Math Times

Department of Mathematics — Fall/Winter 2014

Internships provide new opportunities for graduate students

Students arrive at graduate school passionate about mathematics—but unsure of where it might lead them later in life. Perhaps to a university professorship doing research and teaching, or to a government agency working on cryptography, or a national lab modeling disaster response, or to industry doing data analytics or a position in consulting or finance. Students receive both a "push" and a "pull" from the job market in determining their career direction.

The "push" is that the number of PhDs granted in the mathematical sciences nationwide has increased almost 90% in the past twelve years, while tenure-track job openings remain essentially flat. Our graduates still fare well when seeking academic positions, but the intense competition pushes many students to reconsider their nonacademic options.

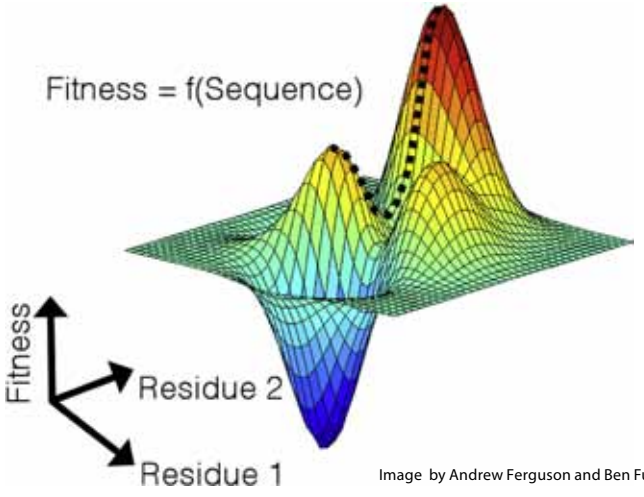

Image by Andrew Ferguson and Ben Fulan.

Our students can be "pulled" into exciting new opportunities opening up at national labs, start-ups, and large enterprises. Many graduate students arrive with an undergraduate background in computer programming, or with minors or double majors in fields such as chemistry, biology, statistics, economics and finance. These interests and skills can be combined with our advanced mathematical training to produce highly employable PhD graduates.

Summer internships provide work experience, confidence, and sometimes even a job offer after graduation. The growth of interest from our graduate students in these research and development positions is striking: seventeen students went this summer to internships in industry, government and scientific labs.

Some internships from summer 2014 include:

- Stephen Berning, Han Wang and Sishen Zhou—vehicle routing algorithms and inverse problems for crop yield maps, at John Deere's Technology and Innovation Center (UI Research Park).
- Jed Chou and Anna Weigandt—image-segmentation for video conferences, at Personify (a UI startup).
- Erin Compaan and Lisa Hickok—network behavioral analytics and uncovering latent factors through machine learning and linear algebra, in organizations within the Department of Defense.
- Matthew Ellis and Nuoya Wang—developing a 3D canopy model to analyze photosynthesis, at the Energy Biosciences Institute on campus.
- Benjamin Fulan—developing an algorithm for creation of an HIV vaccine, with Prof. Andrew Ferguson in the Materials Science Department.
- Meghan Galiardi—population health modeling, in the complex systems group at Sandia National Laboratories.
- Andrew McConvey—modeling to optimize portfolios, at Cantor Fitzgerald & Co., New York.
- Wei Qin—developing trading models, at Akuna Capital.

Many of these internships were funded or arranged under our new grant from the National Science Foundation, the Program for Interdisciplinary and Industrial Internships at Illinois (PI4).

Could your organization host a graduate student intern? We will identify strong candidates for you, so please contact Professors Yuliy Baryshnikov, Lee DeVille, and Richard Laugesen by emailing pi4@math.uiuc.edu.

In this issue:

Math Times is published twice a year by the Department of Mathematics at the University of Illinois at Urbana-Champaign. *Math Times* can be read online at www.math.illinois.edu/mathtimes/.

Tori Corkery is the editor of Math Times. A special thank you to Professor Bruce Reznick for his help with this issue. Faculty photos on pages 5-7 were taken by Darrell Hoemann.

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From the Chair

Alumni and Friends,

It is an exciting time to be a mathematician. Mathematics is in demand both inside and outside academia. Within academic mathematics, the rate of progress of research is as high as at any time I can remember, with remarkable results in many fields. Outside academia, it is very encouraging to see new domains opening up, creating demand for our work and opportunities for our students. It is very interesting to watch the department evolve with the changing landscape for our subject. This issue of the *Math Times* offers glimpses of the wonderful past, lively present, and exciting future of the department.

The issue concludes with an *In Memoriam* article about Richard Jerrard. I had the privilege this past October of attending a memorial service for Dick. The service brought together many current and past members of the department; for me it was an occasion to reflect on what a remarkable community the department has been and continues to be.

In *Alumni News*, we report that the late David Blackwell, who received his PhD here in 1941, has posthumously won the National Medal of Science. The National Medal of Science awarded to Dr. Blackwell's advisor Joseph Doob is in a display case in Altgeld Hall. We are very fortunate to have been the home to such outstanding scholars.

Our current faculty are also achieving outstanding success. Three of our faculty—Rinat Kedem, Charles Rezk, and Slawomir Solecki—were appointed faculty scholars in recognition of their recent contributions, which include giving invited lectures at the 2014 International Congress of Mathematicians in Seoul Korea. Three of our assistant professors—Jayadev Athreya, Kay Kirkpatrick, and Vera Hur—have won NSF CAREER awards. We celebrate the arrival of four new assistant professors and many postdocs and visiting assistant professors. The renewal of the faculty contributes profoundly to the intellectual vitality of the department. It is also a cause for celebration as it reflects both the increasing demand for mathematics and mathematicians and the university's recognition of that demand.

The department is increasingly active in new modes of engagement with the world outside of academia, particularly as we prepare the mathematical workforce of the future. Our PI4 program, described in the cover article and in an article on page 12, positions us as a national leader in preparing PhD students for nonacademic careers. The Actuarial Science Program has just obtained a grant from the Society of Actuaries to develop research opportunities for undergraduate students. Meanwhile, both the local chapter of the Association of Women in Mathematics and the Illinois Geometry Lab have been very active in bringing mathematical opportunities to pre-college students. I am grateful to my colleagues and our students for their hard work and to our supporters for making their work possible.

Matthew Ando
Professor and Chair
Department of Mathematics

Chris Miller

by Jim Dey

Chris Miller (BS 1984 Math & CS, University of Illinois at Urbana-Champaign).

Chris Miller knew from the beginning that his professional goal was to use math and computer science to solve problems, specifically to help the FBI fight white-collar crime.

The 1984 University of Illinois graduate ended up doing what he wanted, but not for whom he expected. Earning a joint degree in mathematics and computer science, Miller has spent nearly 30 years at consumer products giant Procter & Gamble, most recently as the associate director of the LearningWorks Division of New Business and Brand Operations.

"It's not the FBI, but it's exactly what I wanted to do," he said. "I love to solve problems, and I have built a career at Procter & Gamble by solving problems."

One of three children born to a minister father and community college teacher mother, the 52-year-old Miller grew up in Joliet. He said what people say about the children of ministers—that they are the worst behaved—is true in his case.

"I was terrible, but was never suspected," he recalled. "I could do most anything, and nobody ever looked my way. But I am reformed now."

Perhaps it was all the time he spent in church that fooled people. Miller started playing the piano in first grade and the pipe organ in fifth grade. By the time he got to eighth grade, he was using his pipe organ skills to pick up jobs playing for churches, sometimes performing at three different services on a Sunday morning.

Because his mother taught English and advanced reading at Joliet Junior College, Miller spent his freshman and sophomore years there. But he said he planned to transfer to the UI to enroll in the combined math and computer science program.

"I knew that was the thing for me," he said, noting that he earned a minor in music.

