INDIANA UNIVERSITY DEPARTMENT OF
MATHEMATICS ALUMNI NEWSLETTER
COLLEGE OF ARTS & SCIENCES ALUMNI ASSOCIATION

August 2021, No. 21

CHAIR'S CORNER
Kevin Pilgrim '89

Last August we began the 2020-21 academic year fully aware of the challenges that we would face in meeting our missions in mathematics research, teaching, and service. We faced uncertainty on so many fronts: how our students would react to new modalities, how we would adapt to new technologies, how widely the infection would spread, what the financial impact would be, whether our loved ones and friends would be OK; whether democracy would prevail. We faced unprecedented restrictions: on our travel, on having visitors, on having to juggle caring for children while working from home. We faced isolation: from each other, and from our families. We endured endless hours of staring at screens. And we were saddened and shocked by the reduction in our postdoc cohort and the elimination of our research-teaching visitors.

And we prevailed.

In research, we collaborated in new ways. We created online seminars with worldwide attendance. We put ourselves out there in applying for grants, often getting them too. We persevered in expanding the frontiers of knowledge at a world-class level. In teaching, we found the balance between rigor and accessibility and basic fairness in delivering online instruction at scale. We lectured with masks on (ugh). We found ways to connect with students. We continued to believe in students' potential. We did ScienceFest online.

We also began the difficult work as a community to confront the legacy of racism as we formulated our diversity statement and plan. Simultaneously, we began another difficult journey as we geared up to address in a systematic way student success in our foundational courses, with an eye toward mitigating the disproportionate impact on students of color. IU has a new president and our campus will have in the next year a new provost. With the allies I've found on campus, the time may be right for us to think boldly.

And **Dóminique Kemp III** became the first African-American to earn a math PhD from us—see the item under Graduate News. You can also watch the Awards Ceremony online https://math. indiana.edu/news-events/news/2021-04-Awards-Ceremony-recording.html and I encourage readers to watch his speech.

We not only prevailed in the face of the pandemic—we excelled. Read on to see examples!

IN THIS ISSUE

DEPARTMENT NEWS

David Fisher Promoted to Rank of Distinguished Professor

David Fisher is the Ruth N. Halls Professor of Mathematics in the College of Arts and Sciences at IU Bloomington. His breakthrough work in collaboration with Aaron Brown and Sebastian Hurtado solved Zimmer's conjecture, which had been open since the 1980's. Roughly speaking, the conjecture asserts that a low-dimensional space cannot have a high-dimensional symmetry group. A basic example is that while the group of linear isomorphisms of three-dimensional space acts on the 2-dimensional sphere in an interesting and natural way, sending rays to rays, the analogous group of four-dimensional space cannot. He will spend the Fall '21 term at the University of California, Berkeley as a Miller Research Professor.

David Fisher

Michael Larsen

David Fisher and Michael Larsen to Speak at 2022 ICM

The International Congress of Mathematicians (ICM) takes place every four years, and an invitation to speak there recognizes the most significant contributions to research. The event will be held in St. Petersburg, Russia, and is jointly organized by local organizations and the International Mathematical Union. The Fields Medal and numerous other prizes are awarded during the event. Other recent IU ICM speakers include **Ciprian Demeter** and **Russell Lyons**.

Russell Lyons Awarded Simons Fellowship

Russell Lyons is the James H. Rudy professor of mathematics. His research concerns probability theory on graphs, combinatorics, statistical mechanics, ergodic theory and harmonic analysis. His recent research, with Yuval Peres, answers a question posed by Vadim Kaimanovich and Anatoly Vershik in 1979. The prestigious Simons Fellowship will partially support his investigations during his upcoming sabbatical.

Russell Lyons

Dylan Thurston Coauthors AMS Report on Inclusivity

Professor **Dylan Thurston** joined six other mathematicians to co-author the American Mathematical Society's report *Towards a Fully Inclusive Mathematics Profession*. A summary and a copy of the full report is here http://www.ams.org/about-us/understanding-ams-history . The full report gives concrete details of how discriminatory practices hindered the growth of Black mathematicians, and how this impact can be felt today.

Dylan Thurston

Larry Moss Co-Teaches Course on Math and Politics

Professor **Larry Moss** teamed up with Associate Professor of Political Science Armando Razo to co-teach a new course, Mathematics and Politics, as part of the College's 2021 Fall Themester program. The introductory-level course introduced students to mathematical tools to study voting and cooperation. The pair were also interviewed as part of a podcast; see https://themester.indiana.edu/news-events/news/2020-course-moss_razo.html .

Larry Moss

Zorn Postdoctoral Fellow Colleen Delaney Wins Mentoring Award

The award is presented annually by the Center of Excellence for Women & Technology. The citation, in part, reads "Dr. Delaney is a top role model for exemplary and high-impact mentoring" and praises her encouragement of others, willingness to go above and beyond expectations, and advocacy. Her research is supported by a prestigious National Science Foundation post-doctoral fellowship.

