg geometry, a three-dimensional geometry with local constraints on directions of movement that has applications in other fields such as robotics and biology. "The cool thing about it is that it provides a model for real-world situations," he said. "The topic connects to a variety of other fields."

When not pursuing his academic work, Lukyanenko said he likes challenging avocations like fencing and ballroom dancing. "I enjoy things more when I can participate," he said.

One of his favorite participatory activities is the outreach program the UI's Geometry Lab runs for students of all ages. Lukyanenko said the Illinois Geometry Lab hosts visits by students from elementary through high school and holds events in the community to demonstrate the importance and excitement of mathematics.

"We have an obligation to show people how much fun we are having," he said.

Jim Dey is a columnist and editorial writer for The News-Gazette in Champaign-Urbana.

PI4 program helping expand post-graduate career options

The Program for Interdisciplinary and Industrial Internships at Illinois (PI4) was initiated recently by the Department of Mathematics at Illinois.

This program aims to enlarge the range of post-graduate career options for our graduate students. The core funding for the program is provided by a National Science Foundation award of \$1.2 million over five years in the Mentoring through Critical Transition Points program (MCTP), whose goal is “to increase the number of well-prepared U.S. citizens, nationals, and permanent residents who pursue careers in the mathematical sciences and in other NSF-supported disciplines”. The PI4 management team will consist of Professors Yuliy Baryshnikov, Lee DeVille, and Richard Laugesen.

The academic employment bottleneck is particularly severe in mathematics, where the ratio of new PhDs to new faculty openings is large and growing. Yet, at the same time, scientific and engineering fields increasingly recognize a need for researchers with strong mathematical and quantitative backgrounds. These dual trends point to an unprecedented opportunity to develop truly interdisciplinary mathematicians—those who obtain a PhD in mathematics but whose careers take place outside of an academic mathematics department. Our PI4 program will help students explore these alternative career paths.

The activities of the program occur mostly in summer, and consist of three components:

➤ **PI4-Prepare** is aimed at early graduate students, and will feature on-campus summer minicourses to start students thinking about interdisciplinary and computational mathematics. We plan a short training “bootcamp” in mathematical computation and simulation, followed by small working groups on research problems. The overarching goal at this stage is to broaden students’ horizons to include thinking about mathematics as a tool to attack problems in other disciplines.

➤ **PI4-Train** consists of research groups for middle-year graduate students, directed by mathematics faculty. The goal here is to move students away from solving “canned” problems as seen in classes toward working on more open-ended problems, and on problems where even the mathematical formulation of the question is initially unclear. This stage will help prepare students to do real research both inside and outside mathematics.

➤ **PI4-Intern** is aimed at more mature graduate students who will be paired with supervisors to perform summer internships: in industry, at national labs, and in sciences other than mathematics. For industrial and national lab internships, which are rare in mathematics but common in other fields, we will match students with our contacts at the host institutions. A true innovation of the PI4 program is our emphasis on “interdisciplinary internships”, where a mathematics graduate student will conduct research under the guidance of a faculty member in a non-mathematical department during the summer months. Internships will begin in Summer 2014, with students fanning out to work in companies at the UI Research Park, at Sandia National Labs, and in biology and other scientific labs on campus.

Our graduate students in PI4 will gain a much broader view of mathematics and its applications in both the “real world” and in other scientific fields. They will experience networking opportunities and gain access to nonacademic career options that they would never have contemplated when they joined the Department. Even those students who follow a traditional career path in academic mathematics will benefit during their studies from acquiring a useful skill set and experience communicating and collaborating with non-mathematicians. Exciting times lie ahead!

If your company could host a graduate student intern, please contact us at pi4@math.uiuc.edu.

PhD Reunion, September 12-13, 2014

The department will hold a reunion for PhD alumni on September 12-13, 2014. Join us to reconnect with former classmates and teachers and meet our current graduate students.

Activities will include tours of campus and the Altgeld Hall Chimes Tower, a panel discussion on career paths after graduate school, a poster session presented by current graduate students, and a keynote lecture. Alumni will also be able to attend the department’s annual picnic.

For a complete list of activities, hotel accommodation information and to register to attend the reunion, please go to www.math.illinois.edu/reunion/.

Homecoming 2014

Plan to join us for Homecoming this fall! The department will host a Homecoming Party from 2-4 p.m. on October 25, 2014. Look for our tent in front of Altgeld Hall.

Come see the restored Alma Mater—returned to her base in front of Altgeld on April 9, 2014.

Visit www.math.illinois.edu/homecoming/.



What's new in NetMath

The Department of Mathematics NetMath Program is an online distance learning program. During the past semester, NetMath has focused on growth in multiple ways.

Student experience: NetMath has made important strides in improving the student experience in our online courses by making our administrative procedures more efficient. Students now get started in their courses faster and with fewer difficulties than in the past.

