

Aftermath

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Department of Mathematics

COLLEGE OF SCIENCE | THE UNIVERSITY OF UTAH

FACULTY DISTINCTIONS

by Nat Smale



Congratulations to **Aaron Bertram**, for receiving the University's 2016 Distinguished Mentor Award. The award is given by the Graduate School, and "recognizes faculty who effectively guide graduate students and postdoctoral scholars throughout their professional training in a continuing, multifaceted partnership sustained by mutual respect and concern." Aaron was one of only three recipients of the award in the University this year, joining Fred Adler (2009) and Mladen Bestvina (2013) as Distinguished Mentor Award winners.



Congratulations to **Paul Bresslof**, for being selected as a Fellow of the Society for Industrial and Applied Mathematics, Class of 2016. Paul was selected for contributions to mathematical neuroscience and cell biology, with a particular focus on stochastic processes. From the SIAM website: "SIAM designates as Fellows of the Society certain members who have made outstanding contributions to fields served by SIAM and the communities we represent." Paul joins Ken Golden, Jim Keener, and Graeme Milton as the department's SIAM Fellows.



Congratulations to **Jon Chaika**, who was awarded the Poincaré Chair for 2016-2017, by the Institut Henri Poincaré and the Clay Institute. The award is to "support young mathematicians of great promise during the early stages of their careers". It is a 6-12 month research program, involving a stay at the Institut Henri Poincaré in Paris. Jon will be visiting there during Spring Semester of 2017. It should be noted that the other laureate of the 2016-2017 Poincaré Chair is Emanuele Macri of Northeastern University. Emanuele was a postdoc here at Utah some years back.



Congratulations to **Christopher Hacon**, who was awarded the 2016 E.H. Moore Research Article Prize (along with co-authors Caucher Birkar, Paolo Cascini and James McKernan) for the article "Existence of minimal models for varieties of log general type" in the Journal of the AMS (2010). The Moore Prize is awarded every three years by the American Math Society for an outstanding research article that appeared in one of the AMS primary research journals in the previous six years. James McKernan, one of the other authors, was previously a postdoc here at Utah.

TEACHING AWARDS

by Nat Smale and Aryn DeJulis

Congratulations to **Maggie Cummings**, for receiving the Salt Lake University Institute for Religion and the Latter-day Saints Student Association (LDSSA) 2015-2016 Excellence in Education Award. The award is given each year to an outstanding educator on the University of Utah campus who has demonstrated superior teaching skills, dedication to students, and the love of learning in general.



Congratulations to **Sean McAfee**, for receiving the only Honorable Mention amongst those considered for the 2016 Thomas G. Stockham Medal for Conspicuously Effective Teaching. The late Thomas G. Stockham received a similar teaching award from the Massachusetts Institute of Technology during his graduate career and the "University of Utah's Stockham Medal award was established to mirror that program and encourage excellence among student teachers."



Kelly MacArthur Awarded Professors Off Campus Grant

Kudos to Kelly MacArthur for being awarded a Professors Off Campus grant for the year 2014-2015. This was awarded by the Tanner Humanities Center, and is used to link the University and community by encouraging scholars to go “on site” into the community and develop research and service projects in schools, churches, government offices and public interest groups. Kelly used the grant to help her continue in her ongoing volunteer work in state prisons. She worked with prisoners 2-3 hours a week at both the Timpanogas facility (for women), and Promontory facility (for men). From her previous work there, she determined that what was most appropriate, was for them to work through the Math 1010 structure as a college course. The students had access to texts and online videos during their own time. During “class time”, Kelly, along with several undergraduate volunteers would help them go over the material and work out problems. Homework was collected and exams given, as in a regular class. Each class started with about 40-50 students, who were generally very motivated. There was some attrition as students were occasionally released from prison, or moved to another prison. A couple of students were so enthusiastic, that they chose to remain in their medium security prison in order to continue their coursework, when they could have moved to a low security prison! Kelly said that it was very gratifying work, and that she never felt threatened. She has recently started a geometry course for women prisoners.

