ContinuUM

Department Awarded for Undergraduate Program

The Department of Mathematics has received the 2014 Departmental Award for Outstanding Contributions to Undergraduate Education from the College of LSA. The selection committee was impressed with the educational excellence, spirit of innovation, and strong commitment to good advising in the Department, as well as the ability of the Department to create community among majors through sponsorship of clubs, the Math T-shirts, publication of a weekly "missive," and other activities. The Math Department has a strong commitment to innovation for the sake of improved undergraduate learning, and for the sake of giving undergraduates positive experiences in a subject that is often looked at with dread rather than interest and excitement.

Nearly a quarter century ago, as part of the university wide Undergraduate Initiative, the Mathematics Department completely reformed its Introductory Calculus Program. In the spirit of the Undergraduate Initiative, these changes included smaller class sizes, an interactive, collaborative learning environment, and a focus on problem solving. Concomitant with these initiatives, the Department developed an extensive, and widely copied, training program for the instructors in the introductory program. These activities earned the Department this same award in 1994.

During the intervening years, the Mathematics Department has worked to extend these successes to its entire undergraduate program. The results of these efforts are quite astonishing; for example, the department has experienced a more than three-fold increase in the number of majors (more than 225 math majors graduated in academic year 2012–the 8th largest

A Math Club talk for undergraduates by Professor Jeff Lagarias draws a large crowd to the Nesbitt Undergraduate Common Room.

View from the Chair's Office
Mel Hochster

As I stated last year, this continues to be a time of many transitions at the University. The Department experienced a devastating loss when Curtis Huntington passed away last October after more than three years of battling cancer. He continued his service to the department until the last week of his life, and it is hard to imagine how anyone might be more devoted than Curtis. Kristen Moore and Roger Natarajan stepped in to assume Curtis's responsibilities in connection with the Financial and Actuarial Mathematics Program. But Curtis was also Associate Chair for Education. Joe Conlon took over that position, while Mattias Jonsson assumed Joe's duties as Associate Chair for Term Faculty. People came from all over the world to attend the Memorial for Curtis last April. A write up on Curtis is on page 10.

Everyone among our faculty and staff stepped up to help the Department through a very difficult time, and I am deeply grateful. I have never felt more strongly that this Department—faculty, staff, and students—functions like a family, and I am most thankful to have spent my career in this extraordinary environment.

There is one transition that did not occur: I agreed to continue as chair for a final three year term, which I am starting now. Part of the reason for my willingness to continue has been the flexibility that the College has shown in allowing us to hire outstanding faculty even when we do not have an open position, a reflection of the College's continuing dedication to maintaining a preeminent faculty. At higher levels of administration a great deal has happened both in the University and the College. Mary Sue Coleman has stepped down and the University has a new president: Mark Schlissel. The search for a new Dean of the College of Literature, Science and the Arts is over, and Professor Andrew Martin, a renowned scholar in the areas of judicial decision making and political methodology, joins

Faculty Recognition

Charlie Doering received a 2014 Simons Fellowship from the Simons Foundation. The fellowship provides funds to faculty for up to a semester long research leave in order to pursue specific research opportunities. Doreing is recognized for his work in mathematical fluid dynamics. Through this prestigious award, he will be researching the topic "Turbulence, Transport, and Mixing."

Sergey Fomin was included in the report by Thompson Reuters entitled "The World's Most Influential Scientific Minds, 2014." More than 3200 researchers worldwide are on the list, which ranks an individual's impact based on a survey of highly cited papers between 2002-2012. Fomin is one of 99 mathematicians included in the report.

Anna Gilbert presented an invited lecture entitled "Sparce Analysis" at the 2014 International Congress of Mathematicians.

Lizhen Ji received a 2014 Simons Fellowship from the Simons Foundation. The fellowship provides funds to faculty for up to a semester long research leave in order to pursue specific research opportunities. Ji will use the time to work on books about Lie groups, discrete subgroups of Lie groups, and associated locally symmetric spaces, and work with colleagues in China and Europe.

Jeffrey Lagarias has been chosen as a 2014 Fellow of the Society for Industrial and Applied Mathematics. Fellows are nominated and recognized for their outstanding contributions to the fields served by SIAM.

Gavin LaRose was named the recipient of the Deborah and Franklin Tepper Haimo Award from the MAA. The award was presented at the 2014 Joint Mathematics Meetings. The award honors college or university teachers who have been widely recognized as extraordinarily successful and whose teaching effectiveness has been shown to have had influence beyond their own institutions.

Mircea Mustata presented an invited lecture entitled "The dimension of jet schemes of singular varieties" at the 2014 International Congress of Mathematicians.

Kartik Prasanna received a 2014 Simons Fellowship from the Simons Foundation. The fellowship provides funds to faculty for up to a semester long research leave from in order to pursue specific research opportunities. Prasanna will study number theory, specifically Bloch-Beilinson conjectures that relate algebraic cycles to L-functions, at the Institute for Advanced Study in Princeton.

Karen Smith presented an invited lecture entitled "Local and global Frobenius splitting" at the 2014 International Congress of Mathematicians.

Collegiate Professor

Professor **Yongbin Ruan** has been named the William Fulton Collegiate Professor of Mathematics. Ruan received his Ph.D. in 1991 from the University of California, Berkeley. He came to UM in 2006 from the University of Wisconsin, where he was the Van Vleck Professor of Mathematics. Prior to that he held faculty positions at the University of Utah and at Michigan State. He is a widely recognized researcher in the area of symplectic geometry, in particular the development of Gromov-Witten invariants. These invariants have become a mainstay in symplectic topology and gauge theory. Ruan has also worked on significant discoveries in the area of quantum cohomology. His influential joint work on the cohomology of orbifolds has become known as the "Ruan Cohomology."

Ruan's work has been recognized with a number of major international honors and awards. He was an invited speaker at the 1998 International Congress of Mathematicians in Berlin, and in 2006 he was appointed a Clay Senior Scholar. Ruan delivered a plenary lecture at a regional AMS meeting in 2001, and he won research awards from the University of Wisconsin and National Natural Science Foundation of China.

Selflessly devoted to the development of young mathematicians, Ruan has been remarkably successful in mentoring Ph. D. students and postdocs. Several of his students have already made fundamental contributions to the field. He has also been extremely active in organizing conferences and workshops, both at Michigan and externally, and he runs a very active seminar in the Department on geometry and physics.