Linda McKinley Retires After 38 Years of Service

Linda McKinley

Linda's efforts over the years have shaped the broad landscape of student support for introductory mathematics classes. These included support for developing our placement exam for incoming students, the math learning center, the academic support centers, and the courses serving the campus' Groups program for first-generation students. Linda's service was honored by the campus 2018 Gordon Faculty award, and her teaching and work supporting students was honored by the Indiana Mathematics Association of America 2020 Teaching Award.

Welcome Nishad Mandlik

Dr. **Nishad Mandlik** earned his PhD this year from Oklahoma State University, with a thesis on combinatorics and matroids. He will join us this August as a Lecturer and our new placement coordinator. He has extensive experience in college teaching, including 10 sections as instructor of record, with 5 of those in precalculus and trigonometry. In addition to regular teaching, he will serve as placement liaison to campus, and provide support for course coordinators, program evaluation, curriculum development, and dual-credit workshops.

Nishad Mandlik

Michael Pilla

Welcome Michael Pilla

Dr. **Michael Pilla** earned his PhD last year from IUPUI, working in complex analysis and operator theory. He joined IU's Advance College Project (ACP) program this past March as a mathematics curriculum specialist, and will teach two courses a year for us. ACP is a dual-enrollment partnership between IU and select high schools throughout Indiana and surrounding states. The program is currently led by Senior Lecturer Dr. **Tracy Whelan**, who stepped in this past spring when Associate Professor **Ji-Ping Sha** went on sabbatical. Over the coming year, Michael and Tracy will work closely together on site visits to high schools around the region, vetting applications from teachers, and directing fall and summer training workshops.

2021 Zorn Cohort Suspended

Citing declining enrollments in foundational courses and the expense of the program, College leadership suspended the 2021 incoming Zorn postdoctoral fellow cohort. Though disappointed, we are hopeful for a resumption of the program soon.

THE PROBLEM CORNER

Take a piece of paper, and draw a simple closed curve C.

Can you always find a square whose vertices lie in C, no matter the shape of C?

The problem was posed by O. Toeplitz in 1911. While there are many partial results known for special curves C, the general case remains open!


RESEARCH ACTVITIES
Finding the Ultimate Hot Spot

In the early 19th century, Joseph Fourier—prefect, mathematician, and discoverer of the greenhouse effect—showed that a very simple equation predicts the flow of heat. Though this 'heat equation' involves only a few symbols, it is almost always impossible to solve exactly. One can, however, use mathematical analysis to predict qualitative aspects of heat flow. For example, suppose you bake bread and then wrap it up to keep it warm. The bread stays warm, but heat energy can still move around inside the loaf.

In 1974, mathematician Jeffrey Rauch made a mathematical conjecture that predicts that the hottest part of the bread will be located near the crust. Rauch's conjecture has come to be known as the 'hot spots conjecture'. Of course, the conjecture applies not only to loaves of bread but to other objects, for example, insulated steel.

Methods introduced by Fourier himself show that the hot spots conjecture is true for perfectly rectangular objects. However, for most shapes, the veracity of the conjecture is not yet known. **Sugata Mondal** and I recently showed that all objects with a fixed triangular cross-section satisfy the conjecture.

Below is a picture of a long-term temperature distribution of a triangular cross-section:
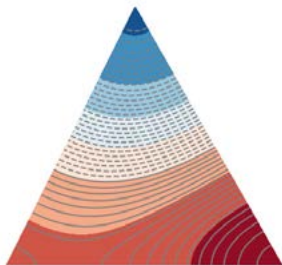
Note that the hottest spot corresponds to dark red and the coldest spot corresponds to dark blue. So not only is the hottest spot on the crust, it actually lies in a corner.

The conjecture still remains unresolved for many shapes. For example, it is not yet known whether every quadrilateral satisfies the hot spots conjecture.
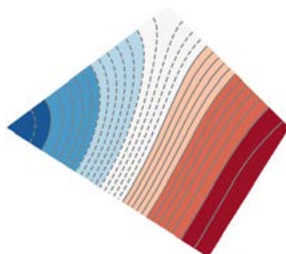
Using computer software one can approximate the long-term temperature distribution of some object. For example, the pictures found here were generated with FEniCS, a software package based on the finite element method. Though such software provides some evidence that the conjecture may be true, it is no substitute for a proof. One can compute until one is blue (or red) in the face, but knowledge of the location of the ultimate hot spot will depend on a mathematical proof.

—*Chris Judge*

To better foster connections, the Department supported graduate student lunches L-R: Daniel Freese, Homin Lee, Yue Shi, Alex Glickfield, and Youngho Kim

GRADUATE PROGRAM

Matthias Strauch
Director of Graduate Studies

Of course, the pandemic also had its impacts on the graduate program in the academic year 2020-21. Of the many aspects, I would like to highlight only two: how the duties of our Associate Instructors were impacted, and how admitted international students were affected.

Although most courses on the graduate level were taught remotely in 2020-21, the university's administration decided that recitations were still to be held in-person. This meant that many of our graduate students had to give those recitations in-person, and I hereby gratefully acknowledge that we have had enough Associate Instructors who were willing to do so. Some of our graduate students taught courses online, and others even were the instructor of one of the few in-person courses. Whether they taught in person courses or remotely, I am thankful for all the efforts which were made, as the fall and spring semesters went as smoothly as one could possibly imagine.