Miller went to work almost immediately after graduation for Procter & Gamble, a worldwide company that has 85,000 employees and over $80 billion in annual sales. Over the years, he's received two patents related to business processes, co-invented a new pet food product (Iams Savory Sauce), held a variety of positions in manufacturing and logistics, and traveled far and wide.

Miller, his wife and two children lived for seven years (from 1993-2000) in South Korea and China, an experience he described as "fantastic for the family overall."

"I built complex distribution networks there," he said, referring to the process of establishing supply chains in those countries that serve distributors and retail customers.

Now with their children grown (his son is a U.S. Naval officer and his daughter just started a career in business), Miller and his wife, Linda, a fifth/sixth grade social studies teacher, reside near Cincinnati. He said he has become a big fan of the Cincinnati Reds baseball team but remains a "die-hard Illini" supporter.

In his latest assignment for P&G, Miller works on creating and introducing new products into the marketplace.

"We give (the new products) the love and nurturing they need in the early stages," he said.

Besides following Illini sports, Miller works with the UI's Department of Mathematics, serving on its Math Development Advisory Board. That includes helping with the fundraising that will be necessary to pay for the multi-year renovation of Altgeld Hall.

Miller said that he's grateful for the education he received at the UI and more than happy to support the math department's efforts to provide a similar education for future generations.

"(My years experience at the UI) was a foundational part of my life. I look back on the whole experience with a great deal of respect," he said. "I can only say positive things."

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

Illinois Reception at joint math meetings in San Antonio

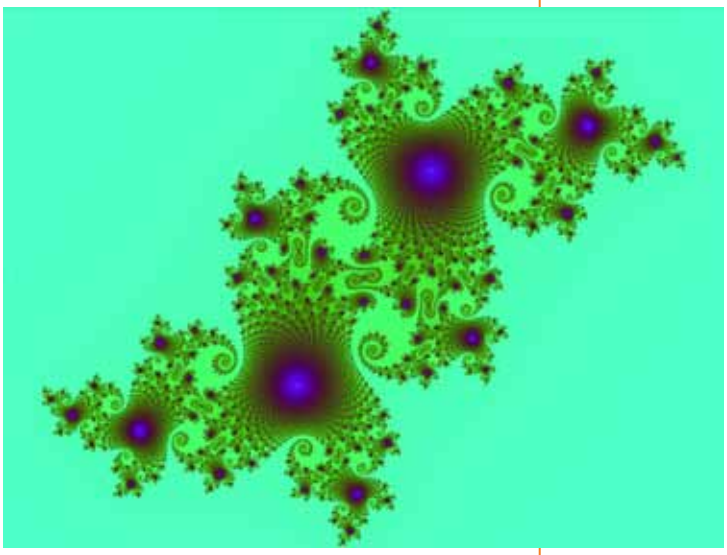
The 2015 Joint Mathematics Meetings will be held January 10-13, 2015, in San Antonio, TX. The Department of Mathematics at the University of Illinois at Urbana-Champaign will host a reception from 5:30-7:30 pm on Monday, January 12, 2015, in Presidio B located on the Third Level of the Grand Hyatt San Antonio. Everyone ever connected with the department is encouraged to get together for conversation and to hear about mathematics at the University of Illinois.

Tame geometry

by Philipp Hieronymi

The main motivating question of my work is the following: `Which expansions of the real field can be considered to be geometrically tame?' The notion is made precise via tools from mathematical logic, but the overall idea is easily explained.

Let $\boldsymbol{X}$ be a collection of subsets of some $\boldsymbol{R}^n$. Starting with zero sets of real polynomial maps, as well as preimages of cartesian products of elements in $\boldsymbol{X}$, we perform basic geometric operations on these sets: take finite unions, complements, Cartesian products, projections into lower-dimensional spaces, identifications into higher-dimensional spaces, and so on. The sets that arise are said to be *definable* from $\boldsymbol{X}$. Now we ask: given $\boldsymbol{X}$ how complicated are the sets definable from $\boldsymbol{X}$? In the case when $\boldsymbol{X}$ is empty, the answer is well known: the process of generating definable sets stabilizes quickly at the collection of all *semialgebraic* sets; these are finite unions of sets given by a finite sequence of polynomial equations (of the form $p(x_1,..,x_n)=0$) and inequalities (of the form $q(x_1,..,x_n)>0$). That means, if you have a set of this form and perform any of the above operations, you end up with a set of the same form. Hence the study of this collection of definable sets is classical semialgebraic geometry.



On the other hand, if one assumes that $\boldsymbol{X}$ contains the set of integers, all Borel sets (i.e. all sets contained in the smallest σ-algebra containing all open sets) arise as definable sets; hence all projections of Borel sets, then all of the complements, then again all of the projections, and so on, with no bound on the number of iterations needed to produce the whole collection of definable sets. Hence in this case, the process produces the collection of all projective sets, the study of which is classical descriptive set theory. This collection of sets differs fundamentally from the collection of all semialgebraic sets: it contains graphs of all continuous functions, and even sets whose Lebesgue measurability is independent from the standard axioms (ZFC) of mathematics. Thus from a geometric view point semialgebraic geometry is *tame*, while descriptive set theory is *wild*.

Most of my work in this area has been to determine for a given collection $\boldsymbol{X}$ whether the collection of sets definable from $\boldsymbol{X}$ is tame or not; that is, whether it behaves more like semialgebraic geometry or more like descriptive set theory. In particular, I study the definable sets when $\boldsymbol{X}$ contains natural mathematical objects like fractals or trajectories of vector fields. In joint work with Illinois alumnus Christopher L. Miller (PhD 1994), we proved that if the collection of definable sets from $\boldsymbol{X}$ contains a subset of $\boldsymbol{R}^n$ with non-integer Minkowski dimension, it also contains the set of integers (and hence is wild). So if one considers a set a *fractal* (see picture for an example) if its Minkowski dimension is not an integer, no fractal can be tame in the sense above. It is not surprising that the collection of definable sets generated by a fractal is complicated, but that it contains all projective sets, is indeed a surprise.

So why is the whole program of identifying tame geometries important? Definable sets are very natural objects. Knowing their properties is crucial not only in geometry and logic. For example Alex Wilkie showed that if $\boldsymbol{X}$ just contains the graph of the exponential function, every set definable from $\boldsymbol{X}$ has only finitely many connected components and hence, as was noted by Illinois professor Lou van den Dries, shares many of the good properties of semialgebraic sets. Recently Jonathan Pila and Wilkie realized that the tameness of this collection implies bounds on the number of rational points on the definable sets, allowing Pila to solve the André-Oort Conjecture in the case of products of modular curves. This is a result for which Pila won the Clay Research Award in 2011.

Philipp Hieronymi is an Assistant Professor in the Department of Mathematics at the University of Illinois at Urbana-Champaign. He received his PhD in 2008 from the University of Oxford, UK, under the direction of Professor Alex Wilkie. Before joining the department in 2010 as a Doob Postdoc, he spent one year at the Fields Institute at the University of Toronto and at McMaster University funded by the German Academic Exchange Service. His research in logic focuses on the model theory of ordered structures and is currently supported by a grant from the National Science Foundation. Read more about Hieronymi on his website at www.math.illinois.edu/~phierony/.


Partha Dey

Partha Dey

Assistant Professor
PhD 2010, University of California at Berkeley

Partha Dey grew up in the "city of joy" Kolkata, India, where he did his undergraduate and masters degree in statistics. He completed his PhD at UC Berkeley under the supervision of Prof. Sourav Chatterjee and Prof. Steve Evans. Before coming to Illinois he spent three years at the Courant Institute of Mathematical Sciences as a Simons Postdoctoral Fellow and one year at the University of Warwick as a Visiting Assistant Professor. He is interested in mathematical physics and probability with applications to physics, biology and social networks. Specifically he works on Stein's method, First passage percolation and related growth models; and on random networks and random matrices. During his spare time, he enjoys reading science fiction and non-fiction, taking photographs with his D7000, cooking experimental dishes, or exploring new places.