ANNA CAMPBELL BLISS

(1925-2015)

by Natasha Carlton

Anna Campbell Bliss, an acclaimed, thought-provoking, and talented artist died on October 12, 2015. Bliss passed away in her Salt Lake City home with her husband, Robert Bliss, by her side. They had been together for 68 years.

Bliss’s work can be found in many locations around Salt Lake City (for example, the Utah State Capitol and Salt Lake City International Airport) and around the world, but University of Utah students do not have to travel very far to see her extraordinary artwork. The Cowles Mathematics Building and the University of Utah’s Nursing Building are two locations on campus where you can find pieces of her collection.

In her book, *Art for a House of Mathematics*, Bliss recalled how the University of Utah’s Department of Mathematics and the Utah Arts Council organized a competition asking “for art that would identify the [Cowles Mathematics] building as a ‘House of Mathematics’ and convey its wide-ranging influence.” The Department and the Utah Arts Council accepted her proposal. Within the Cowles Mathematics Building, along its long corridors, Bliss’s art extends throughout the building displaying the magnificence of mathematics. Bliss’s art was created through the use of a computer and mixed media “for a more tactile experience,” and placed on 18-inch-square aluminum plates. Some of the plates were hand-painted, silk-screened, or laser etched with color added by screening.

“The material would be suggestive and stimulus for the imagination,” said Bliss in *Art for a House of Mathematics*. “Each plate was to be a work of art but related to its immediate context and part of the general intellectual mathematics and visual concept.” In an article from *Deseret News* in 2002, Bliss stated that she “didn’t want the art to be something that rammed ideas down [student’s throats],” but that awakened their curiosity and made them “do a little work in the process, serving as a catalyst for further thought.”

Today, as students pass through the halls waiting to enter their classrooms or anticipate meeting with a professor or another peer, they are often seen examining Bliss’s work closely. It is obvious that her intent to stir their curiosity and enrich their imagination has exceeded even her most ambitious expectations.

Pictured top right: Anna Campbell Bliss from the film ‘Intersections’ by David Leitner
<http://www.arcoflight.org/project.html>

Pictured bottom right: Anna’s artwork on first floor of LCB
<http://www.annacampbellbliss.com>



FACULTY PROFILE: DON TUCKER

by Natasha Carlton

Dr. Don Harrel Tucker

Title: Professor of Mathematics

Specialization: Differential Equations and Functional Analysis

Experience: He has taught for the University of Utah's Department of Mathematics for 58 years.

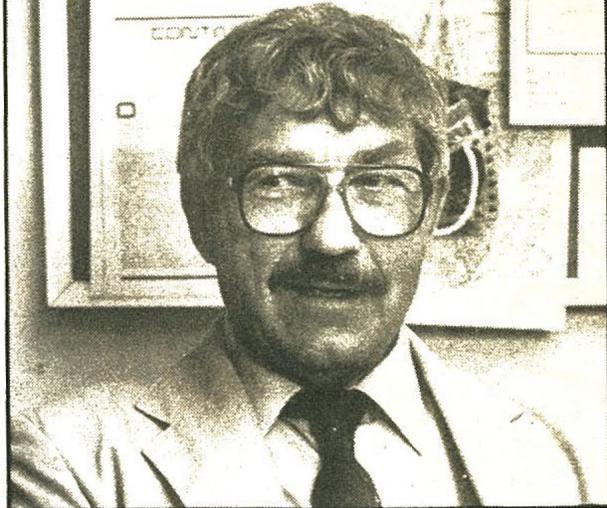
Hobbies: Writing Poetry, Hunting, Fishing

Natasha: "Tell me about yourself. Where did you grow up, your career, what kind of hobbies do you have...?"

Dr. Tucker: "Gossipy stuff?"