The fact that many U.S. embassies and consulates closed in the beginning of the pandemic meant that most of our new international students experienced significant problems in getting student visas for the United States. Arrangements were made so that those students who would be unable to come to Bloomington were able to follow courses remotely and earn credits, and this is what all our international students did. Of those who were abroad when being admitted in spring 2020, **Miri Son** and **Youngho Kim** managed to arrive in time for the fall semester. **Camilo Arosemena Serrato** from Colombia joined us a few weeks later in September. Then **Hyein Choi** (from Korea), **Nasheed Jafri** (from India), and **Tianyu Sun** (from China) came late in 2020 to begin their in-person studies in January. And as for **Dmitrii Solovev** (from Russia) and **Kai Fu** (from China), we are hopeful that they will be joining us in the future.

Dóminique Kemp First African-American IU Mathematics PhD

Dóminique Kemp

Dóminique Kemp wrote his thesis in the areas of decoupling theory and harmonic analysis under supervision of Prof. **Ciprian Demeter**. This area studies the interference of overlapping waves, and it has connections to many areas of mathematics, from partial differential equations to differential geometry to number theory.

Dóminique grew up in Lansing, Michigan. He earned his Bachelor's degree in Mathematics from Stanford University in 2014. He was admitted in 2015 and was awarded the prestigious President's Diversity Recruitment Fellowship, which allowed him to fully focus on his progress in the program for two full years (first and fifth year).

"Looking back on my experience now, I think that graduate school is a time period when each person must grapple with their passion and love for mathematics and assess just how deep it runs, just how much they are willing to sacrifice for it.", said Dóminique. Reflecting on the challenges that students of underrepresented groups face, he remarked, "First impressions carry so much weight...watching everything you say or do can be daunting. This may be one reason why under-representation in mathematics is self-enforcing." Offering advice to math department leadership, he shares this insight: "Let us do what we can learn to recognize this, and to support each other in ways that extend beyond routine professionalism, to acknowledge the communities from which we each emerged."

Dr. Kemp received a prestigious NSF postdoctoral fellowship award to support his future research. In the 2021-23 academic years he will be visiting the University of Wisconsin-Madison. In 2023-24 he will be a postdoctoral research associate at Princeton University and in 2024-25 he will be a member of the Institute for Advanced Study there.

17 New Students Admitted

Among the 17 newly admitted students are three students who earned their Bachelor degree at IU: **Evan Phares** and **John Philip Pampreen** are joining our M.A.T. (Master of Arts for Teachers), and **Franco Storino** has been admitted to the MA program. Among our incoming cohort are 4 women, one Native American, and one non-binary-gender student.

The number of new students has been lower this year, as two students who were admitted in 2020, but have been unable to come to Bloomington this academic year because of the pandemic, had to be counted towards the new cohort.

Graduates 2021

We congratulate our students who graduated in 2020-21 (with their current postdoc position or employment given in parentheses):

Nathan Burton (MA), **Andrew Davis** (MA, admitted to the PhD program at IUPUI), **Eduardo Fischer**, **Christiane Gallos** (MA, has been admitted to our PhD program), **Dorothea Gallos** (MA, has been admitted to our PhD program), **Kelvin Guilbault**, **Yaqing Hu** (Morningside Center of Mathematics), **Dóminique Kemp** (University of Wisconsin, Madison), **Cemile Kurkoglu** (Denison University), **Aranya Lahiri** (UC San Diego), **Tim Lai**, **Tao Ma** (Jefferies Group), **Insung Park** (Institute for Computational and Experimental Research in Mathematics, Brown University), **Menuja Perera** (Virgina Tech), **Noah Riggenbach** (Northwestern University), **Jared Roush** (MA, admitted to the PhD program at the Illinois Institute of Technology), **Emily Rudman** (Ohio State University), **Joshua Seidman** (MA), **Sailun Zhan** (Binghamton University)

Cemile Kurkoglu
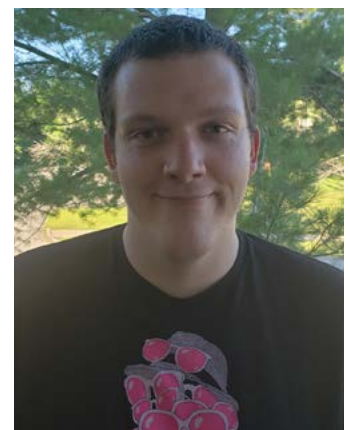
Noah Riggenbach

College Dissertation-Year Research Fellowship

Krutika Tawri

Krutika Tawri has been awarded the prestigious Dissertation-Year Research Fellowship from the College of Arts and Sciences. Krutika does research on various problems in Partial Differential Equations with College Professor **Roger Temam**.

Outstanding Thesis Award

Insung Park

Honoring the excellent results of their dissertations, the Outstanding Thesis Award has been given this year to two students:

Dóminique Kemp, for his thesis "Decoupling in Cases of Vanishing Curvature with Applications", written under the direction of Professor Ciprian Demeter.

Insung Park, for his thesis "Julia Sets with Ahlfors Regular Conformal Dimension One", written under the direction of Professor **Dylan Thurston**.