Elena Fuchs

Elena Fuchs

Assistant Professor
PhD 2010, Princeton University

Elena Fuchs grew up mostly in California after moving there from Russia in 1990. After getting her undergraduate degree at UC Berkeley, she moved to the East Coast to Princeton University, where she received her PhD under the supervision of Peter Sarnak. She then moved back to California for a postdoc at her alma mater. Her research lies at the intersection of number theory and geometric group theory. She lives in Urbana with her husband, her little son Nikolai, and her cat. If she had free time, she would spend it baking, running, and ice skating.


Martin Luu

Martin Luu

Assistant Professor
PhD 2011, Princeton University

Martin Luu completed his PhD at Princeton University in 2011 under the supervision of Chris Skinner. Afterwards, he spent three years at Stanford University as a Szego Assistant Professor. His research concerns various aspects of the Langlands program. This includes compatibility results between local and global Langlands correspondences, applications of the modularity lifting results introduced by Wiles, the role of p-adic deformations of the various notions appearing in the Langlands program, and also relations to mathematical physics, in particular dualities of quantum field theories.


James Pascaleff

James Pascaleff

Assistant Professor
PhD 2011, Massachusetts Institute of Technology

James Pascaleff works in symplectic geometry and topology, particularly Floer homology theories and mirror symmetry. This has connections with Hamiltonian dynamics and algebraic geometry. He holds degrees from the University of Chicago (AB 2006) and MIT (PhD 2011, advisor D. Auroux). Prior to coming to Illinois, he was a postdoc at the University of Texas at Austin. His primary musical instrument is the trombone.

New Faculty

Ruth Davidson

NSF Postdoctoral Fellow
PhD 2014, North Carolina State University

Ruth Davidson obtained her undergraduate degree in mathematics from the University of Washington in 2009. She then completed her PhD in 2014 at North Carolina State University under the supervision of Patricia Hersh and Seth Sullivant. Her research interests are mathematical phylogenetics and geometric combinatorics. During her spare time, she enjoys running, outdoor activities, and playing music.

Sun Kim

Visiting Assistant Professor
PhD 2010, University of Illinois at Urbana-Champaign

Sun Kim completed her PhD at the University of Illinois at Urbana-Champaign under the supervision of Professors Bruce C. Berndt and Kevin Ford. She did her undergraduate degree in mathematics at Korea University, South Korea. After her PhD, she spent a year at the Pennsylvania State University as a lecturer and then three years at the Ohio State University as a Ross Assistant Professor. She is interested in classical analytic number theory, and enumerative combinatorics—the theory of partitions.

Janna Lierl

J.J. Uhl Research Assistant Professor
PhD 2012, Cornell University

Janna Lierl completed her PhD at Cornell University under the supervision of Laurent Saloff-Coste. Before coming to Illinois she spent two years at the Hausdorff Center for Mathematics at the University of Bonn, working in the group of Karl-Theodor Sturm. Her research falls into the areas of probability and geometric analysis. She studies the heat kernel and Harnack inequalities on metric Dirichlet spaces, including fractal spaces.

Jason Lo

Visiting Assistant Professor
PhD 2010, Stanford University

Jason Lo studied mathematics as an undergraduate at the University of Sydney and the Australian National University. In 2010, he completed his PhD at Stanford University under the supervision of Jun Li. Before coming to Illinois, he was a postdoctoral fellow at the University of Missouri-Columbia (with a one and a half-year break, during which he completed his Taiwanese military service). His research interests lie in algebraic geometry, and more specifically, the study of stability conditions and moduli problems in derived categories. While not doing math, he enjoys running and learning the Amis language.

Cary Malkiewich

J.L. Doob Research Assistant Professor
PhD 2014, Stanford University

Cary Malkiewich hails from Worcester, Massachusetts, and got his bachelors degree from Princeton University. He completed his PhD at Stanford University under the direction of Ralph Cohen. Cary's research interests lie broadly in algebraic topology and smooth manifolds. He has recently studied applications of calculus of functors to string topology, and how both algebraic K-theory of spaces and topological Hochschild homology interact with Koszul duality. In his free time Cary enjoys running, cooking, retro gaming, and spending time with his wife.


Ruth Davidson


Jason Lo


Cary Malkiewich


Alexander Miller

Alexander Miller

J.L. Doob Research Assistant Professor
PhD 2013, University of Minnesota

Alexander Miller grew up in Minnesota and got his PhD in 2013 from the University of Minnesota. He is interested in combinatorics and reflection groups.

Detchat Samart

J.L. Doob Research Assistant Professor
PhD 2014 Texas A & M University

Hailing from Thailand, Detchat Samart attended Texas A&M University in 2009 as a doctoral student. Before that he received his bachelor's degree in mathematics from Chulalongkorn University in Bangkok. He completed his PhD in 2014 under the supervision of Matthew Papanikolas. His research focuses on Mahler measures and its connection with values of L-functions and other special functions. He is also interested in modular forms and arithmetic of algebraic varieties. During the Spring 2015 semester, he will visit the Centre de Recherches Mathématiques in Montreal and return to Illinois for the Fall 2015 semester. Besides doing math, he also enjoys music-related activities, travelling, and playing ping pong.

Jenya Sapir

J.L. Doob Research Assistant Professor
PhD 2014, Stanford University

Jenya Sapir got her PhD in 2014 from Stanford University, under the supervision of Maryam Mirzakhani. Her research interests are in low dimensional topology and geometric group theory. Specifically, she is interested in the various ways to study curves on surfaces. In her free time, Jenya enjoys backpacking and ceramics.

Zoran Vondraček

Visiting Assistant Professor
PhD 1990, University of Florida

After receiving his PhD, Zoran Vondraček moved to his native Croatia where he is currently a professor of mathematics at the University of Zagreb. In 1994-95 he was a Humboldt Fellow in Saarbrücken, Germany, in 1998-99 he held a visiting position at the University of Florida, and in 2006-07 he was a visiting professor at the Illinois. His work is in the area of stochastic processes and probabilistic potential theory. Around 2002 he started collaboration with Renming Song which since then has resulted in over 25 papers and one monograph.

Samantha Xu

Visiting Assistant Professor
PhD 2014, UCLA

Samantha Xu grew up in Tucson, Arizona, and she completed her undergraduate degree in mathematics at University of Arizona. She completed her PhD in mathematics at UCLA under the supervision of Rowan Killip. Her research interest is in probabilistic methods for Hamiltonian PDEs: in particular, the construction and analysis of invariant Gibbs measures. Outside of mathematics, she enjoys tending to her ever growing collection of plants, trying out new foods, and cheering for the Arizona Wildcats (Bear Down, Arizona!).


Detchat Samart


Jenya Sapir


Zoran Vondraček


Samantha Xu

Faculty News

Kedem, Rezk and Solecki receive scholar appointments

The Department of Mathematics is proud to announce 2014-2016 appointments of three faculty members: Rinat Kedem as the Lois M. Lackner Faculty Scholar, Charles Rezk as the Kuo-Tsai Chen Faculty Scholar, and Slawomir Solecki as the Kenneth I. Appel Faculty Scholar. Each will receive $5,000 in each of the next two years to support his/her efforts.