Ruan has chosen to name his professorship after his colleague, Distinguished University Professor William Fulton, a pioneer in the field of algebraic geometry.

Photos by UM Photo Services, the Department of Mathematics, Danielle Ziaja, or submitted by the subjects.

www.lsa.umich.edu/math

There's an App for That

Professor Danny Forger recently developed and released a jet-lag mobile app which provides shortcuts that can help travelers snap their internal clocks to new time zones as efficiently as possible. "Overcoming jet lag is fundamentally a math problem and we've calculated the optimal way of doing it," said Forger. "We're certainly not the first people to offer advice about this, but our predictions show the best and quickest ways to adjust across time zones."

The iPhone app, called Entrain, is believed to be the first to take a numbers-based approach to "entrainment," the scientific term for synchronizing circadian rhythms with the outside hour. The app is based on new findings by Forger and Kirill Serkh, a doctoral student at Yale University who worked on the project while an undergraduate at UM, and current mathematics doctoral student Olivia Walch.

Entrain is built around the premise that light, particularly from the sun and in wavelengths that appear to our eyes as the color blue, is the strongest signal to regulate circadian rhythms. These fluctuations in behaviors and bodily functions, tied to the planet's 24-hour day, do more than guide us to eat and sleep. They govern processes in each one of our cells.

Short disruptions such as jet lag and its symptoms of fatigue and insomnia can affect mood and performance. And scientists have linked regular disturbances and disorders of the system to depression, certain cancers, heart disease and diabetes. Pilots, flight attendants and shift workers, which make up more than 10 percent of the American workforce, are particularly susceptible.

The shortcuts the app offers are custom schedules of light and darkness depending on the itinerary. The schedules boil down to one block of time each day when you should seek the brightest light possible and another when you should put yourself in the dark, or at least in dim light. You don't even have to be asleep.
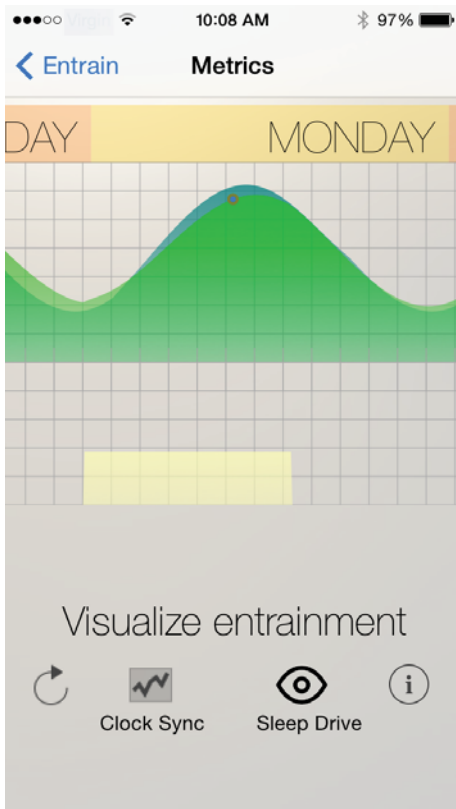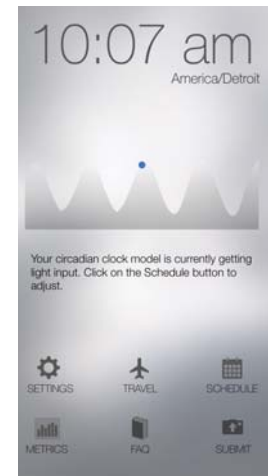
The study, published in Public Library of Science Computational Biology, relies on two leading mathematical models that have been shown to accurately describe human circadian rhythms. Forger and his group used these equations and a technique called optimal control theory to calculate ideal adjustment schedules for more than 1,000 possible trips.

The app gives users access to these schedules. They start by entering their typical hours of light and darkness in their current time zone, then choose the time zone to which they are traveling and when, as well as the brightest light they expect to spend the most time in during their trip (indoor or outdoor.) The app offers a specialized plan and predicts how long it will take to adjust. If you must go outside, you can wear pink-tinted glasses to block blue wavelength light, the researchers say. And if the app prescribes "bright outdoor light" in the middle of the night, a therapeutic lightbox can do the job—yes, its shortcuts sometimes require odd hours.

To get over jet lag most efficiently:

- Experience one block of light and one block of darkness each day.
- During the light phase, be in the brightest light possible.
- During the dark phase, be in the dimmest light possible. Even a short burst of bright light at the wrong time can extend the time it takes to adjust.
- Dark phases don't have to be sleep phases.
- If you must be outside during dark phases, block blue light with rose-tinted glasses or a visor. Follow the customized, mathematically optimal schedule offered by the free app, Entrain.

The Entrain app has had over 100,000 downloads for the iPhone version. The app for android phones has just been released. The app can be found on the App Store, Googleplay, and at the following website: entrain.math.lsa.umich.edu/

New Faculty

Bhargav Bhatt joined the Department in Fall 2014 as an Associate Professor. Bhatt attended Columbia University for his undergraduate degree, and received his Ph.D. in 2010 from Princeton University, under the supervision of Professor A. J. de Jong. From 2010 to 2014, he held a postdoctoral position at UM; since Fall of 2012, he was at the Institute for Advanced Study at Princeton.

Bhatt has made first-rate contributions to a broad spectrum of research, and he has established an impressive international reputation. One of the strengths of his research is the way he links algebraic geometry, commutative algebra, and number theory, using advanced techniques from each of these fields to attack problems in the others. He has demonstrated a thorough understanding of the details underlying these advanced techniques to such an extent that his research modifies and extends them to reach entirely new sorts of applications.

In the area of derived algebraic geometry, Bhatt has thoroughly mastered the machinery for dealing with complicated singularities, as well as other machinery at a similarly high level of abstraction, for example p-adic Hodge theory. In addition, he has shown both great technical power in applying these theoretical tools and great creativity in finding new realms for their application. The depth and breadth of the areas of Bhatt's work have established him as one of the top young researchers in the field.