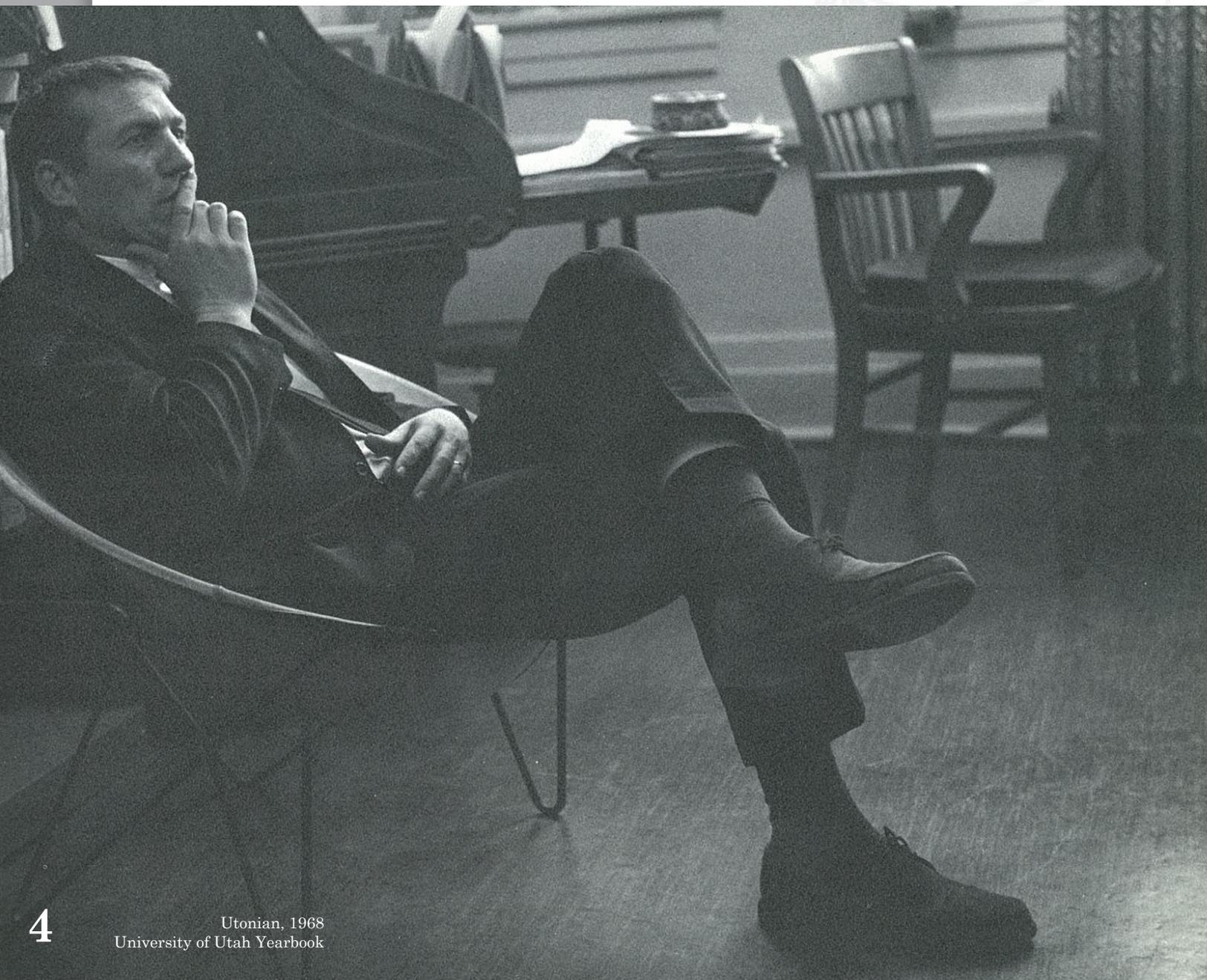
Natasha: "Um, yes. I guess you could call it that."

Dr. Tucker: "Well, I didn't exist until I was 23 years old. That's a fact."



Picture taken 1988

In 1953, at the age of 23, Dr. Don Harrell Tucker started working at a Military Physics Research Lab in Austin, Texas. Little did he know that the FBI had to complete a "secret" clearance/background investigation for him to work there. What they found was that he did not exist. The reason being was that he was born in a tent. Yes, you read that right.