Rinat Kedem is an outstanding scholar and teacher; her work demonstrates that she is one of those rare individuals who can not only master a breadth of topics, but also has the technical prowess to make deep and significant contributions bridging the gap between mathematics and physics. Her research informs her teaching, and allows her to reach students working in many different areas. She has been doing groundbreaking work at the interface of mathematical physics and combinatorial representation theory. In particular, she is a leader in the study of integrable statistical mechanical models and cluster algebras, which are mathematical objects which arise in a myriad of settings, ranging from canonical bases in representations of quantum groups, discrete integrable systems to quiver representations to Poisson geometry. Kedem was also a pioneer in the study of fermionic character formulas in representation theory, and applied them to the study of problems in condensed matter physics. The rigorous proofs of these formulas led to the connection to cluster algebras. Kedem has a special and unique ability to forge ahead and look for possible connections between her own work and other areas of both mathematics and theoretical physics, which is facilitated by her command of both languages. Kedem was an invited speaker in the mathematical physics section of the 2014 ICM. She is deeply involved with teaching at both the graduate and undergraduate levels; she ran a large summer REGS in 2012 (with M. Bergvelt) on cluster algebras and integrable systems and currently supervises two doctoral students. At the undergraduate level, she is currently working on curricular reform; namely flipping the algebra classes Math 416 and 417.

The Lois M. Lackner Faculty Scholar appointment has been made possible by a generous gift from University of Illinois alumna Dr. Lois M. Lacker. Dr. Lackner holds three degrees from the University of Illinois: B.S. in the Teaching of Mathematics (1957), M.S. in the Teaching of Mathematics (1958), and Ph.D. in Education (1968).

Charles Rezk is an outstanding scholar and teacher; he is a leader in research at the interface of algebraic topology and higher category theory. Higher category theory involves the study of, roughly speaking, maps between maps between maps, ad infinitum. This has surprising connections to mathematical physics, and plays a central role in topological quantum field theory. Rezk was an invited speaker in the topology section of the 2014 ICM. Rezk is also a stellar teacher, having been on the List of Teachers Ranked as Excellent seven times in the last three years. He is active in graduate education, having served as advisor to three students who have graduated with Ph.D.s. He is currently supervising four students.

Kuo-Tai Chen was a distinguished faculty member of the mathematics department from 1967-1987. Chen is best known for his work in algebraic topology. His work on iterated integrals (basically de Rahm cohomology for path spaces) is fundamental to the underpinnings of rational homotopy theory and Sullivan's development of minimal models.

Slawomir Solecki is a world renowned scholar in mathematical logic, in particular, in descriptive set theory and its interactions with analysis, topology, and combinatorics. Solecki was an invited speaker in the logic section of the 2014 ICM. One highlight of his recent work is a proof of the first instance of a conjectured dichotomy characterizing Borel equivalence relations which are reducible to orbit equivalence relations of Polish group actions. He also clarified the relationship between extreme amenability of groups and concentration of measure by proving a Ramsey theorem using fixed point methods from algebraic topology, and developed an abstract, unified approach to finite pure Ramsey theory (which is a very active area of combinatorics). Solecki's work stands out for its breadth and the wonderful applications of logic to study problems in other areas of mathematics. Solecki received the Departmental Distinguished Teaching Award for tenured faculty in 2010, and has appeared on the List of Teachers Ranked as Excellent five times since then; students comment on his contagious enthusiasm for mathematics. Solecki is also a leader in graduate education, having supervised seven doctoral dissertations in the last seven years, with another three students in the pipeline.

Kenneth I. Appel was a distinguished faculty member of the mathematics department from 1961-1993. Appel won (with Wolfgang Haken) the Fulkerson Prize for their proof of the Four Color theorem, but he is also known for his work in group theory (notably work with Schupp on Artin groups) and mathematical logic.

Henson receives Shoenfield Prize

At the 2014 Association for Symbolic Logic (ASL) annual meeting, Professor Emeritus C. Ward Henson received a 2013 Shoenfield Prize for outstanding expository writing in the field of logic for his paper with Itaï Ben Yaacov, Alexander Berenstein, and Alexander Usvyatsov "Model Theory for Metric Structures," Model Theory with Applications to Algebra and Analysis, Vol. II, Lecture Notes of the London Mathematical Society, No. 350, Cambridge University Press, 2008, 315–427. The Shoenfield Prize was established by the ASL to honor the late Joseph R. Shoenfield for his many outstanding contributions to logic and to the ASL.

Ford, Hur and Nevins receive CAS appointments

Kevin Ford, Vera Hur, and Tom Nevins, have received 2014-15 appointments in the the Center for Advanced Study (CAS).

Kevin Ford, appointed an Associate, is extending and adapting innovative techniques, developed recently with Trevor Wooley to analyze integer solutions of special systems of equations known as Vinogradov's systems, to greatly improve bounds for the integer solutions of more general types of Diophantine systems of equations. The systems under consideration possess a certain symmetry and other special structure, and the goal is to prove that the number of solutions is small whenever the number of variables in the system is also small in a certain sense.

Vera Hur, apppointed a Beckman Fellow, 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. Her 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.

Tom Nevins is using his Associate appointment to participate in a semester-long Geometric Representation Theory program at the Mathematical Sciences Research Institute in Berkeley, CA. He is working with collaborators at MSRI to continue advancing his work on D-modules and applications. Nevins has been using the algebraic theory of differential equations, as encoded in structures called "D-modules," to establish new tools in geometric representation theory and apply those to concrete open problems in the field.

Berndt and Malik awarded Beckman Research Award

Professor Bruce Berndt and graduate student Amita Malik recently received a Research Assistantship from the Research Board, which was also designated as a Beckman Award, given to only a small percentage of research assistants. Amita Malik will read and work on problems on mock theta functions, the subject of the fifth and final volume that Berndt is writing with Professor George Andrews of Pennsylvania State University on Ramanujan's lost notebook. Mock theta functions were the last discovery of India's great mathematician Srinivasa Ramanujan before he died at the age of 32.

Straub receives G. De B. Robinson award

The Canadian Mathematical Society (CMS) has announced the two winners of this year's G. De B. Robinson awards for research published in the journals of the CMS. One of the awards was given to Jonathan M. Borwein, Armin Straub, James Wan, and Wadim Zudilin for their paper "Densities of Short Uniform Random Walks," with an appendix by D. Zagier. Armin Straub is a J. L. Doob Research Assistant Professor in the Department of Mathematics at the University of Illinois.

Math outreach

AWM hosts GEMS workshop

Over the last year, the Association for Women in Mathematics chapter at the University of Illinios has been expanding its outreach component. The Girls Engaged in Math and Science (GEMS) Workshop for middle school girls has been particularly successful. This fall the theme was Geometry and Nature, and topics included learning about bubbles, crystals, and snowflakes. These initiatives have been supported from the Office of Public Engagement, the Department of Mathematics, as well as Kay Kirkpatrick's NSF CAREER Grant.

IGL in the schools

The Illinois Geometry Lab (IGL) is committed to public engagement and mathematical education. This fall, the members of IGL conducted a number of activities, including classroom visits where they explored Platonic and Archimedian solids with the Math Team at Urbana High School, learned about the geometry of bubbles with students from Rantoul Township High School, and studied probability with students at ChiPrep in Chicago.

The IGL's passion for mathematics extends beyond the walls of the classroom This year's annual Gathering for Gardner marked Martin Gardner's 100th birthday and featured magic tricks, visual paradoxes, and puzzles. The IGL has also partnered with the Association for Women in Mathematics to start the GEMS Workshop for middle schoolers.

Photo by Claire Merriman

Photo by Laura Schaposnik

Middle school girls Azure Rubel, Bianca Rubel, and Natalia Pittendrigh (above) explore geometric shapes in nature by constructing different models at one of the GEMS workshops held this fall. Volunteers Anna Yang, at left (a graduate student in the chemistry) and Vanessa Rivera-Quiñones (a graduate student in mathematics). Photo at right: Middle school girls Anna Kinderman and Cherin Lee explore the symmetries of snowflakes.