Liliana Borcea joined the Department in Fall 2013 as the Peter Field Collegiate Professor of Mathematics. Borcea received her Ph.D. in Scientific Computing and Computational Mathematics from Stanford University in 1996, under the supervision of George Papanicolaou. After a year at Caltech on an NSF postdoctoral fellowship, she joined the faculty at Rice University as an assistant professor. She was promoted to associate professor in 2001 and to full professor in 2007 with the title Noah Harding Professor of Computational and Applied Mathematics.
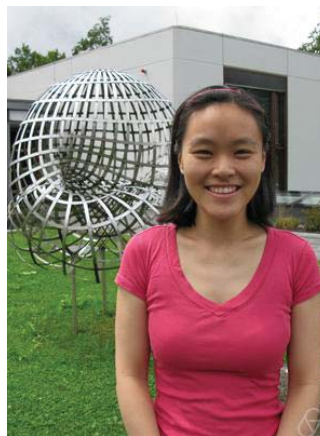
Borcea is an applied mathematician, and her work includes new approaches to real-world problems as well as rigorous theoretical analyses of these. She has established herself as a world leader in inverse problems and imaging. Inverse problems can roughly be described as "find the equation, given the solution." In particular, she studies inverse problems for the wave equation. An inverse problem in this situation might be to infer information about the medium (i.e., a cancer in the patient, an oil deposit in the earth, etc.) from information about how waves (ultrasound, seismic waves) propagate through it. If given the solution (the waves), try to find the equation (in particular the parts that correspond to properties of the medium). Borcea has been able to contribute important new results in areas that actually arise in practice. One of these areas concerns wave propagation in random media. Early studies focused on smooth, homogeneous media, in which it is relatively easy to detect, for example, a small region of exceptionally high (or exceptionally low) density. But if the medium is inhomogeneous, with many small parts in which the waves propagate differently, then it becomes much more difficult to detect exceptional spots in the medium. Another area of Borcea's research is the study of homogenization of high-contrast media. These are media in which many small parts of materials with very different physical characteristics are packed closely together. The goal is to understand the effective behavior of the composite.

Upon receiving her collegiate professorship, Borcea chose to name it for Peter Field, a professor of mathematics in the College of Engineering and the College of Literature, Science and the Arts at U-M from 1903 to 1946.

Wei Ho joined the Department in Fall 2014 as an Assistant Professor. She received her A.B. from Harvard University in 2003 and her Ph.D. in Mathematics from Princeton under the direction of Manjul Bhargava in 2009. She received an NSF Postdoctoral Fellowship to spend 2009-2010 at Harvard and 2012-2013 at Princeton. She was a Ritt Assistant Professor at Columbia from 2010 to 2014.

Ho's research is in number theory, algebraic geometry, and representation theory. Her research has included taking techniques and ideas from (or finding applications in) other fields such as invariant theory, dynamics, and combinatorics. A common theme in much of her research concerns constructions of algebro-geometric moduli spaces by using orbits of representations of algebraic groups and various arithmetic applications of such explicit descriptions of the moduli spaces. Her Ph.D. advisor has initiated a program in

New Faculty

this area which uses the idea of obtaining information about, say, curves satisfying additional conditions by studying what happens when a group (i.e, a collection of operators that preserve certain symmetries) acts on a vector space. Some problems that have been resistant for decades are yielding to this technique. This joint work between Bhargava, Ho, and Arul Shankar has won significant accolades and prizes.

In her short career, Ho has received several honors in addition to her NSF Postdoctoral Fellowship. She received the Herman Peries Prize from Cambridge University, a Centennial Fellowship from Princeton, an NSF Graduate Fellowship, a National Defense Science and Engineering Graduate Fellowship, and a National Security Agency Young Investigator's Grant. Ho is an excellent teacher and an exceptionally gifted expositor. She has been a mentor, especially to women in mathematics, in many different contexts.

Sarah Koch joined the Department in Fall 2013 as an Assistant Professor. She obtained Ph.Ds both at the Université de Provence in 2007 and at Cornell University in 2008 under the guidance (in both cases) of J. H. Hubbard. Since her Ph.D., Koch held an NSF Postdoctoral Fellowship (at the University of Warwick and Harvard University) and was a Benjamin Peirce Assistant Professor at Harvard University.

Koch works in complex dynamics and Teichmüller theory, including the interaction between them. These areas have developed greatly over the last thirty years. Koch has been particularly interested in questions surrounding the behavior of the Thurston pullback map defined on a certain Teichmüller space. She has established herself as a leader in this subject and has initiated a great many research programs that have generated excitement in the mathematical community. Koch has been described as the best new American researcher in this important field in the last ten years. Her enthusiasm for mathematics, teaching, and helping students is infectious.

In her career, Koch has already received significant recognition. In addition to the NSF Postdoctoral Fellowship, she is a current recipient of a Sloan Research Fellowship. She received the Harvard University Certificate of Teaching Excellence in 2012 and 2013. In 2006 she was awarded the Robert John Battig Prize for excellence in research from the Cornell Mathematics Department.

Roger Natarajan joined the Department in Fall 2013 as a Lecturer III within the Actuarial and Financial Mathematics program and is currently the Actuarial Program Director. He brings with him 30 years of experience in the Actuarial profession. After receiving a Bachelors degree from the University of Madras, India and a Masters degree from the Indian Institute of Technology-Madras, India, Natarajan received a Ph.D. in Mathematics from the University of Alabama. He began a stellar career in the insurance industry with Home Life Insurance Company, in New York. He advanced to the role of Vice President at Allstate, Ameriprise Financial, MetLife and at CIGNA. He also served as Chief Actuary at Allstate, Ameriprise Financial, and GE Financial. He concluded his corporate career as head of global product development for CIGNA International which was operating in 28 countries. During his career he guided various actuarial teams in valuation, design and development of products for domestic and international markets (Asia and Latin America) across the entire spectrum of life (Traditional, Universal, and Variable), and health insurance, for close to 25 years.

Prior to joining UM, Natarjan taught an advanced level Actuarial course at Columbia University. He is a Fellow of the Society of Actuaries, and a member of the American Academy of Actuaries. In the past, he served on the Board of Directors of IDS Life Insurance Company. Natarajan has personal connections to UM—he had a long professional relationship and long personal association with late Actuarial Program Director Curtis Huntington, and his son Vivek is a 2004 graduate of the UM Mathematics Actuarial program and a Fellow of the Society of Actuaries. Natarajan hopes to develop tools and programs to assure our students proceed to the career they desire in Actuarial and Financial Mathematics. He is also involved in fundraising both at UM and with various classical music organizations.