CAREER SPOTLIGHT
Three PhD students interning for regional companies

This past year, IU joined the Internship Network in the Mathematical Sciences (https://inmas.us/). This NSF-funded, multi-university initiative has as its mission to provide high-quality training and internship experiences that broaden career opportunities for students in the Mathematical Sciences. A key goal is to demonstrate the value that mathematicians can add to organizations that might not have large established internship programs already. Our department partnered with the College, its Walter Center for Career Success, and our

Vinicius Ambrosi

Institute for Scientific Computing and Applied Mathematics to support our participation. This summer, three students will spend eight weeks in paid internships. **Vinicius Ambrosi** is working for the Bee Corporation, a recent startup launched by two IU alums, which provides growers with imaging and software tools to assess real-time health of beehives. **Sanjana Agarwal** is working at Equilo, which provides data analysis tools to organizations striving for gender equality. **Kelvin Guilbault** is working at Cummins, a major provider of engines, both diesel and electric.

Sanjana Agarwal

Kelvin Guilbault

Virtual panel event for grad students showcases careers in industry

In late April, five mathematicians gave a virtual panel presentation highlighting opportunities for mathematicians in industry: Jasmine Powell, technical writer at MathWorks; Laura White, mathematician/aerospace engineer at NASA; Kimberly Shurupoff, math hiring director at the NSA; Paul Bruillard, Senior Data Scientist at Opendoor; and Elizabeth Wicks, Data and Applied Scientist at Microsoft. The event was part of a series organized by grad students **Hayley Bertrand** and **Caroline Davis**. If you're interested in participating in a similar event, please let alum & career liaison Kevin Pilgrim know pilgrim@iu.edu .

Some of the participants of the PMI Post-Doc Virtual Panel Event. Photo supplied by Caroline Davis.

UNDERGRADUATE PROGRAM

Shouhong Wang
Director of Undergraduate Studies

This past year presented many challenges for students, parents, professors, graduate associate instructors, undergraduate instructors (UGIs), undergraduate graders (UGGs), advisors,bbbb   and supporting staff members. I would to thank all of you for your hard work, effort, and patience to make this year a successful year. I am also grateful to my predecessor Professor Ayelet Lindenstrauss for her generous support. In spite of the challenges, our undergraduates shined and here are a few of their most notable achievements:

Nine math majors: **Lukas Cavar, Kelley Edwards**, **Erin Elliott**, **Kelli Michaels**, **Shyam Sunder Rajgarhia**, **Franco Storino**, **Marc Touraev**, **Timothy Vincent**, and **Jared Winslow** were elected to Phi Beta Kappa.

Daniel Rickert (math and physics major) and **Tianshu Yu** were among four students earning the 2021 Marshal H. Wrubel award, administered by the Department of Astronomy. Tianshu is a junior in math, has taken 7 graduate level courses, and was nominated by Professor Russ Lyons. He has also received our own Corey Manack Memorial Scholarship. Daniel has also received our own Trula Sidwell Hardy Mathematics Scholarship and Anne B. Koehler Scholarship.

Daniel Rickert

Tianshu Yu

The team of **Alex Farrar, Eric Herbst** and **Michael Mosley** won the sixth annual Society of Actuaries (SOA) international student research case study challenge. Michael, a senior in finance and accounting, Alex, a sophomore in saxophone performance and applied mathematics, and Eric, a sophomore in finance and business analytics, represented the diverse talents of IUB well.

Alex Farrar

Eric Herbst

Michael Mosley

Each year, a case study is released with fictional data. Students work over the course of eight weeks to respond to the open-ended study, representing realistic actuarial challenges. This year's challenge was to create a novel insurance policy covering adverse changes in population health in two fictional countries. Sixty-four teams from around the world submitted reports with their recommendations. After IU's team, the other five finalist teams came from Singapore, the US, Hong Kong, Indonesia, and Portugal.

The team was mentored by **Russell Lyons**, who is the department's James H. Rudy Professor. "As always, this year's case study was very challenging," said Prof. Lyons. "Despite other demands on their time, our team worked hard with a surprising degree of independence. Once they advanced to the final six, they needed to prepare a presentation and answer questions from the judges. I was extremely impressed with both their written report and their oral presentation."

There have been a number of other undergraduates competing for IU in math competitions. A team of two students **Mark Oussoren** and **Jasper Baltz** competed in the Putnam Competition. And a team of three students **Mengchu Li**, **Xuchang Liu** and **Wei Yuan** competed in the international Mathematical Contest in Modeling.

Beyond the classroom, our undergraduates have been making wonderful use of research opportunities, such as working alongside professors and getting involved in research-related programs.

Junior **Tianshu Yu** worked on a research project on entropy in cryptographic keys, mentored by Math and Informatics faculty member Professor **Esfandiar Haghverdi.** Senior **Marc Touraev** (Physics and Math major) worked alongside Professor Anton Kapustin from Caltech, resulting a joint research paper: "Non-relativistic geometry and the equivalence principle;" see https://arxiv.org/abs/2101.04153 .