Conferences

Poisson 2014 – Conference, School and Prize

The Poisson biennial meetings started in 1998 with the first meeting held at the Banach Center in Warsaw. This was followed by meetings at the CIRM in Luminy, at IST in Lisbon, at the University of Luxembourg, at the National Olympics Memorial Youth Center in Tokyo, at EPFL in Lausanne, at IMPA in Rio de Janeiro, and at the University of Utrecht, the Netherlands. In 2014 the meeting came to Illilnois. Poisson 2014 was the first meeting in the series to be held in North America.

The conference, held August 4-8, was attended by around 140 participants, with roughly half of those participants coming from overseas. A Summer School was held in the week prior to the conference, with the aim of providing graduate students and postdocs with the necessary background so they could profit from the conference. There were close to 100 participants in the School.

The talks and courses covered a wide range of areas arising from Poisson brackets and their applications, including symplectic, Dirac, generalized complex and related structures, Lie algebroids and Lie groupoids, Poisson algebras and Poisson varieties, quantization and higher structures, quantum groups and representation theory.

During Poisson 2014 the winners of the 2014 Lichnerowicz prize were announced. The recipients were David Li-Bland and Ioan Marcut. Li-Bland was a PhD student of Eckhard Meinrenken in Toronto and he is now on a NSF postdoc at UC Berkeley. Marcut was a postdoc here at Illinois in 2013-14. Before, he was a PhD student in Utrecht under the guidance of Marius Crainic. The prize was awarded to Marcut for his fundamental contributions to the global geometry of Poisson structures, most notably through his (semi-) local normal forms and rigidity results. He is now in a tenure track position in Nijmegen, the Netherlands.

UI mathematics professors Eugene Lerman and Rui Loja Fernandes were in charge of the local organization, with the help of J.J. Uhl Research Assistant Professor Jordan Watts and graduate students Daan Michiels and Joel Villatoro.

Number Theory conferences

This spring, the Department of Mathematics hosted back-to-back number theory conferences, both in the department's home, Altgeld Hall. The Midwest Number Theory Conference for Graduate Students and Recent PhDs (MNTGC10) was held on June 5-6, followed by the Number Theory at Illinois: A Conference in Memory of the Batemans and Heini Halberstam (Bateman-Halberstam Conference) on June 5-7, 2014.

MNTGC10 was the tenth edition of a regional meeting that rotates among universities in the area with strong number theory programs. It featured a plenary talk by Professor Kevin Ford of the University of Illinois and 36 contributed talks.

There were about 100 participants from some 40 universities, including ones in Europe and Asia. The organizers of the meeting were Illinois graduate students Katie Anders, Nick Andersen, Amita Malik, and M.Tip Phaovibul and instructor Rebekah Gilbert. Faculty advisors were Professor Bruce Berndt and Professor Emeritus Harold Diamond.

The Bateman-Halberstam conference was an international gathering of the type the department has hosted periodically. Participants ranged from recent PhDs and rising young stars to leading figures in number theory. Twenty-two invited talks and 10 contributed talks were presented, reflecting a broad spectrum of topics. A total of 138 mathematicians, representing 15 countries took part; from the U.S., 22 states were represented. An attendee of note was Eira Scourfield, who came from England to honor her mentor, Professor Halberstam. The conference was organized by faculty members in the Number Theory area, with Diamond serving as chair.

Additional conference activities included a banquet at the Illini Union with talks and video clips about our honorees; a party for MNTGC10 participants; and group photos (posted on the conferences' website www.math.illinois.edu/nt2014).

A proceedings volume of the conference, edited by Berndt and Diamond, is being prepared as a special issue of the International Journal of Number Theory.

The meetings were supported by grants from the National Science Foundation, the University of Illinois Department of Mathematics, and the Number Theory Foundation.

Midwest PDE Conference, October 18, 2014

The Departmenet of Mathematics was host to the 74th Midwest PDE (MWPDE) meeting on October 18-19 of this year. Local organizers were Vera Hur, Nikos Tzirakis, Ed Kirr and Burak Erdogan. The MWPDE has been running twice a year since May 1977, when it was first held at Northwestern. It is funded by a National Science Foundation grant that is held at the University of Illinois at Chicago, and the location of the meetings rotates among many different university mathematics departments in the midwest. Over forty people participated in the meeting, which featured talks by

- Ike Agbanusi (Univ. of Illinois)
- Mimi Dai (Univ. of Illinois Chicago)
- Ciprian Demeter (Indiana University)
- Aseel Farhat (Univ. of Indiana)
- Irene Gamba (Univ. of Texas Austin)
- Mat Johnson (Univ. of Kansas)
- Irina Nenciu (Univ. of Illinois Chicago)
- Keith Promislow (Michigan State)
- Leeds Tao (Univ. of Illinois)
- Michael Weinstein (Columbia)
- Sijue Wu (Univ. of Michigan)
- Yao Yao (Univ. of Wisconsin)

Midwest Actuarial Student Conference

For one Saturday in October, Champaign was the center of the actuarial science universe. The 2nd Annual Midwest Actuarial Student Conference (MASC) was held on the University of Illinois campus on October 18. Approximately 370 undergraduate and graduate actuarial science students, from 26 midwestern colleges and universities, registered for the conference, which was held in the newly renovated Lincoln Hall Theater.

Professor Rick Gorvett, Director of the University of Illinois Actuarial Science Program, had wanted to create a multicollege conference for actuarial science students for a number of years. When he mentioned this desire to some student officers of Illinois' Actuarial Science Club the idea quickly took root. It was agreed that Purdue would host the first Midwest Actuarial Student Conference, and Illinois would host the second, with the two schools' faculty program directors and their actuarial science club officers jointly organizing both events.

Working with Purdue and the University of Michigan (which will host the 3rd Annual MASC in 2015), Illinois students and faculty organized a full-day conference with a variety of sessions and topics of interest to actuarial science students. Annie Fowlkes, the President of the Illinois Actuarial Science Club, took the lead in organizing regular conference calls and overseeing logistics.

Session topics included: university outreach efforts by the professional actuarial societies; a recent actuarial graduates panel; predictive modeling and its potential applications in actuarial science; professionalism and business ethics; nontraditional actuarial roles; interviewing advice; information for students interested in attending graduate school; and actuarial exam-taking advice.

The lead (Platinum) sponsor of the conference was the Casualty Actuarial Society. The Society of Actuaries was one of the Gold sponsors. Other sponsors at various levels included a number of insurance companies, consulting firms, and actuarial service organizations.

Upcoming conferences in 2015

Graduate Student Topology and Geometry conference

For the second time since 2008, the annual Graduate Student Topology and Geometry conference will be held at the University of Illinois Urbana-Champaign on March 28-29 2015.

In its 13th edition, the conference is intended to bring together graduate students in geometry and topology from different institutions to interact with young and distinguished researchers in these fields. Most of the talks will be given by graduate students and these will be complimented with longer talks by distinguished plenary speakers and young faculty.