Andrew Snowden joined the department in Fall 2013 as an Assistant Professor. He received his B.S. degree in mathematics from the University of Maryland, then went on to graduate school at Princeton University. He received his Ph.D. in 2009 under the supervision of Professor Andrew Wiles. Snowden spent the next academic year at Stanford on a National Science Foundation postdoctoral fellowship, and then completed a three-year postdoctoral appointment at MIT.

New Faculty

Snowden's research interests are broad and include Galois representations, arithmetic geometry, and invariant theory. He has been characterized as one of the most original and powerful mathematicians of his generation, combining an ability to assimilate difficult and technical mathematics across many fields with a keen sense of problem solving. Much of his research involves difficult proofs, often bringing together ideas and techniques from several areas of mathematics, leading to results that greatly simplify the picture of what had been thought to be a very complicated situation. He showed this in early work with projective invariants of systems of points on a line. He has since established a striking finiteness theorem casting a completely new light on some classical questions concerning the algebraic structure of so-called Segre varieties. In a more number-theoretic direction, Snowden has recently proved an important result involving Galois deformation theory. This is one of the central technical tools that came into the epoch-making proof by Wiles of Fermat's last theorem in the 1990s.

During his undergraduate career, Snowden was recognized by the University of Maryland with the Aziz Mathematics Scholarship twice, as well as the J.R. Dorfman prize. He was awarded the Centennial Fellowship from Princeton, and later received a Clay Liftoff Fellowship from the Clay Mathematics Institute.

Nina White was appointed Lecturer III in the Department in Fall 2013. White received her B.A. degree from the University of California-Berkeley in 2005. She then spent the 2005-2006 academic year in the Department of Mathematics at the University of Cologne on a German Academic Exchange Study Scholarship. In 2006 she came as a doctoral student to the University of Michigan and received her Ph.D. in April 2012 under the joint supervision of Juan Souto and Richard Canary. She was a postdoctoral research fellow in the University of Michigan School of Education prior to accepting the Lecturer position.

Like most mathematics graduate students, White was a Graduate Student Instructor while completing her degree. She first taught in the calculus sequence, but later acted as an assistant in the course sequence for future elementary and middle school teachers. Following this first experience as a GSI for the course for teachers, White made a decision to build a career in mathematics education. After receiving her degree, she was the instructor for the first and second courses in the three-course sequence for teachers. She is a skilled instructor and has the ability to motivate all students, but in particular those education students who may have struggled with mathematics in the past. The math education courses are currently part of the Inquiry Based Learning program in the Department, and White works to develop and enhance these courses to actively engage students in mathematical exploration and problem-solving. In addition to her teaching and course development duties in the Math Department, White is also working with Professors Stephen DeBacker and Alejandro Uribe to start a Math Teachers' Circle in Wayne County starting Summer 2015 for in-service middle school teachers.

View from the Chair's Office

the University of Michigan. He was formerly at the University of Washington, Saint Louis. He was an undergraduate major in Mathematics and in Government, and much of his research can be described as applied statistics. Mathematicians like to keep track of the shortest length of a chain of co-authors that joins them to the prolific number theorist Paul Erdös, which is their Erdös number. That is, people who wrote a joint paper with Erdös have Erdös number 1, those who did not but wrote a joint paper with someone who has Erdös number 1 have Erdös number 2, etc. Dean Martin has Erdös number 3. (By the way, I also have Erdös number 3.) These new appointments demonstrate again the commitment of the University of Michigan to excellence in both research and teaching.

I want to remind everyone again about our Career Day on November 21, 2014, when alumni are invited to visit and explain what their careers are like to our current students. If alumni can't make the career conference, Undergraduate Program Director, Professor Stephen DeBacker, would be more than happy to hear their stories via e-mail: lsa-math-updir@umich.edu.

There have been very sizable cuts in National Science Foundation funding for mathematics. This is true for other federal agencies supporting mathematics as well. The number of grants, the level of funding, and the durations of the awards have all decreased, and this will have a substantial effect on the availability of funds for inviting visitors, helping graduate students attend conferences and workshops, and so forth. The University, College, and Department have, so far, responded extremely well to the current conditions, but it is increasingly difficult to meet the challenge. The help of those who have supported the Department financially in these difficult times has proven to be vital to maintaining our prominence. I want to express my very great appreciation once more to those who have made contributions that are helping the Department to continue to thrive.

degree program in the College) and a more than twenty-five percent increase in the number of student enrollments per year (now approximately 13,500 – second only to Psychology). Many factors have contributed to the success of the undergraduate program; broadly speaking, these fall into three categories. First, through constant innovation and assessment, the Department has created and maintained an excellent undergraduate curriculum. Second, through counseling activities that begin when students matriculate and continue until they graduate (and, sometimes, beyond), the Department successfully guides students through their Michigan math experience. Finally, through its sponsorship of clubs, promotion of the ubiquitous Math T-shirt, creation of outreach opportunities, publication of a weekly missive, running as many as fifty faculty directed summer research experiences for undergraduates each year, and many other activities, the Department has fostered and sustained a community of math scholars.

The Department is internationally recognized for its remarkable effectiveness and innovation in undergraduate mathematics, which includes having one of four centers for Inquiry Based Learning (IBL) funded by the Educational Advancement Foundation and being one of twenty-five programs in the world designated as a Center for Actuarial Excellence. The novel nature of the introductory courses is amplified in courses taught through the IBL center. These courses provide students with research-like experiences in controlled settings. The emphasis in these courses is on the process of investigation and discovery, and the depth of understanding the students obtain and their exposure to how working mathematicians approach problems are uniquely promoted by the inquiry-based learning environment. All of the Department's courses that focus on the mathematical training of future elementary and secondary school teachers are now taught IBL-style, and the Department is looking to extend these techniques to other courses including the honors versions of multivariable calculus and differential equations.

Assessment is necessary to assure the effectiveness of pioneering practices. In 2008 Calculus I students participated in a study of conceptual understanding in first semester calculus and demonstrated learning gains that were two standard deviations above the national average. Assessment tools have shown that, for the UM introductory mathematics courses, the retention and "success" rates are phenomenal compared to Michigan's peer institutions: students receiving grades of "D" or "E," or who withdraw from the courses, constitute less than ten percent of those enrolling in the courses—by comparison, other institutions report rates that exceed fifty percent. As a consequence of these results the Department is one of a select few currently part of a nationwide, NSF-funded study of introductory calculus that seeks to determine characteristics of successful programs.