Lab of Geometry (LOG) is a departmental program first introduced in the Spring semester 2019 under the supervision of Professor **Dylan Thurston**. The aim of this program is to understand a concept deeply enough so that you can tell a computer to produce meaningful pictures from which you can get further insights and conjectures. The Spring 2021 LOG program moved online and was coordinated by Professor **Dylan Thurston**, Professor **Matt Bainbridge** and graduate student **Homin Lee**, with four graduate students **Vinicius Ambrosi**, **Ryan Stees**, **Ricky Simanjuntak**, and **Caroline Davis** serving as mentors. Seven undergraduates **Nick Adkins**, **Daniel Lutes**, **Gengzhe Li, Chenming Huang**, **Tianshu Yu**, **Zachary Lichtenstein**, **Yijia Chen** worked on three projects: Schwarz-Christoffel (SC) mapping, Fibrations for Knots, and Entropy in Complex Dynamics. To read more about the Laboratory of Geometry, visit https://sites.google.com/view/laboratory-of-geometry-iub/home

Another research-related program is the **Directed Reading Program (DRP)**, which pairs undergraduates with graduate students to learn an advanced topic of the undergraduate's choosing, and has benefits for both. This year the program was directed by faculty member Dr. **Vladimir Eiderman**. In Fall 2020, undergraduates **Jasper Baltz**, **Daniel Lutes**, **Gengzhe Li, Chenyi Bi**, and **Michael Johnson** were mentored by graduate students **Hayley Bertrand**, **Homin Lee**, **Ryan Stees**, **Anuj Kumar**, and **Sean Sanford**. In Spring 2021, undergraduates **Austin Cantrell**, **Christina Duffield**, **Daniel Rickert**, **Yijia Chen**, and **Michael Johnson** were mentored by graduate students **Mark Ronnenberg**, **Daniel Condon**, **Aric Wheeler**, **Tom Yerger**, and **Sean Sanford.** More information can be found on its webpage: https://math.indiana.edu/student-portal/directed-reading-program/index.html

Several graduating seniors are going to pursue PhD studies, including **Mark Oussoren** to UC Berkeley, **Franco Storino** to Indiana University Bloomington, **Sam Norrell** to University of Wisconsin Madison, and **Abe Leite** to Stony Brook University. Also, **Michael Li** is going to York University in Toronto studying Mathematics and Statistics with a focus on Financial Mathematics; **Chenming Huang** is going to a masters program at Columbia University; **Evan Phares** and **Philip Pampreen** are pursuing a master of arts for teachers (MAT) at IU. We wish our graduates all the best in their future endeavors.
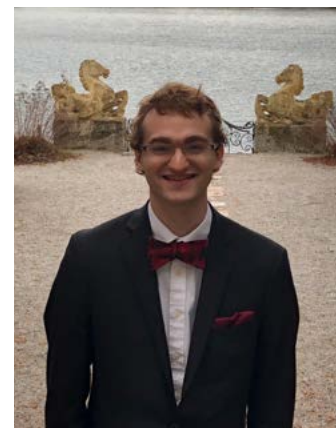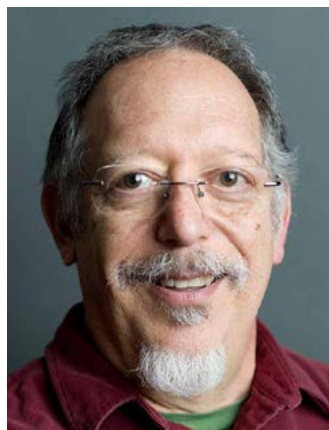

Mark Oussoren

Abe Leite

Evan Phares

Philip Pampreen

STAFF NEWS
Frank Reiter Retires After 31 Years of Service

Frank Reiter

Frank Reiter, who has advised mathematics students since 2017, will retire at the end of this academic year. At IU, he earned a BA double major in East Asian Studies and Philosophy from the College, and then Masters degrees in Instructional Systems Technology and Educational Psychology from the School of Education.

His advising career began in University Division in 1990. In 1997 he became Assistant Director of Advising in University Division and then in 2007 became Director of Advising. In 2013 he moved to the College, advising first in Economics, and then taking on also mathematics BA students. Before his work in the area of academic advising he had several other jobs: Amtrak porter, set painter for the IU opera, dishwasher at the Uptown Café, and union electrician (IBEW).

Mary Jane Wilcox Retires

Mary Jane Wilcox began working for Indiana University in the Library in 1979. She held that position for three years, and then her family moved to Crown Point, IN. Four years later, she began working at IU Northwest for the Bookstore there and then in Parking Operations. Her Department of Mathematics career started at IU Northwest in 1987 and, after two years, she and her family moved to Bloomington where, as legend has it, she left IU Northwest on Friday and started in Bloomington on Monday. Her career in Bloomington began as a typist in 1989 and she held that position for four years. In 1993, she moved to being the faculty secretary for Jon Barwise. In 1996, she started a 10-year stint as the Chairman's secretary, a position she held until 2007, when she became the fiscal officer for the department.

Mary Jane Wilcox with her daughter, Mandie McCarty, and grandchildren

As fiscal officer, Mary Jane's role was complex, but one she handled daily with equal parts expertise and grace. Whether she was helping someone acquire the correct visa, balancing the budget or making sure the payroll was correct, she seemingly managed it all effortlessly.