NetMath Portal: As part of our continuing technological innovation, NetMath is currently developing the NetMath Portal, which will be a web-based platform that integrates various functions performed by NetMath instructors, staff and students. Students will be able to readily access course resources such as their current place in the course and estimated timeline to complete the coursework, grading feedback from mentors and instructors, online chat hour schedule for their particular course, and access to all the student's communication with NetMath. Instructors and staff will be able to get a picture of an individual student's course progress at a glance, which will help in keeping students on track and improve course completion rates.

Partner High School Program: We have organized several events to help expand our Partner High School Program. As in past years, during the ICTM State Finals Math Contest high school teachers were invited to the NetMath office for an informational session about online course offerings for high school students, MTL (Math Teacher Link) courses for high school teachers, as well as the Partner High School Program. In June we will host teachers from current and prospective Partner high schools for the third Annual NetMath Partner High School Jamboree on campus. Activities will include discussions on program improvement, growth and opportunities to represent the Partner Program.

NetMath Certificate of Professional Development in Applied Mathematics: In the past year we have seen increasing interest in Math 299, the Capstone Course toward completing the NetMath Certificate program. In order to qualify for the Capstone Course students must have taken the entire calculus sequence, a differential equations course, and an additional 300- or 400-level course with NetMath.

Mentor and TA news: This summer we will have 8 Teaching Assistants and approximately 23 undergraduate mentors working for NetMath. Most mentors help students through NetMath courses, while TAs will have additional duties in updating courseware, contributing to exam question banks, helping with undergraduate mentor training, all the while gaining valuable experience in online course instruction. Winners of the Mentor Excellence Awards for Spring 2014 were Binye Li, Mohammed Saad, Nick Wright, Chris Penney and Thomas Niewiara.

Three U of I units partner with AIMS-SA

Three University of Illinois at Urbana-Champaign units—the Department of Mathematics, the Department of Physics, and the Graduate College—are the first to partner with the African Institute for Mathematical Sciences-South Africa (AIMS-SA) through its newly-launched Institute Partners Programme. A portion of the annual sponsorship dues will be applied toward the cost of sending U of I faculty to Cape Town to teach short courses, participate in workshops, and recruit graduate students at AIMS-SA.

Steve Bradlow (U of I Mathematics), who taught at AIMS-SA in 2013 and was instrumental in setting up the partnership, comments: "AIMS-SA is a very unique, very inspirational institute. Its mission is 'to enable Africa's brightest students to flourish as independent thinkers, problem solvers and innovators capable of propelling Africa's future scientific, educational and economic self-sufficiency.' In my experience, to teach there is to feel you're playing a small part in something big and valuable. It's an experience that I highly recommend to my colleagues here!"

Department of Mathematics Chair Matthew Ando, remarks, "This is an important partnership. We are now an institutional sponsor that will make a difference for students at AIMS-SA, and it will also make a difference for us in what our faculty and students can do."

Department of Physics Head Dale Van Harlingen welcomes the opportunity to send faculty to participate in AIMS-SA workshops and course teaching, and to having AIMS-SA students come to Illinois.

U of I faculty who helped establish the partnership include: Matthew Ando, Steve Bradlow, Tom Nevins, Richard Laugesen, Jayadev Athreya, and Jared Bronski (Department of Mathematics); Dale Van Harlingen, Rob Leigh, Laura Greene, and physics Nobel laureate and Professor Tony Leggett (Department of Physics); and Dean Deba Dutta (Graduate College).



AIMS-SA and Illinois faculty celebrate their partnership during a teleconference held in January 2014.

Local AWM chapter and IGL receive Public Engagement Grant funding

Each year the University of Illinois Office of Public Engagement funds community-related projects, scholarly work, creative endeavors, course development and other activities within the broad framework of public engagement. Both the department's local chapter of the Association for Women in Mathematics (AWM) and the Illinois Geometry Lab (IGL) were awarded Public Engagement Grant Projects funding for 2013-14.

Graduate students Amelia Tebbe and Michelle Delcourt were awarded a grant for AWM projects. Their primary goal is to encourage young women at various critical ages to pursue higher education in math and science. Their project will support the university's 2013-2016 Strategic Plan and will "enhance accessibility to undergraduate programs and increase diversity within these programs" and "attract and support

students from underrepresented groups." They have a number of fun activities planned for the coming year including the third annual Sonia Math Day for Girls.

The IGL will continue to build and expand its network of outreach activities which include workshops at local schools, hosting field trips, participating in the Science at the Market Program at the Urbana Farmer's Market, partnering with the Champaign-Urbana Schools Foundation, working with Head Start teachers in Danville, introducing activities to Chicago math circles and science fairs, hosting a booth at the American Association for the Advancement of Science Family Science Days in Chicago, working with the Education Justice Program at the Danville Correctional Facility, and working with the Chirag School in Uttarakhand, India.

Students apply academics to practical business problems in AXIS Student Challenge

The AXIS Research Center invited students in the Department of Mathematics to compete for recognition and cash prizes by developing a Microsoft-based planning application. The application will serve as a prototype for AXIS to improve its corporate planning process.