This award is a significant recognition of the Department's efforts to assure that the undergraduate mathematics experience is innovative and effective, while providing a community atmosphere through programs and activities.

Michigan Math & Science Scholars

The Michigan Math and Science Scholars completed another successful program in 2014. More than 360 high school students from around the world attened one or both of the sessions offered. First held in 1997, the program is designed to offer a pre-college experience exposing students to a breadth of curricula offered at the University of Michigan while introducing high school students to current developments and research in the sciences. The program is open to any high school rising sophomore, junior, or senior. In 2015, three 2-week sessions will be offered; students may attend one, two or all three sessions. Besides offering numerous courses in Math, the program includes the areas of Anthropology, Astonomy, Biology, Chemistry, Computer Science, Paleontology, Physics, Psychology, and Statistics.

Dates for Summer 2015:

Session 1: June 21 - July 3

Session 2: July 5 - July 17

Session 3: July 19 - July 31

Please visit http://www.math.lsa.umich.edu/mmss/ for more information.

Professor Stephen DeBacker teaches the course "Hex and the 4 Cs"

2014 Graduate Program Fellowships & Awards

A. W. Flint Memorial Scholarship
Zhibek Kadyrsizova

Alice Webber Glover in Math Scholarship
Daniel Barter
Andrew Brouwer
Brandon Carter
Gabriel Frieden
Trevor Hyde
Grace Ingermanson
Zhou Zhou
Jake Levinson
Bowei Wu
Ming Zhang
Zhou Zhou

Allen L. Shields Fellowship
Michael Chmutov

Arthur Herbert Copeland, Sr. Memorial Scholar
Harold Blum
Audra McMillan

Ben Dushnik Scholarship in Math
Corey Everlove

Carroll V. Newsom Scholarship
Raymundo Navarrete
Suchandan Pal

Edwin Wilkinson Miller Scholarship
Andrew Melfi

E.S. & A.C. Everett Memorial Scholarship
Daniel Hathaway

Gabrielle & Sophie Rainich Fellowship
Francesca Gandini

Juha Heinonen Memorial Graduate Fellowship
Xiaolei Zhao

Luther Claborn Mathematics Scholarship
Adam Kaye

Marjorie Lee Browne Scholars
Joseph Borja
Alexis Cook
Long Ly
David McMillon
Bryan Nevarez
Adrian Ochoa
Erick Vega
Ismael Xique

Mathematics Alumni/Alumnae Scholarship
Kevin Hannay

Mathematics Department Graduate Fellowship
Pedro Acosta
Siddhant Agrawal
Hai Bin Chang
Jeong Ha Cho
Rankeya Datta
Daniel DeWoksin
Dondi Ellis
Stefan Froehlich
Alexanrdos Georgakopoulos
Weichen Gu
Han Huang
John Kelly
John Kilgore
Jiaqi Li
Wei Li
Yining Lu
Robert Lutz
Viswambhara Makam
Gary Marple
Alexander Munk
Michael Newman
Ashwath Rabindranath
Elizaveta Rebrova
Andrew Schaug
Wenling Shang
Gregory Simon
Jiah Song
Qingtang Su
Yan Shuo Tan
Philip Tosteson
Feng Wei

Yun Wei
Derek Wood
Yuchong Zhang

Mathematics Scholarship Fund
Charlotte Chan
Scott Rich

Maxwell Reade Scholarship
David Prigge

National Physical Science Consortium Fellowship
Christopher Fraser

National Science Foundation Fellow
Rebecca Rebhuhn-Glanz
Brandon Seward
Robert Silversmith
Olivia Walch
John Wiltshire-Gordon

President's Challenge for Graduate Support
Tengren Zhang

Rackham International Fellowship
Jeremy Hoskins
Rohini Ramadas

Rackham One-Term Dissertation Fellows
Pedro Acosta
Daniel Hathaway
Gregory Simon
Yi Su
Xiaolei Zhao

Rackham Outstanding GSI Award
Kevin Carde
David Renardy

Rackham Predoctoral Fellowship
Jeffrey Calder
Emily Clader
Mary Wootters

Rackham Science Award
Raymundo Navarrete
Suchandan Pal
Robert Walker

Research Training Grant (RTG) – Algebra
Harry Altman
Kevin Carde
June Huh
Rachel Karpman
Adam Kaye
Patricia Klein
Alexander Leaf
Ariel Shnidman
Brooke Ullery

Research Training Grant (RTG) – Geometry
Becky Hoai
Matthew Jacobs
Gene Kopp
Nathan Priddis
David Renardy
Russell Ricks
Andrew Zimmer

Sumner B. Myers Memorial Prize
Jae Kyoung Kim

The Department of Mathematics Outstanding Teaching Award
Corey Everlove

The Karen Rhea Excellence in Teaching Award
Nathan Priddis

The Mort Brown Excellence in Teaching Award
Jake Levinson

The Pat Shure Excellence in Teaching Award
Daniel DeWoskin

The Wirt & Mary Cornwell Prize in Mathematics
June Huh

2014 Doctorate Degrees

Harry Altman completed his dissertation "Integer complexity, addition chains, and well-ordering" under the direction of Jeff Lagarias.

Jeffrey Calder completed his dissertation "Hamilton-Jacobi equations for sorting and percolation problems" under the direction of Selim Esedoglu. He has a position at the University of California, Berkeley.

Kevin Carde completed his dissertation "Cluster algebras and classical invariant rings" under the direction of Sergey Fomin. He has a position with Canada/USA Mathcamp.

Michael Chmutov completed his dissertation "The structure of W-graphs arising in Kazhdan-Lusztig theory" under the direction of John Stembridge. He has a position with the University of Minnesota.

Emily Clader completed her dissertation "The Landau-Ginzburg/Calabi-Yau correspondence for certain complete intersections" under the direction Yongbin Ruan. She has a position at ETH Zurich.

Nicholas Ford completed his dissertation "Geometric shifts and positroid varieties" under the direction of David Speyer. He has a position with Jane Street Capital.

Bich Hoai completed the dissertation "On symplectic invariants associated to Zoll manifolds" under the direction of Dan Burns.