At home, Mary Jane will be retiring to a loving family, including grandchildren Andrew, Brody, Tucker, Issabelle, Jake, Kyra and Zeb, along with her English bulldog, Bentley, who will gladly keep her busy. Whether it be swim or football practice or just being a grandma and babysitter, it's safe to say that, while her job in the department is ending, her job at home has (happily) just begun.

Without question, Mary Jane's departure will leave a hole in the department that will be hard to fill. She not only displayed a vast knowledge in her duties as fiscal officer, but she was also a vital part of the fabric of the department as well. Her office was a frequent stop for faculty and staff alike whether it be for work or just a friendly chat, her door was always open. Maybe most of all, we will miss her being the one person every year who picks IU to win the championship in our annual Math Department NCAA pool.

ALUM NEWS

With hundreds of our majors and graduate students earning their degrees each year, it's hard to know where to begin reporting their news. If you, too, have news to share or a story to tell, visit https://math.indiana.edu/forms/alumni-stories.html

Holly Attenborough '13 Receives Statewide Wisconsin Distinguished Teaching Award

Dr. Holly Attenborough, Associate Professor of Mathematics at UW-Platteville, was recently honored with the 2021 Distinguished Teaching Award from the Wisconsin Section of the Mathematical Association of America. The Wisconsin Section Distinguished Teaching Award was established in 1991 to emphasize the high importance that colleges and universities in Wisconsin place on teaching mathematics.

Holly Attenborough

John Brown '12 Awarded Knowles Teaching Fellowship

This year, 34 promising high school mathematics and science teachers who are just beginning their careers were awarded Knowles Teaching Fellowships.

John earned a Bachelor of Science in Mathematics and a Bachelor of Arts in English from Indiana University in 2012. He also earned a Master of Advanced Study in Mathematics from the University of Cambridge in 2014 as a Gates Scholar, and a Master of Arts in Teaching from Relay Graduate School of Education in 2020. John serves on the program committee of Math Circles of Chicago, where he worked as an instructor for four years.

The Knowles Teacher Initiative supports a national network of mathematics and science teachers who are collaborative, innovative leaders improving education for all students in the United States.

Suzanne Weekes '89 is SIAM Executive Director

The Society for Industrial and Applied Mathematics (SIAM) has announced the appointment of Dr. Suzanne L. Weekes, Associate Dean of Undergraduate Studies, ad interim, and Professor of Mathematical Sciences at Worcester Polytechnic Institute (WPI), to the position of Executive Director. In her new role, Weekes will continue to build SIAM's reputation as the leading professional society for applied mathematicians and computational scientists.

Dr. **Najja Marshall** '14 earned his PhD in neuroscience from Columbia University. Watch his video conversation on the neuroscience behind music and physical movement at: https://www.youtube.com/watch?v=BaByLVEzAzA

Dr. **Dylan Rudy** '11 went on to earn his PhD in 2021 at Texas Tech. He then joined the Quantum Computing Team at Booz Allen in Baltimore.

Josh Grayson '06 earned double degrees in mathematics and piano performance, and went on to receive a doctorate in historical musicology from the University of Southern California. He now runs a company, Lost Roots Family History https://lostrootsfamilyhistory.com/ . Its work is devoted to recovering and preserving the memories of our ancestors. Though the company's focus is on Jewish families of Central and Eastern Europe, it works in other areas too.

Eric Langowski '18 is a data scientist for the Illinois Department of Central Management Services. Recently featured in a College "All Careers Considered" podcast, his research has been featured in the *New York Times*, *Washington Post*, *Bloomberg News*, and other publications.

ALUMS AND FRIENDS GIVING BACK

Toni Bluher '83, a subject matter expert at the National Security Agency (NSA), visited us virtually in late September 2020 and led an inspiring discussion for our majors and graduate students about careers and work-life balance, highlighting opportunities at the NSA. She was twice awarded the Presidential Meritorious Rank Award by President Obama and was named the 2015 NSA Researcher of the Year. She has frequently mentored undergraduates in NSA's Director's Summer Program, and is a past president of NSA's oldest learned society, the Crypto-Mathematics Institute.

We were excited to receive expanded financial support from several alums and friends.

Dr. Satish and Avnish Bhatnagar endowed the **Bhatnagar Award in Applied Mathematics**, which will recognize an outstanding thesis.

Dr. Satish Bhatnagar received his PhD from IU in 1974, writing his thesis in the area of partial differential equations. That year he joined the mathematics faculty at the University of Nevada Las Vegas and he is now a Professor there. He is the author of several books, including *Epsilons and Deltas of Life*, a series of reflective essays.

Jeffrey and Deborah King expanded their support for the scholarship that bears their name; it will serve significantly more students in the coming years.

Jeffrey and Deborah earned degrees in Math and Nursing from IU and IUPUI.

The new **Research Support and Travel Fund** was created by a friend of the department, who wishes to remain anonymous.

This year, it supported conference registration fees for graduate students, colloquium speakers, and undergraduate research projects.

AWARDS

Unfortunately we had to hold our annual awards ceremony via Zoom again in April. You'd think that with all the practice of the past year, things would have run smoother. Well, it turned out a bit rocky; check out the video and program on our news website at https://math.indiana.edu/news-events/news/2021-04-Awards-Ceremony-recording.html. But we are just as proud of all our awardees.