Dr. Tucker was born in a tent about three miles north of Delwood, Texas, at a construction site in a blizzard. A physician could not make it through the storm until three days later. By then he had pneumonia. Dr. Tucker explained, "My guess is that the physician thought I was going to die, so he didn't bother to record anything. But I was a damn bit meaner than he thought, and I didn't die. But he still didn't bother to record my birth and that is why it was a problem for the FBI."

At the time, in order to receive a birth certificate in Texas (that had not been recorded at birth) it required witnesses other than family members. However, in his case there were no witnesses to be found. "How was I going to work on these secret things in physics if I didn't exist?" said Dr. Tucker. So after some deliberation the county judge ruled that he existed and that was good enough. Dr. Tucker asks, "How's that for some gossip stuff?"

Ask anyone who knows Dr. Tucker and they will tell you that he is a man of many stories, but that is not the only thing they will tell you. They will tell you that he is intelligent, compassionate, driven, charming, sarcastic, and let's not forget, an esteemed mathematician.

From 1951-1958, Dr. Tucker completed his bachelor's degree at West Texas State and MS and PhD at the University of Texas in Austin, Texas. While working toward his degrees, Dr. Tucker played football for West Texas State, worked a short time in a high school, was an Assistant in the Department of Mathematics at the University of Texas, and spent five years as a Special Instructor there as well before leaving for Utah. On July 1, 1958, he arrived at the University of Utah to start his first day as Associate Professor in the Department of Mathematics. In an article from the U's Chronicle in 1988 by Amber Mckee, Dr. Tucker explained, "At the time I came to the U, the math department was a great distance from being a respected institution...I thought it would be a place where I could help build a good department."

Since arriving that day in 1958, he has been instrumental in elevating the department to national prominence. Often working behind the scenes, Dr. Tucker was one of the driving forces behind recruiting top faculty. A former undergraduate of his, Joe Taylor, returned in 1965 to lead the department toward becoming the research powerhouse it is today. Joe still describes Dr. Tucker's influence on him as a freshman as the turning point in his life.

Among Dr. Tucker's accomplishments, he has published many mathematical papers and books, presented at national and international conferences, visited universities around the world to give lectures and teach, became involved in teacher education programs, and received many awards from the U of U and professional society organizations. Some of his distinctions over the course of his career are: University of Utah's Distinguished Teaching Award (1980), University of Utah's Distinguished Honors Professor Award (1980), the Certificate of Meritorious Service of the Mathematical Association of America (MAA) (1990), the Outstanding Service Award from the Utah State Board of Education (1993), the Choice Award (1995), the University of Utah's Presidential Teaching Scholar Award (1996), and the MAA Intermountain Section Teaching Award (2013).

Of all his achievements, the ones he values most are the positive influences he has had on his students. When asked about his teaching style he said, "I don't teach mathematics. I teach kids about mathematics. One-on-one. Eyeball-to-eyeball." He wants to make math enjoyable and attainable for students. When asked about what advice he would give to future and current mathematics students pursuing a degree in mathematics he said, "We are all students. Ask questions. Stay curious. Even after graduation the learning can't stop there. I want to encourage students to become scholars."

STEWART ETHIER RETIRES

by Aryn DeJulis



Stewart Ethier is retiring this year after 32 years with the University of Utah.

Stewart chose to study probability during graduate school at the University of Wisconsin – Madison and finished his Ph.D. in 1975 under the supervision of Tom Kurtz. Upon completion, he spent one year as a Visiting Member of the Courant Institute, then moved to the Statistics and Probability Department at Michigan State University, and finally moved to Utah in 1984.

During his career, most of Stewart's research has been in applied probability, especially mathematical population genetics, gambling theory and recently game theory and Parrondo's paradox. His best-known publication is the book *Markov Processes: Characterization and Convergence* (1986) coauthored with Tom Kurtz. It has over 1,500 citations on MathSciNet. He has frequently collaborated with Jiyeon Lee (Yeungnam Univ.) whom he met when she visited Utah in 2008 – 2009. Most of our graduate students and younger faculty might not be aware

that he used to be a mathematical biologist, and his most recent paper (a collaborative effort with several Italian probabilists) is in this area. Stewart's Erdős number is 3.