June Huh completed the dissertation "Rota's conjecture and positivity of algebraic cycles in toric varieties under the direction of Mircea Mustata. June has a position with the Clay Mathematics Institute.

Rafe Kinsey completed his dissertation "A priori estimates for two-dimensional water waves with angled crests" under the direction of Sijue Wu.

Master's graduate David McMillon with Ph.D. graduate Jingchen Wu.

Kin Kwan Leung completed the dissertation "Complex geometric invariants associated to Zoll manifolds" under the direction of Dan Burns. Kin has a position with the University of Toronto

Sijun Liu completed the dissertation "Functional equations involving Laurent polynomials and meromorphic functions, with applications to dynamics and Diophantine equations" under the direction of Michael Zieve.

Zhipeng Liu completed the dissertation "Discrete Toeplitz determinants and their applications" under the direction of Jinho Baik. Zhipeng has a position with New York University.

Linquan Ma completed the dissertation "The Frobenius endomorphism and multiplicities under the direction of Mel Hochster. Linquan has a position with Purdue University.

Hieu Ngo completed the dissertation "Generalizations of the Lerch zeta function" under the direction of Jeff Lagarias. Hieu has a position with Texas A & M University-Qatar.

Nathan Priddis completed his dissertation "A Landau-Ginzburg/Calabi-Yau correspondence for the mirror quantic" under the direction of Yongbin Ruan. He has a position with Leibniz University of Hannover.

Maria Riolo completed her dissertation "Topics in structured host-antagonist interactions" under the direction of Charlie Doering.

Geoffrey Scott completed his dissertation "Torus actions and singularities in symplectic geometry" under the direction of Dan Burns. He has a position with the African Institute for Mathematical Sciences.

Ashley Wheeler completed her dissertation "Ideals generated by principal minors" under the direction of Mel Hochster. She has a position with the University of Arkansas.

Mary Wootters completed her dissertation "Any errors in this dissertation are probably fixable: Topics in probability and error correcting codes" under the direction of Martin Strauss. She has a position with Carnegie Mellon University.

Jingchen Wu completed the dissertation "Some problems in Stochastic Control Theory related to inventory management and coarsening" under the direction of Joe Conlon. Jingchen has a position with Amazon.com.

Yulin Wu completed the dissertation "On existence and properties of rotating star solutions to the Euler-Poisson equations" under the direction of Joel Smoller.

Xin Zhou completed the dissertation "Asymptotics of equivariant syzygies" under the direction of Rob Lazarsfeld and Mircea Mustata. Xin has a position with Global Atlantic.

Andrew Zimmer completed his dissertation "Rigidity in complex projective space" under the direction of Ralf Spatzier. He has a position with the University of Chicago.

Curtis E. Huntington 1942-2013

Long time factuly member, Actuarial Program Director and Associate Chair for Education Curtis Huntington passed away in October 2013 after a three-year battle with cancer.

Born in Boston in 1942, Huntington's father was an actuary and his mother was also a mathematician. He received a BA in mathematics in 1964, and an MA in business in 1965, both from UM, and later received a JD from Suffolk University. After completing service as a commissioned officer in the U.S. Public Health Service, Huntington joined the New England Mutual Life Insurance Co. (Boston), where he served from 1967 until his retirement in 1993 as a Vice President and Corporate Actuary.

During his distinguished career, he was named a fellow of the Society of Actuaries (FSA 1968), a member of the American Academy of Actuaries (MAAA 1972), a fellow of the Conference of Consulting Actuaries (FCA 2001), and an associated professional member of the American Society of Pension Professionals and Actuaries (APM 1990). His service to the actuarial community was monumental, and he helped to guide and shape the profession internationally for many years. Huntington was recognized for his distinguished career and tireless service to the profession. He was the 2010 recipient of the Harry T. Eidson Founders Award from the American Society of Pension Professional and Actuaries, and he also received the Jarvis Farley Service Award from the American Academy of Actuaries for his distinguished service to the actuarial profession through his numerous volunteer efforts during his career. In 2012, he received the Lifetime Achievement Award from the Conference of Consulting Actuaries.

In 1993, Huntington returned to UM as a Professor of Mathematics and Director of the Actuarial Mathematics Program and the Financial Mathematics Program. He served two terms as the associate chair for education in the Department, including the three years prior to his passing. He chaired the scholarship committee, assuring that students who needed tuition support received help. Huntington also arranged, proctored, and helped to fund the actuarial exams for students. He was instrumental in the significant increase of graduates from the actuarial/financial mathematics program over the past two decades. He helped to expand the program to include a financial component, increased the number and quality of the faculty members in the area, and increased the activities for the students. Huntington was proud of the active Student Actuaries at Michigan (SAM) group and guided them in organizing employ-er recruiting, professional development activities, and social events. He would excitedly share the successes of the SAM intermural teams in sports including broomball and water polo.

Huntington worked tirelessly on the development and fundraising activities of the Department, and served as the Development Committee chair for several years. He formed the Actuarial Alumni Leadership Council, which helps to guide and support the program. He personally endowed a fund in his mother's name that recognizes outstanding students in mathematics. He was the driving force in a successful campaign to endow a professorship in honor of Professor Cecil Nesbitt. When students graduated from the actuarial/financial mathematics program, they were instilled with Huntington's philanthropic spirit. He encouraged them to support UM as soon as they had the means, and he led by example. Several years ago, Huntington's colleagues at UM and from the actuarial profession established the Curtis E. Huntington Honorary Fund to provide support to the students and programs within actuarial/financial mathematics.

Even during his illness, Huntington found the time to lead and promote the actuarial profession around the world. His national and international travel schedule was packed with lectures, board meetings, and conferences. During his extensive travels, he made time to visit his other homes in Boston and New Zealand. He forged many personal friendships around the world, and made time for anyone who needed him.

A memorial service for Huntington was held at the Michigan Union in April 2014. More than 150 friends and colleagues joined to celebrate Huntington's life and contributions to the Actuarial profession and the UM. Personal memories were shared by many friends and colleagues. His sister, Peg, and her husband, Hugh, traveled from New Zealand to host the ceremony. Memorial contriubtions have been made to the Huntington Honorary Fund in the Department of Mathematics.

The Department recently received $2 million from Huntington's estate. The funds will be used to continue the activities within the Actuarial and Financial Mathematics program.