Undergraduate Awards

Thelma Abell Prize
Zayn Karim and Greta Stephenson

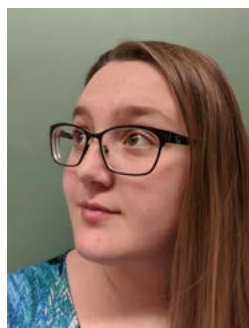**Gail Homan Adele Mathematics Scholarship**
Christina Duffield

Ciprian Foias Prize
Robert Grimley

Ruth E. Gilliatt Memorial Scholarship
Christina Duffield and Gabbie Moreno

Christina Duffield   *Gabbie Moreno*

Trula Sidwell Hardy Scholarship Fund
Daniel Rickert

Cora B. Hennel Memorial Scholarship
Maximillian Newman, Katie Pletz, Mark Ronnenberg, and Graham Seiler

Jeffrey and Deborah King Scholarship
Brooke Augustine

Anne B. Koehler Scholarship
Daniel Rickert and Lucy Lippman

Donald Otto Koehler Scholarship
Arthur Hertz, Zachary Lichtenstein, Andrew Morgan, and Andrew Smith

Brooke Augustine

Cory M. Manack Memorial Scholarship
Tianshu Yu

Rainard Benton Robbins Prize
Samantha Bailey

Graduating Senior Recognition Award
Abe Leite, Franco Storino, Mark Oussoren, and Philip Pampreen

Shabani Book Fellowship
Enoch Ayeh

Marie S. Wilcox Scholarship
Austin Cantrell, Hyein Choi, Ayça Durmaz, and Dalton Sconce

William P. Ziemer Student Assistance Fund
Jasper Baltz, Somi Kang, Pavel Kovalev, Justin Peterson, and George Stylianou

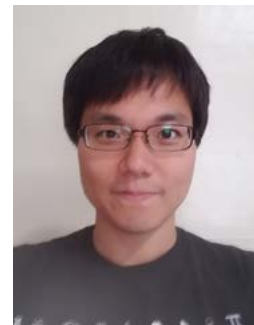**M118 Undergraduate Intern Award**
Bethany Brinson

Enoch Ayeh

Graduate Awards

Hazel King Thompson Fellowship
Kai Fu, Hongki Jung, Anuj Kumar, Homin Lee, Mark Ronnenberg, Sean Sanford, Kai Smith, Dmitrii Solovev, Dylan Spence, Ryan Stees, Siyuan Tang, Aric Wheeler, and Ramazan Yol

College of Arts and Sciences Fellowship
Juan Camilo Arosemena Serrato, Kevin Buck, Hyein Choi, Conor Doig, Chengzhang Fu, Madison Howard, Nasheed Jafri, Youngho Kim, Tony Wei Li, Justin Lin, Maximillian Newman, Steven Schaefer, Miri Son, and Moshe Stein

Robert E. Weber Memorial Award
Youngho Kim

Youngho Kim

Noah Kaufmann

James P. Williams Memorial Award
Hyein Choi, Justin Lin, Maximillian Newman, and Youngho Kim

Robert K. Myer Graduate Fellowship in Mathematics
Noah Kaufmann

Muriel Adams Stahl Graduate Fellowship
Krutika Tawri

William B. Wilcox Mathematics Award
Seok Hyun Byun

College of Arts and Sciences Travel Award
Gökçen Büyükbaş

David A. Rothrock Teaching Award
Hayley Bertrand, Daniel Condon, Daniel Freese, Jared Roush, Samanwita Samal, and Ricky Simanjuntak

Outstanding Thesis Award
Dóminique Kemp and Insung Park

College of Arts and Sciences Dissertation Research Fellowship
Krutika Tawri

Seok Hyun Byun

Faculty Awards

Rothrock Mathematics Faculty Teaching Award
Kevin Zumbrun

Kevin Zumbrun   *Jane Wang*

Indiana University Trustees' Teaching Award
Andrew Dabrowski, Matvei Libine, and Ayelet Lindenstrauss

Zorn Teaching Award
Jane Wang

IN MEMORIAM: Billy Rhoades

Billy Rhoades

Billy Eugene Rhoades, 92, of Bloomington, passed away suddenly Friday, May 7, 2021. He was born in 1928 in Lima, Ohio. Billy received his doctoral degree in 1958 under the direction of A. Wilansky. He remained at Lafayette College as an Assistant Professor until 1965. During this period, Billy became increasingly involved in Mathematics Education, an interest that continued throughout his career. From 1963 to 1965, he was granted leave of absence from Lafayette College to serve as the Associate Director (and subsequently, as Director) of the Committee on the Undergraduate Program in Mathematics (CUPM) in Berkeley, CA, which was a powerful force in mathematics education reform for many years.

After a two-year assignment with CUPM, Billy accepted a teaching position at IU as an Associate Professor with tenure in 1966.

Billy associated himself closely with all aspects of pedagogy and mathematics education.