Our most recent PhD alumni:

Who they are and where they are now

- Katherine Anders, Assistant Professor, University of Texas, Tyler, and Project NEXT Fellow
- Brian Benson, Visiting Assistant Professor, Kansas State University
- Ilkyoo Choi, Postdoctoral researcher, Korea Advanced Institute of Science and Technology (KAIST)
- Noel DeJarnette, Assistant Director, Mathematics and Science Support Center, University of Cincinnati
- Ser-Wei Fu, Non-tenure-track Assistant Professor, Temple University
- Ping Hu, Research Fellow, Department of Computer Science, University of Warwick, Coventry
- Jaehoon Kim, Research Fellow, University of Birmingham
- Ioannis Konstantoulas, Wylie and Burgess Assistant Professor Lecturer, University of Utah
- Chunyi Li, Postdoctoral Research Fellow, University of Edinburgh
- Anton Lukyanenko, RTG Assistant Professor, University of Michigan
- Gregory Puleo, Postdoctoral Research Associate, Coordinated Science Laboratory, University of Illinois
- Uma Ravat, Lecturer in Statistics, University of Illinois at Urbana-Champaign
- Brian Ray, Senior Analyst, Daniel H. Wagner Associates
- Austin Rochford, Data scientist, Monetate, Philadelphia
- Daniel Schultz, Research Associate, Pennsylvania State University
- Jiashun Shen, International Business Department, Kunshan Rural and Commercial Bank, Suzhou, Jiangsu, China
- Sarah Son, Visiting Instructor, Korea National University of Education
- Rui Song, Predictive Modeler, Plymouth Rock Assurance Company
- Sineenuch Suwannaphichat, Lecturer, Silpakorn University, Thailand
- Wipawee Tangjai, Lecturer, Mahasarakam University, Thailand
- Vyron Vellis, Research Postdoctoral Position, University of Jyväskylä, Finland
- Yat-Sen Wong, Research Scientist, InsideSales.com
- Lechao Xiao, Hans Rademacher Instructor for Mathematics, University of Pennsylvania
- Qiang Zeng, Visiting Postdoctoral Fellow in Mathematics, Harvard University

IMSE launchpad for joint projects

IMSE (Initiative for Mathematical Sciences and Engineering) was created two years ago with generous funding from the UI Vice Chancellor for Research, with the long-term goal of creating a center for the interaction of mathematics and engineering. Advances and innovations in mathematics and engineering are increasingly enabled by cross-fertilization. The dual objectives of fostering cutting-edge mathematics as indispensable in addressing significant engineering applications and of advancing the next generation of mathematics through the infusion of new classes of problems hardly can be addressed anywhere in the nation better than on the Urbana-Champaign campus.

Over the past two years IMSE proved itself a catalyst for mathematicians and engineers to work together, by engaging the former in emergent engineering applications and equipping the latter with state-of-the-art mathematical tools. IMSE hosts a seminar series, supports workshops and summer schools, and awards small grants to across-Green-Street collaborative teams. Learn more about IMSE activities at http://imse.math.illinois.edu.

IMSE seeks new modalities and models of interactions between engineers and mathematicians. The PI4 program was initiated with IMSE support and uses it as a launchpad for many joint projects between our department and researchers in the College of Engineering.

New volunteer leadership program

This fall, Mathematics Ambassadors represented the department at a breakfast with the External Review committee on campus to study our department, and at lunch with the Mathematics Development Advisory Board. In addition to helping at Orange and Blue day on the quad, the Math Ambassadors worked at the homecoming party setting up, selling t-shirts and enouraging participation in games.

The Mathematics Ambassadors program, new this past fall, selects junior or senior mathematics undergraduate majors based on strong academics, demonstrated leadership and involvement, and commitment to the department, college, and university.

Learn more about the Mathematics Ambassadors program at www.math.illinois.edu/UndergraduateProgram/mathematicsambassadors.html.

Mathematics Ambassadors, from left: Yu Alex Fu, Joeseph Zeller, Caroline Ferris, Chengzhe Jin, Sraddha Acharya, Shaoyang Antonio Luo, Xueqi Wang, and Ian Lee.

PI4 summer experience broadens prospects for employment

One of the new programs here in the Department of Mathematics, the Program for Interdisciplinary and Industrial Internships at Illinois (PI4), got off to a fast and exciting start in 2014. Over thirty graduate students were engaged in, and supported by, this program during the summer. Many of our students interned in myriad locations, both industrial and academic, and participated in several group projects supervised by faculty in our department.

The summer kicked off with a two-week Computational Mathematics Boot Camp, in which Prof. Anil Hirani threw students into the deep end of scientific computing. This activity was aimed at getting students up to speed working in a modern scientific computing environment based on a flavor of Scientific Python. After the boot camp, the students split into one of three tracks, depending on their experience level and non-mathematical interests.

The first group was supervised by Prof. Jared Bronski. In this group, the students developed their simulation skills through weekly project work on models for dynamics on networks. These included models for determining consensus amongst various agents sharing partial information, and even encoding and studying a numerical simulation of the game Monopoly! Prof. Lee DeVille supervised a group of more senior students with a focus on stochastic processes in biology. The two final projects were on the dynamics of competing and cooperating species in complex ecosystems, and on the phylogeny, i.e. "family trees," of groups of species competing for common resources. The reports from these group projects can be found at https://pi4.math.illinois.edu/?p=302.

Finally, a diverse group of students, ranging from incoming first-years to final-years, tackled real-world problems at local labs and companies, and government agencies around the country (see the cover article in this issue).

When all the chalk cleared, it was apparent to many of the students how transferrable the skills gained in the computational boot camp really were: almost every student reported that they were immediately able to use those coding skills in their summer projects. Moreover, in a post-summer survey, a large majority of the students felt that the summer experience would broaden their prospects for employment after graduation.

All in all, the summer PI4 program was a resounding success, and will take place again in future summers. We are always looking for greater faculty and student involvement in our program. If you are a graduate student who would like to participate, or a faculty member who would like to become involved in this program, please contact us at <pi4@illinois.edu>.

Blackwell wins National Medal of Science

On October 3, 2014, President Obama announced the ten winners of this year's National Medal of Science, the nation's highest honor for leadership in Science. The list includes a notable Illinois alumnus, David Blackwell, who earned his Ph.D. in mathematics from Illinois in 1941. Blackwell died in 2010.

Growing up the son of an African-American rail worker in the 1920s, David Blackwell would have faced slim hopes for college if not for his unmistakable brilliance with numbers. By age 16 he had entered the University of Illinois, and by age 22 he earned a PhD in mathematics, launching a stellar career. Once he left the College of LAS (where he studied under the renowned Joseph Doob), Blackwell's abilities—with numbers and in dealing with people—were put to the test, because so many mathematicians were unaccustomed to working with African-Americans. By 1954, however, after working at several historically black universities (including 10 years at Howard University), he became a mathematics professor at the University of California at Berkeley.

He would become the first African-American tenured professor at Berkeley, and also the first African-American scholar inducted into the National Academy of Sciences (in 1965). Blackwell was chairman of the Department of Statistics at Berkeley from 1964 to 1968, and would later serve as assistant dean of Berkeley's College of Letters and Sciences.

Blackwell is known for fundamental contributions to many fields in mathematics, including statistics, sequential analysis, and game theory. His 1954 book, *Theory of Games and Statistical Decisions*, coauthored with M.A. Girshick, is considered a classic. He was also known for being an outstanding lecturer, receiving the Berkeley Citation in 1988 for extraordinary contributions to the life of the university.

Yesilyurt receives Ikeda Research Award

Hamza Yesilyurt (PhD 2004) is the recipient of the 2013 Masatoshi Gündüz Ikeda Research Award. The annual award is given in memory of Prof. Dr. M. G. Ikeda, who made many contributions to Turkish mathematics. The recipient, who must be under 45 years of age, is chosen for his or her contributions to research. In particular, Yesilyurt was cited for his research on mock theta functions, which appeared in his doctoral dissertation, written under the direction of Professor Bruce Berndt.