Actuarial Program Highlights

It is hard to believe that one year has passed since I joined the actuarial faculty at the University of Michigan. It is quite an honor and privilege to follow in the footsteps of legendary Professor Curtis Huntington. I am very thankful to my colleagues Bradley Hinesman, Joe Marker, Kristen Moore, and Jenny Young for their extraordinary help as I transitioned from the corporate life to an academic life.

Needless to say, we all were deeply saddened by the passing of our colleague, teacher, mentor, and friend, Curtis Huntington. His commitment to the actuarial program at Michigan and the actuarial profession at large was remarkable. He was wholly devoted to our program and our students, giving of his time, energy, and resources. Our program and our students thrived under his leadership.

We continue to build on the solid foundation laid by Professor Huntington and his predecessors. Our programs in Actuarial and Financial Mathematics are extremely popular and continue to thrive. Approximately 400 students have declared majors in Actuarial and Financial Mathematics, comprising about 60% of the total number of undergraduate mathematics majors. We also have five Masters students focusing on Actuarial Mathematics and we have seven current and recently graduated Ph.D. students working on problems in insurance and finance.

During the academic year 2013-14, a total of 81 eligible students received an actuarial exam subsidy. We also increased the subsidy to $225 per person (from $200) to match the recent application fees increase for Exam P by the Society of Actuaries.

Our students are well-recruited by employers. In 2013-2014, representatives from 29 companies visited campus to recruit our students for full-time positions and summer internships. Moreover, our students visited four companies at their headquarters.

Our student-run actuarial club, Student Actuaries at Michigan, or SAM, is one of the more active academically-focused groups on campus. Last year, there were nearly 183 dues-paying members, and there are about 480 people in the Facebook group. SAM activities include resume and interview workshops, campus visits from and field trips to prospective employers, outreach to local high schools to promote the actuarial profession, intramural sports, and social events. At the Fall 2014 informational meeting, an overflow crowd of interested students spilled out into the hallway adjacent to the lecture room. Highlights of the student's activities are detailed on their Facebook page, as well as their website.

Our Actuarial Program is designated by the Society of Actuaries (SOA) as a Center of Actuarial Excellence (CAE). For the last three summers, two of our students represented the University of Michigan at the SOA's CAE Student Summit, where they had the opportunity to learn more about the SOA and the actuarial profession, to meet with SOA leadership and experienced practitioners, and to connect with students from other CAE schools.

In May 2014, we held the Twelfth Annual Actuarial Commencement Luncheon, which is a high point of the academic year. Professor Huntington began this tradition in 2003. He named the event the Nesbitt Commencement Luncheon to honor his friend and mentor, Cecil Nesbitt, who was an active member of the actuarial faculty here for 63 years. This year, we renamed the event the Nesbitt/Huntington Commencement Luncheon.

Over 150 people attended, including graduating seniors, their families, and the faculty. We celebrated the graduates' accomplishments with a catered lunch, and our commencement speaker was Susan Smith (BA 1963). Ms. Smith began her career at Towers Perrin, then TPF&C, in Philadelphia. She progressed through the titles of Consultant, Principal, Assistant to the Chief Actuary, and ultimately Vice President. Ms. Smith retired in 1992. In 2007 she endowed the Susan Smith Professorship in Actuarial Science in the Department.

We are thankful to Michael Frank (BS, 1987) for creating the LinkedIn group University of Michigan Actuaries. Please consider joining the group as a way to network and keep in touch with fellow alumni/ae. Also, you can update your University of Michigan directory information at https://leadersandbest.umich.edu/alumni_update/

Please let us know if you have comments, questions, or suggestions; we would love to hear from you. And if your travels bring you to Ann Arbor, please pay us a visit in East Hall.

B. Roger Natarajan, PhD, FSA
Actuarial Program Director

Members of the Actuarial Alumni Leadership Council met in Ann Arbor in September 2014.

Awards Ceremony & Graduation Ceremony

2014 Undergraduate Awards

Putnam Competition

The Department's team for this year's William Lowell Putnam Competition placed 22nd out of 557 teams. The members of the team were **Luhang Lai**, **Joseph Richey,** and **Matthew Tanzer**. In the individual competition, **Matthew Tanzer** and **Shiquing Yu** finished in the top 200 out of more than 4000 students.

In the 31st Annual University of Michigan Undergraduate Mathematics Competition **Joseph Richey** and **Dylan Stephano-Shachter** tied for first place, and **Matthew Tanzer** placed third.

Margaret S. Huntington Awards in Actuarial Outreach

Janie Brink
Dennis Chew
Madeline Gilleran
Jenny Gong
Scott Griffith
Yixin Jin
Daniel Kaprielian
Joel Sharin
Mandhiraj Singh
Katherine Troutman
Anna Varsam

Evelyn O. Bychinsky Awards

recognizing underclass students who show exceptional promise in mathematics:

Benjamin Brady
Nishant Gupta
Gwyneth Moreland
Mayank Patke
Heather Price
Joseph Richey
Robert Rose
Yichuan Wang
Karl Winsor

Leon P. Zukowski Prize

recognizing outstanding service in the Mathematics Learning Center:

Christopher Drouillard

Mathematics Alumni/Alumnae Scholarship

Katherine Poggensee

Marilyn and Stewart Gloyer Scholarship

Michael Chrzan

Wilfred Kaplan Award in Applied Mathematics

Dylan Sena

William LeVeque Award in Number Theory

Joseph Richey

Jack McLaughlin Award in Algebra

Zhongyi Zhang

George Piranian Excellence in Mathematical Writing Award

Noah Shutty

Frank Raymond Award in Geometry and Topology

Bar Boytman

Outstanding Achievement in Mathematics Awards

David Bruce
Yi Hang Chiew
Yikai Gong
Michael Hu
Jun Meng
Me Shen
Xiangting Shi
Zi Chuen Soo
Wuyuanzhe Sun
Jianlin Wang

Otto Richter Memorial Prize in Actuarial Science

Ji Chuan Leong

Irving Wolfson Award

Joseph Kropiewnicki

CIGNA Award

Xiaoxiao Liu

Lois Zook Levy Award

recognizing an outstanding mathematics student who plans to pursue a career in K-12 mathematics education:

Katherine Barbour

Michigan Mathematics Merit Scholar

Christopher Drouillard
Nathan Hallman
John Holler
Joseph Kropiewnicki
Ji Chuan Leong
Salvatore Parenti III
Matthew Tanzer
Ruoting Wang
Nicholas Wasylyshyn
Ashley Weber
Xi Wu
Yurui Zhu

Outstanding Graduating Seniors

Luhang Lai
Molly Logue
Wei Qian
Elliot Wells

Wirt and Mary Cornwell Prize in Mathematics

Zhongyi Zhang

Members of the Student Actuaries at Michigan group at Whirlyball, one of their many extracurricular activities. More information on their activities can be found on their website http://sam.math.lsa.umich.edu/ or their Facebook page.