He was assistant chairman for undergraduate affairs, and took charge of AIs for some time. He coordinated the dialogue between the Mathematics Department and the School of Education and was instrumental in the development of our Math-T courses to prepare future teachers. He supervised the Master of Arts in Teaching program during his entire career at Indiana. At the same time, Billy remained active outside the university on committees and panels, speaking widely on mathematics education to sectional meetings of the Mathematical Association of America and the National Council of Teachers. He was the Director of the Academic Year Institutes program sponsored by the National Science Foundation.

Billy Rhoades' filing system

Billy remained active in research throughout his career; he still made regular trips to Rawles Hall in Spring 2021. He is the author of 411 research papers listed in the AMS MathSciNet database, mainly in the fields of Summability and Fixed Point Theory. He had a remarkably meticulous filing system stored on 3x5 note cards. Every Wednesday afternoon, Billy could be seen in the Swain Hall Library poring over journals, updating the cards, and cross-referencing the information. He was generous in sharing that information with others, and he was especially keen to encourage younger colleagues at institutions which lack the fine library facilities that we enjoy at Indiana. For example, he collaborated extensively with mathematicians in Turkey, and helped attract top PhD students from universities there to our graduate program.

Billy was a master of classical Summability Theory. Some years ago when Paul Halmos was giving a popular (for mathematicians!) talk "On Matrices I Have Met", Paul raised the question: Does the Cesaro matrix have a square root? It was a typical Halmos puzzle—simple to state, but irritatingly unknown to the audience. Billy, using his vast knowledge of Summability Theory, easily showed the answer was yes, and was able to describe explicitly the square root.

Billy was also an active member for many years in the United Presbyterian Church in Bloomington, serving on the synod and as an elder. He was an avid tennis player, and loved sports of all kinds. For many years, he had tickets to IU basketball, football, and soccer. We will remember Billy as a man of integrity, of faith, loved by his wife and family, and respected by his colleagues here and around the world.

–Kevin Pilgrim (Footnote: in preparing this, I drew upon information compiled earlier by Grahame Bennett and John Ewing.)

GIVING

The Department of Mathematics is grateful for all of the support it receives from its generous donors. The Department has several funds to which you can give. Donations may be made using the attached Indiana University Foundation Donation Form or through the Give Now link at https://math.indiana.edu found by following first "About" and then "Alumni and Giving".

- Mathematics Enrichment Fund (I380008688): Gifts to this fund will be used for the general support of the Mathematics Department, in the College of Arts and Sciences.
- William P. Ziemer Student Assistance Fund (P370013557): Gifts to this endowment are used to support both undergraduate and graduate students in the Department.
- Glenn Schober Memorial Fellowship Fund (I380008692): Gifts to this fund support fellowships in the department. The fellowship may support such things as travel and registration fees for students attending national meetings.

The Indiana University Foundation solicits tax-deductible private contributions for the benefit of Indiana University and is registered to solicit charitable contributions in all states requiring registration. For our full disclosure statement, see http://go.iu.edu/89n

Gift by Mail

INDIANA UNIVERSITY FOUNDATION

Designate Your Gift

Designation (specify campus, school, or program):   Gift amount:

_____   _____

_____   _____

_____   _____

Total amount: $_____

Payable as a: ☐ One-time gift   ☐ Multiyear pledge (up to five years)

Multiyear pledge(s): Please send me pledge reminders for installments of $_____ to be contributed:

☐ Annually   ☐ Semiannually   ☐ Quarterly   ☐ Monthly   Beginning ____ / ____ and ending ____ / ____
                                                                      MM   YY   MM   YY

Payment Method

Option 1: One-time Credit Card Gift

Please charge my: ☐ American Express   ☐ Discover   ☐ MasterCard   ☐ Visa   Total gift amount: $_____

Card number _____   Expiration date ____ / ____
                                                                         MM   YY

Signature _____

Option 2: Check

Make your check or money order payable to **Indiana University Foundation**.

Matching Gifts

☐   My company will match my gift, and a completed matching gift form is enclosed.

Donor Information (*Required information)

*Full name: _____ Did you attend IU?   ☐ Yes   ☐ No

*Home address: _____

*City: _____ *State: _____ *Zip: _____

Home phone: (_____) _____ Email address[1]: _____

[1] By providing your email address, you are opting to receive emails from Indiana University.

Please send me information about:

☐ Giving through donor societies   ☐ Giving through estate planning

☐ Other _____

The Indiana University Foundation is the designated fundraising agency for Indiana University. Gifts received that are not designated for a specific area will be credited in equal portions to the area(s) indicated on the reply/gift card. A small portion of funds and/or income therefrom may be used to defray direct costs of raising funds. IUF is registered to solicit charitable contributions in all states requiring registration. For our full disclosure statement, see *go.iu.edu/89n*.

You may support IU/IUF via a donor-advised fund and/or private foundation, but under IRS regulations, you cannot satisfy an outstanding pledge through either type of vehicle.

Tax Advantages

Gifts to Indiana University are deductible as charitable contributions within the limits of the Internal Revenue Code. Indiana taxpayers are eligible for a 50 percent tax credit for gifts up to $400 on joint returns or $200 on individual returns.

IU22HAE1ASAL11NATF2MU

**Thank you for your support of Indiana University.
It is greatly appreciated!**