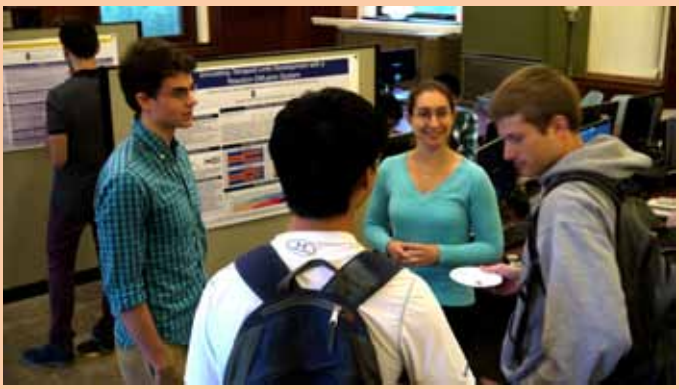
Samotij receives König Prize

Wojciech Samotij (PhD 2010) is the 2014 recipient of the Dénes König Prize awarded by SIAM for the best paper by a student in combinatorics who graduated in the last 4 years [J. Balogh and W. Samotij, The number of $K_{s,t}$-free graphs, *Journal of the London Mathematical Society* (2011) 83, 368–388]. His thesis, which contained this paper, was completed under the direction of Jozsef Balogh. Samotij also received a 2013 EuroComb prize. He was postdoc at Tel Aviv University in 2010-11 and 2012-13, and a Fellow at Trinity College, Cambridge University (UK), from 2010-2014. This year Samotij started a tenure-track faculty position at the School of Mathematical Sciences, Tel Aviv University, Israel.

PhD Reunion 2014

The department held a reunion for PhD alumni on September 12-13, 2014. Activities on Friday began with a tour of the Altgeld Hall chimes tower and campus, followed by a panel discussion and poster session. The panel discussion on Career Paths after Graduate School was well attended. Panelists were: Gosia Konwerska (Wolfram Research), Catherine Meadows (Naval Research Laboratory), and Manmohan Kaur (Professor, Benedictine University); pictured below. A poster session presented by current graduate students showcased some 19 different research projects (lower photo).

The keynote lecture, *A Random Walk through Mathematical Physics*, was given by Assistant Professor Kay Kirkpatrick. The reunion concluded with the department picnic at Crystal Lake Park in Urbana. Beautiful fall weather was enjoyed by all.



Photos by Andrew Stengele.

Research experiences for actuarial science students

A new opportunity is being rolled out for many of our undergraduate actuarial science students: a formal research experience.

This past summer, the University of Illinois' Actuarial Science Program received a three-year, six-figure grant from the Society of Actuaries to implement a formal program of undergraduate research opportunities. The grant covers academic years 2014–15 through 2016–17.

Several years ago, the University of Illinois was named a Center of Actuarial Excellence (CAE) by the Society of Actuaries—one of only 14 such schools in the United States. In addition to the prestige accompanying this designation, being a CAE qualifies a school to apply for competitive educational and research grants. Illinois' proposal, "An Undergraduate Research Program in Risk and Actuarial Science," to build and implement a robust program of undergraduate research opportunities for many of our actuarial students, was selected as a winning Educational Grant application.

"Much research in the risk and actuarial science fields is performed by corporate and consulting actuaries and other actuarial practitioners, which the vast majority of our students will become upon graduation," said Rick Gorvett, director of the Illinois Actuarial Science Program and the principal investigator on the CAE grant. "A program like this is a tremendous opportunity for students to gain experience in research processes and techniques, which will be useful throughout their careers whenever they encounter a situation or problem that requires the collection of information, thoughtful analysis, and project planning. Also, it's an opportunity for students to see for themselves that research can be an enjoyable activity, and inspire them to pursue such activities on their own—or at least not to be afraid of research!"

Over the course of the first academic year of the program, Gorvett anticipates involving at least 25-30 students, on about 10 projects. End products will vary according to the particular project, but will include a mixture of summary papers, poster sessions, written case studies, and presentations, all primarily written or delivered by students. Deliverables from the projects will be posted on a newly-created research program website, to be accessible by other students at universities around the world, as well as by actuarial and risk practitioners, for the benefit of everyone.

All of Illinois' actuarial science professors will participate in the program, managing projects in their particular areas of interest and expertise. Included among the initial projects are:

- A multi-part, multi-level regression model for the demand for U.S. inpatient mental healthcare.
- The pricing of conditional Asian options.
- Risk measures for variable annuity guaranteed benefits.
- An actuarial student user's guide to the R programming language.
- Actuarial and risk management applications for agent-based models.
- Differences in risk perceptions between societies and cultures.

Each year during the three-year implementation period, the number of projects and of students participating in research will increase. In the second and third years, courses related to undergraduate research activities will be created and offered to students. Also, several companies will be asked to participate as advisors, providing the program with insights as to what current topics and research opportunities would be most relevant and reasonable for students to pursue.

All in all, an exciting opportunity for students and faculty alike!

New summer REGS program for NetMath TAs

We are pleased to announce the start of a REGS program in NetMath. Math graduate students who have acquired at least three semesters of teaching experience with NetMath will be eligible to apply for one summer of support with their advisor. Funding for up to three REGS will be awarded on a competitive basis, starting Summer 2015. Application packets will be available in Spring 2015.

NetMath is also announces two new positions. NetMath is pleased to welcome Bruce Carpenter, Associate Director of Instruction and Josey Nance, Coordinator of High School Programs.

Bruce Carpenter had served as Visiting Lecturer in the NetMath program since 2012. He brings a wealth of teaching experience to NetMath, both in large and small lecture/discussion formats as well as in computer-based classes. Bruce has a deep-rooted interest and many years of experience in developing software and courseware for online mathematics courses. He has a Master's degree and a PhD, both from the Department of Mathematics at the University of Illinois.

Joe Nance worked as a high school instructor in China prior to accepting his NetMath position. Besides maintaining and developing the NetMath Partner High School program, Joe is directing efforts toward expanding the program in China. Joe has a Bachelor's degree in Mathematics with a minor in Physics and a Master's degree in Mathematics from the University of Illinois.

Robert Weber

by Jim Dey

When Robert "Robbie" Weber enrolled as a freshman at the University of Illinois in 2011, he knew he wanted to study math and computer science. Now as he approaches graduation and focuses on graduate school, Weber is confident he wants to teach those subjects someday in a college classroom.

"I really didn't have any clear idea when I was leaving high school what I wanted to do," said Weber, a 22-year-old senior from the DuPage County community of Itasca. "But I really like teaching."

How does a college senior know he likes to teach? Well, Weber is one of just a few undergraduates who are active in the classroom, working as a teaching assistant in lower-level computer science classes.

"It's an honor to be brought back as a course assistant," said Steve Herzog, a student advisor in computer science department.

An honor it may be, but honors are old hat to Weber. He collects them by the boatload. Both a Chancellor's Scholarand a James scholar, Weber has won awards for his academic prowess in three departments—mathematics, computer science and his minor of German. He's also attracted attention for his research, his most notable effort involving combinatorics (a branch of mathematics concerning the study of finite or countable discrete structures.

Mathematics professor A.J. Hildebrand first met Weber when he was a student in his class, Probability and the Real World.

"He, along with two other students, did a class project, 'Can One Fake Randomness?' that proved to be wildly successful and resulted in an award-winning poster presentation at the University's Undergraduate Research Symposium in April 2014," said Hildebrand. "...There is probably a lot more to say about him than what I know."

Weber was drawn to math and computer science in high school, ultimately deciding he wanted a combined major when he attended college. So it's striking that he was first attracted to the UI when he was in middle school because of its men's basketball team, specifically the Fighting Illini's 2004-05 Final Four squad.

"I was (and still am) really a big fan of the basketball team," Weber said.

He became an even bigger fan of the UI when he learned it offered a combined major in math and computer science as well as Big 10 basketball.

"It worked out that the things I was interested in outside of academics and the academics were here," he said. "...Illinois hasbeen everything I have hoped for and more."

Despite his accomplishments, Weber noted that math and computer science, both rigorous disciplines, are challenging. "Some things come easy, but a lot of things don't," he said.

Weber said he's intrigued by, among other things, the puzzles that both subjects pose. He likes to be able to "explain my answer and convince everyone that my answer is correct" and "use math to figure out what we can solve and what we can't."

As for his minor of German, a subject in which he said he is "conversational," Weber said he enjoys corresponding in that language with his immigrant grandmother.