Development Highlights

This year the Department has been fortunate to receive significant donations from alumni. With the additional funds, some new and exciting opportunities are being developed.

We have already received a portion of a bequest from Curtis Huntington's estate. These funds will help to continue his legacy of support and development of student programs and assistance in the area of Actuarial and Financial Mathematics. The Curtis E. Huntington Honorary fund was created several years ago to provide similar support and enhancements to this area of the Department. The establishment and growth of this fund is due to the efforts of the Actuarial Alumni Leadership Council members. Their leadership gifts, as well as their work in promotion of the fund, have helped it to grow to a point where it will have immediate impact on students and activities. Memorial contributions since Huntington's death have been directed to this fund, and the outpouring of support from around the world was heartening.

Earlier this year, the Department received a significant contribution from the Van Loo family. The gift originated from the estate of James Van Loo, a 1967 UM mathematics alumni, and was facilitated by his brother Bill, who received Engineering degrees from UM. The very generous gift from the James Van Loo Trust will provide varied support in the Department. It has already allowed for the hiring of a Van Loo postdoctoral assistant professor, David Goluskin, whose interdisciplinary research interests include fluid dynamics and partial differential equations. The Van Loo fund will also provide a variety of assistance in the area of applied and interdisciplinary mathematics, including undergraduate student research support and supporting symposia for students and faculty involved in interdisciplinary research. Funding is also available for training of faculty, graduate and undergraduate students involved in math education, as well as development of new courses and revision of curricula for existing courses.

The Department also received a generous gift from the estate of Jack Byrne, a 1959 Actuarial Masters alum. The Department is still developing a plan for the gift, the amount of which has been enhanced by the Byrne family.

It is fortunate that the Department can rely on our many alumni and other donors to continue to be "Victors for Math." In conjunction with the new fundraising campaign at UM, a special event is planned aimed at establishing online giving. Giving Blueday, December 2, 2014, is UM's first university-wide day of giving. Scheduled on Giving Tuesday–a global day of giving following Thanksgiving weekend–Giving Blueday is a day to make a difference in thousands of lives and impact the future of our world. Additional information can be found on the giving website www.lsa.umich.edu/math/alumni/givingopportunities. Please continue to be Victors for Mathematics at Michigan!

Alumni Updates

Harold P. Benson (BS 1971) received a PhD in Industrial Engineering/Management Science from Northwestern in 1976. He recently retired from the University of Florida after teaching in the Business College for more than 33 years.

Barry Garelick (BA 1971) is teaching high school mathematics in California, as part of a second career after retiring from the U.S. Environmental Protection Agency in 2011. He has a recent publication in AMS Notices entitled "Problem Solving: Moving from Routine to Nonroutine and Beyond" http://www.ams.org/notices/201310/rnoti-p1340.pdf.

Rick Armstrong (BA 1972) received a teaching certificate, then spent two years teaching overseas for the Peace Corps. He returned to Ann Arbor and joined a Master's program for training community college math teachers at UM. He then participated in developing the K-6 Comprehensive School Mathematics program in St. Louis. When funding ended for that program, he began a 28 year career teaching many levels of mathematics at St. Louis Community College. He remained active in the Math community, and is currently enjoying retirement.

Maureen (Evans) Fujimori (BA 1980) continued her education at Eastern Michigan, receiving a MA in 1985. She is currently the upper school math teacher/advisor at Bancroft School in Massachusetts.

JongHae Keum (PhD 1988) has been appointed the President of the Korean Institute for the Advanced Study in Seoul, Korea.

Francis J. Gialanella (BS 1991) received a MD in 1995 from Jefferson Medical College and is currently a private practice physician in New Jersey.

Craig Westerland (PhD 2004) is the 2013 Australian Math Society Medal recipient, recognizing outstanding contributions from researchers under the age of 40. He is an ARC Future Fellow at The University of Melbourne, and is considered a pioneering researcher in algebraic topology and its connections with geometry, mathematical physics and number theory.

Paul Georgandellis (BS 2005) was recently accepted into the Masters of Computer Science program at the University of Chicago.

Jonathan Song (BA 2013, MA Education 2014) has been awarded a five-year Teaching Fellowship from the Knowles Science Teaching Foundation. The fellowship awards exceptional young men and women who have the potential to become leaders from the beginning of their careers, empowering them to become primary agents of educational improvement.

Where's Your Math T-shirt Been?

Top row, l-r: Lulu Wang (2016) at the Mean Value Theorem bridge in Beijing; Karl Wilson (2016) at the Garden of Constants at OSU; Wei Qian (2013) in Sequoia National Park. Second row, l-r: Heather Price (2016) at Buckingham Palace; Katie Poggensee (2014) in Waikiki, HI; Josh Abramson with the Michigan Synthetic Biology team in Toronto. Third row, l-r: Mike and Carrie Jones and family at Wonderworks in SC; Molly Wilson (2016) at the NASA office in Cleveland, OH. Bottom row, l-r: AnnieJae Fischburg (2012) on the Jumbotron in Times Square; Nick Triantafillou (2013) at the Seville Bull Ring; Lisa Sostecke (1973) at Mandalay, Myanmar. For information on ordering your own Mathematics Department t-shirt, contact math.mich@umich.edu.

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What Are You Doing?

We'd like to hear from you! Please complete and return this form for our alumni/ae files. You may mail it to the address above, fax it to 734-763-0937, or email the information to math.mich@umich.edu. See www.math.lsa.umich.edu/alumni/

Name_____

University of Michigan Degree(s) with years & advisors_____

Degrees from other Universities/Years_____

Home Address_____

City, State Zip_____

Home Phone_____E-mail_____

Firm/Institution_____

Position_____ Business phone_____

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