Currently, Stewart is teaching Math 5750, Topics in Applied Mathematics: Game Theory, for the sixth and final time. This is a fascinating course that students seem to enjoy and it usually attracts an enrollment of 30 – 40 students. He hopes someone will be willing to offer it next year.

Some memories Stewart has from his time in the University of Utah Department of Mathematics include: Joe Taylor's New Year's Eve parties, Frank Stenger's seafood gumbo parties, and Peter Alfeld's Irish coffee parties. His fondest memories are of the sabbaticals he took abroad. He spent time in Tokyo, Japan; Melbourne, Australia; and most recently Daegu, South Korea. He even taught a graduate course at Yeungnam University and got an ovation from the students at the last class (this never happened at Utah). He regrets missing the chance to participate in Utah's new Korean campus.

As he focuses on his future moving forward, Stewart plans to continue working on his research interests and hopes to attend conferences and visit collaborators without the added worry of teaching conflicts. He expects to travel with his wife Kyoko (whom he married in 1986), and not just for conferences. In addition, they will become snowbirds, living in Wanship, Utah, in summers and Las Vegas in winters. Many years ago they learned to ski, but have largely given it up. Maybe the time has come to try water skiing instead.

Best of luck to Stewart and thank you for your time spent with us in the University of Utah Department of Mathematics.



Pictured above: Stewart's dog, Cauchy, trying to comprehend Cauchy's theorem

MAKE A DIFFERENCE

With the rising costs of higher education, undergraduate scholarships are vital to helping our students achieve their educational goals. In the math department, we have many outstanding students who are both deserving and in need of financial assistance. Our Undergraduate Scholarship funds are often stretched too thin.

If you would like to contribute to the future success of our majors, please visit our department webpage:

www.math.utah.edu





UNDERGRAD SPOTLIGHT: MACKENZIE SIMPER

by Tom Alberts

Photos by: Michael Schoenfeld / Royter Snow Design

In the two years that I've been in this department I have been very pleasantly surprised by the quality of the education we offer our undergraduate majors, and especially the fantastic research opportunities that we make available to them. Mackenzie Simper is a prime example of this department's commitment to the development and nurturing of undergraduate talent. She is one of the exceptional seniors who will be graduating from our department in May. She is well known to many of us for being a star student in our advanced courses, but in the short time she has been here Mackenzie has also done phenomenal research work.

Four years ago Mackenzie enrolled in Salt Lake Community College (SLCC) with the intention of following her parents footsteps in the medical field and becoming a doctor. However, this all changed when she took a proof-based linear algebra course at SLCC taught by Kyle Costello (an alumnus of our department). Mackenzie herself describes this as an "eye-opening experience" that awakened

her to the famous problems in the history of math and its most well known actors.

As a result, when she transferred to the University of Utah Mackenzie was intent on learning as much math as she could. In Fall 2014 she was taking my Intro to Probability class, and acing it pretty handily. She came to my office hours to ask if I might have a research project for her, the departmental REU program fit our needs perfectly and so I set Mackenzie up with a project and away she went. She dove into the problem with complete enthusiasm and total dedication. It was a research level problem on the stochastic heat equation on Markov chains that required tools from stochastic processes, large deviations theory, and Ito calculus. Mackenzie learned most of this material from scratch and did so very independently. Each week I would give her a little lecture on some topic and then she went off to research it on her own. When she came back the next week she had fully grasped the material, and more than once she managed to teach me some new tricks.

We followed this REU with a second one on the Bak-Sneppen model, which describes the evolution of fitnesses in a population that is governed by natural selection but the with the spatial distribution of the species taken into account. In the probability literature Bak-Sneppen is a well-known Markov chain that is very simple to describe but notoriously difficult to analyze. Together Mackenzie and I were able to tackle a small aspect of the problem by computing the stationary distribution for a small number of species, using the powerful Markov chain technique called reversibility. Our approach yielded a much simpler and more direct proof of the same results that were previously found by Eckhard Schlemm at Imperial College London. In the end they were novel enough to warrant a publication, and they can be currently found at [arXiv:1510.04114 \[math.PR\]](https://arxiv.org/abs/1510.04114).