It's that love of learning that Weber said he wants to pass on. Research, he said, is fine, but "I want to work with students."

That enthusiasm is why Herzog, his advisor, predicts that Weber "will be a good teacher someday."

"That's a sign of real passion for course material," he said.

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

Fall 2014 UI math contest results

A combined 54 students participated in the first contest event of the academic year, the UI Freshman Math Contest, and the UI Mock Putnam Exam, held back-to-back on September 27, 2014.

The UI Freshman Math Contest is an entry level contest that provides freshmen an opportunity to show their problem solving skills in direct competition against their peers. First offered in 2011, it has become one of our most popular contests. This year's edition was won by Phillip Harris, a Freshman in Math and Computer Science. William Song, also a Freshman in Math and Computer Science, took home Second Prize. Matthew Cho, a student at Uni High, and Fanbo Xiang, a Freshman in DGS, received Honorable Mentions for placing third.

The UI Mock Putnam Exam is a long-running local version of the Putnam Exam, a nationwide math contest for undergraduates that has been dubbed the "world's toughest math test". The exam consists of six challenging math problems, similar in nature to problems on Putnam contests, but a bit easier. The winner of this year's edition was Haidong Gong, a Sophomore in Mathematics and co-winner of last year's UI Freshman Math Contest. Second Prize went to Yifei Li, a Junior in Mathematics and Physics. Zhaodong Cai, a Sophomore in Mathematics, received Third Prize.

This year's contests have been organized by A.J. Hildebrand, Timur Oikhberg, M. Tip Phaovibul, and Hiram Golze. For more information, visit the UI Math Contests webpage at www.math.illinois.edu/contests.html.

Donor Honor Roll *(July 1, 2013 – June 30, 2014)*

We honor those who have given so generously to the Department of Mathematics
to strengthen and enhance excellence in mathematics at Illinois.

The Honor Roll of Donors is not published online for security reasons.
If you would like a hardcopy of this issue that does contain the
Honor Roll of Donors, please contact the editor
(see page 2 for contact information).

Homecoming 2014

Some 100 math faculty, students, and alumni attended Homecoming 2014 in front of Altgeld Hall on a warm fall day on October 25, 2014.

Next year's homecoming party will be on Saturday, October 24, 2015. Visit www.math.illinois.edu/homecoming/ for details about next year's event.

Photos by Andrew Stengele.

Richard Jerrard
1925-2014

Richard Patterson Jerrard died at Carle Foundation Hospital in Urbana on Wednesday, July 23, 2014, his 89th birthday, after a long illness.

The son of Leigh Patterson Jerrard and Lillian Taylor Jerrard, he was born and grew up in Winnetka, where he attended public schools. He spent childhood summers in a log cabin on the Brule River in northwest Wisconsin with his family. His love for the north woods remained with him throughout his life.

In the summer of 1943, he graduated from New Trier High School, and then enlisted in the Army Air Corps. He was sent to a hotel in Miami Beach, where he roomed with seven other recruits, to begin basic training. In the spring of 1945 after flight training, he received his wings and was commissioned as a second lieutenant.

He was sent to Madison, Wis., where his tall, thin physique and scholarly ways earned him the nickname "the Flying Pencil." He made many practice flights while he waited for orders to go overseas to Japan as a pilot on a B-17 Flying Fortress. The Japanese surrendered, the war ended, and he was discharged.

Following the war, he enrolled in the University of Wisconsin. At first he was assigned to the same barracks at Truax Field that he had lived in while in the Air Corps. In later years, he liked to recall that, when an attractive female classmate asked him what he had done in the war and he told her he had been a pilot, she replied, "That's what they all say."

He received his bachelor's and master's degree in mechanical engineering from Wisconsin in the spring of 1950. That fall, he began to work as an engineer at a research laboratory at General Electric in Schenectady, N.Y., under the supervision of Hillel Poritsky. He met his future wife, Dr. Poritsky's daughter, when invited home for dinner.

In 1954, he started to work on his doctorate in mathematics at the University of Michigan in Ann Arbor. He received his Ph.D. in 1957 and went to work at Bell Telephone Laboratory in Summit, N.J., joining a group researching vibrations in quartz crystals. He felt that there he was getting far away from mathematics. He began to look for a job in academia after visiting Ann Arbor in June 1958 to obtain his doctoral hood.

Very soon afterwards, he received, by phone, an offer from the University of Illinois' Mathematics Department, which he accepted on the spot. In September 1958, he came to Champaign-Urbana to begin teaching and remained here until he retired in 1995, writing and publishing over 20 papers in mathematics journals.

His mathematical research was unusually broad by today's standards, and included papers in the applied mathematics, algebraic topology, number theory, complex analysis. He is remembered for his proof of a theorem which states that, given any simple closed (analytic) curve on the plane, there exists a square whose vertices all sit on the curve. In 2007 he was awarded the George Polya Award, along with John Wetzel and two others, for a paper entitled "Straw in a Box."

He also devoted a great deal of energy and care to university governance; he spent time as chair of the University Senate Council and was a member of numerous committees, including the University Senates Conference, the Graduate College Executive Committee and the LAS Executive Committee. In the Mathematics Department, he served a term as director of graduate studies.

He spent three years in Warwick University in England and a year in Cambridge on sabbatical leave, doing research, and three terms teaching at Deep Springs College, a small experimental college and cattle ranch in the California high desert. He and his wife were co-authors of "The Grad School Handbook" published by Perigee Press, a division of Penguin Putnam.

He was treasurer of the Funeral Consumers Society and had been treasurer of the C-U Montessori Society. After he retired, he worked as a volunteer with Provena Hospital to help older people. On one occasion, he managed to secure a passport for a woman who tried to join her son in Mexico but was thwarted by the lack of a birth certificate. For many years, he also coached the Math Club at Urbana High School.

He is survived by his wife of 63 years, Margot Jerrard; daughter Laura Jerrard of Oakland, Calif., married to Andrew Blackwood, and sons Leigh Jerrard of Los Angeles and Robert Jerrard of Toronto, Ontario, married to Nara Jung; and two grandchildren, Niko and Kailee. He is also survived by his brother John of Batavia, a niece and two nephews.

Contributions in Richard's memory can sent to the University of Illinois Department of Mathematics. Condolences may be offered at renner-wikoffchapel.com.

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!

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Support Actuarial Science through scholarships, fellowships, graderships, and faculty support.

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

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Support our bold plan to renovate Altgeld and Illini Halls to create a collaborative environment for mathematics learning and discovery.

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IJM sponsors annual Doob lecture; welcomes new editor

The *Illinois Journal of Mathematics* (IJM) is sponsoring a Doob lecture to be given at the annual Stochastic Processes and Applications (SPA) meetings in honor of Joseph L. Doob (1910-2004), a founding editor who was instrumental in getting the journal started. The inaugural Doob lecture was given during the 2007 SPA meeting which was hosted by the University of Illinois at Urbana-Champaign. The arrangement is ongoing and is a joint Institute of Mathematical Statistics-Bernoulli Society lecture. The SPA program committee has recently announced that Professor Terry Tao, University of California Los Angeles, has been selected as the Doob lecturer for SPA 2015 in Oxford. In return for IJM support, the Doob lecturer is invited to contribute a paper to IJM based on the lecture.

We are pleased to announce a new addition to the IJM Editorial Board as of May, 2014. Karen Smith is a professor of mathematics at the University of Michigan Ann Arbor, where she is teaching and doing research in algebraic geometry and commutative algebra. Professor Smith also has editorial responsibilities with the *American Journal of Mathematics*, *Advances in Mathematics*, and *American Mathematical Monthly*. IJM editors serve initial terms of four years with the possibility of an extension for a second term. Other members of the IJM Editorial Board are:

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