Students were given sample data in an Excel spreadsheet and asked to create a SQL database and a C# program to interact with the data. Teams of students worked on the challenge throughout the spring semester. The AXIS Research Center held weekly meetings to familiarize the students with reinsurance, corporate planning, and specific functionality required in the application. The top three teams were invited to present their application via video to AXIS executives in New York and Bermuda.

AXIS Reinsurance Chief Underwriting Officer Bill Fischer; Chief Actuary Peter Martin; Executive Vice President Peter Kiernan; and Director of the AXIS Research Center David Hays were on campus April 16, 2014 to recognize the three winning teams and present them with cash prizes.

In addition to the monetary award, students received the experience of applying their academic learning to a real world business problem. One of the first place winners stated, "From the AXIS Challenge, I have learned knowledge that I can never acquire from classes, and it is really helpful. It is about applying what I have learned practically, not just solving problems from textbooks."

Matthew Ando, Chair of the Department of Mathematics, noted that the AXIS Student Challenge demonstrates that the skills and talents of mathematics majors are needed to solve many practical problems facing businesses today, providing opportunity for current and future math graduates.

"The AXIS Student Challenge provides another indication of the opportunities for companies like AXIS to collaborate with the University of Illinois to solve business problems. Our presence in Research Park makes initiatives like this possible to accomplish," stated David Hays, a former member of the Mathematics Development Advisory Board.

AXIS Capital is a Bermuda-based global provider of specialty lines insurance and treaty reinsurance with locations in Bermuda, the United States, Europe, Singapore, Canada, Australia and Latin America. The AXIS operating subsidiaries have been assigned a rating of A+ by Standard and Poors and A+ by A.M. Best.

Congratulations to the Axis Student Challenge winning teams! First Place (\$3,000) Muye Chen, Xin Lou, and Zhengqi Yang; Second Place (\$1,500) Shaoyang Luo, Yangneng Zhang, and Yuyan Ma; Third Place (\$300) Kevin Lee, Mengyi Wang, and Haiqian Wang.



AXIS executives, student competitors, and Department of Mathematics representatives during the awards ceremony.



Department of Mathematics Giving Form

Today, more than ever, the Department of Mathematics relies on the generosity of its alumni and friends. Join us in ensuring a brilliant future by supporting the department in its educational and research missions.

Yes! I believe in the importance of excellence in mathematics and wish to show my support!

\$ _____ **Mathematics Partnership Fund** (332346)
Your gift to the Partnership Fund will have the widest impact as it supports a range of activities including student awards and travel, distinguished lecturers, the recruitment of excellent faculty, and alumni events.

\$ _____ **Actuarial Science Fund** (330225)
Support Actuarial Science through scholarships, fellowships, graderships, and faculty support.

\$ _____ **Illinois Mathematics Scholarship Fund** (341016)
Scholarships enable the most promising admitted undergraduate mathematics students to pursue their education at Illinois.

\$ _____ **Mathematics Research Experience Endowment Fund** (772913)
Support research experiences for undergraduate students (REUs).

\$ _____ **Mathematics Legacy Fund** (338168)
Support our bold plan to renovate Altgeld/Illini Halls to create a collaborative environment for mathematics learning and discovery.

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Mathematics Development Advisory Board helping to shape future of department

The Mathematics Development Advisory Board (MDAB) is an alumni board drawn from the spectrum of the department's academic programs. Created in 2010, the Board has been working diligently in several critical areas supporting the department, its programs, and its students. The MDAB consists of twelve alumni with rotating three-year terms. Professor Sheldon Katz serves as Chair of the Board. Outside of the annual meeting, the Board accomplishes its work through a committee structure and conference calls.

At the MDAB's annual meeting in November 2013, priorities were set and three Board committees were reactivated for the 2013-2014 academic year: the Altgeld Committee, Scholarships Committee, and Commercial Track Committee.

The Altgeld Committee (chaired by William Schwegler, BS '89 Actuarial Science) is supporting the department's ambitious efforts for the renovation, restoration, and transformation of Altgeld and Illini Halls. This committee is helping the department plan a successful campaign. Stay tuned!

The Commercial Track Committee (chaired By Kevin Davis, BS '92 Mathematics) has adopted three focus areas: preparing students for career opportunities, developing corporate

contacts for the Department of Mathematics, and career event programming. Career preparation has become an important part of the experience of Illinois mathematics students thanks to the help of this committee. One of our newest academic advisors, Shannon Schwarb, also serves as a career specialist for our undergraduate majors and is implementing the Commercial Track Committee's recommendations, assisting with advising, corporate contacts, and career event programming. There are ongoing parallel efforts within the graduate program.

The Scholarships Committee (chaired by Gail Veasman Kellogg, BS '65 Teaching of Mathematics) has set ambitious goals for fundraising for scholarships in recognition of their increased importance in attracting excellent students to our department. The committee is also providing logistical support for fundraising for other departmental priorities.

The Mathematics Development Advisory Board welcomes your ideas! You are encouraged to contact Shannon Schwarb (shanzl@illinois.edu) with suggestions regarding careers, or Sheldon Katz (katzs@illinois.edu) about fundraising for Altgeld and Illini Halls or scholarships.