One of Mackenzie's most impressive research projects took place at a 10-week, NSF funded REU at Brown University. Under the direction of Professor Bjorn Sandstede and his postdoc John Gemmer, Mackenzie studied a problem on the dynamics of differential equations under small stochastic perturbations. In a system where the deterministic differential equation has two attracting equilibria it is possible for a small but persistent amount of Brownian noise to force a particle from one equilibria to the other. The time-scale at which these transitions occur is known to grow exponentially as the amplitude of the noise diminishes, and it is also known that if the system is gradient then with all but exponentially small probability the most likely transition path is the heteroclinic orbit connecting the two equilibria. This is the so-called Freidlin-Wentzell theory of large deviations. With her research supervisors Mackenzie studied the case when the deterministic system is non-gradient, but surprisingly they discovered that even when the underlying dynamics are changed (under certain conditions) the most likely transition path is still the heteroclinic orbit (of the new system). Mackenzie and her supervisors are in the process of writing up these results now and expect them to be published in a top dynamics journal.

All this has led to Mackenzie receiving a number of prestigious awards. At this year's Joint Mathematics Meetings in Seattle, Mackenzie was awarded the Alice T. Schafer Prize for Excellence in Mathematics by an Undergraduate Woman. This national award is given annually by the Association for Women in Mathematics to a female undergraduate who demonstrates a true passion in mathematics. Shortly thereafter Mackenzie won a Churchill scholarship that will fully support her in the one-year Part III (Tripos) program at Cambridge University, beginning this fall. The Churchill is extremely competitive and awarded to only 15 students each year. Mackenzie has also received several extremely compelling offers to graduate schools and recently decided to join Stanford's mathematics PhD program, beginning in Fall 2017.





MESSAGE FROM THE CHAIR

As the semester winds down, it's a perfect time to look back on the achievements of the past year. We once again had a very successful hiring season. Sean Lawley will move from his current postdoctoral position to become a tenure-track Assistant Professor. Sean received his PhD in 2014 from Duke. He is an outstanding applied mathematician with broad interests in mathematical biology and probability. Akil Narayan, a leading applied mathematician with expertise in uncertain quantification, will also join us as an Assistant Professor next year. Akil received his PhD from Brown in 2009, held a postdoctoral position at Purdue, and was most recently on the faculty of the University of Massachusetts (Dartmouth). Akil will be affiliated with the Scientific Computing and Imaging Institute.

Our faculty continue to win prestigious awards (some of which are described inside this issue), and raise the prominence of the Department in both its research and teaching missions. This year we will confer nearly 100 undergraduate degrees in mathematics, a 60% increase over our numbers from just five years ago, and we will graduate sixteen new PhDs. These numbers are a testament to our dedicated faculty and staff, but especially to the outstanding students we serve.

We will honor our students (and faculty and staff) at our annual Awards Ceremony later this month. I hope to see you there (or at another department event) sometime soon!

Peter Trapa
Professor and Chair, Department of Mathematics



Graduation Photos Taken By:
Nicole Morgenthau



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Graduation News

This year nearly 100 undergraduate mathematics majors will receive a baccalaureate degree. 2 students will receive a Masters degree in Mathematics and 3 will receive a Master of Statistics degree. Students receiving the Ph.D. in 2015 - 2016 are:

- Jason Albright
- Vira Babenko
- Patrick Bardsley
- Andrew Basinski
- Pavel Bezdek
- Victor Camacho
- Morgan Cesa
- Sung Chan Choi
- Paul Andrew Egbert
- Drew Johnson
- Brent Kerby
- Predrag Krtolica
- Tony Lam
- Haydee Lindo
- Alan Watson
- Cheryl Zapata



Congratulations to all our graduates!