MLB Scholars Program Offers Bridge to Success

The Marjorie Lee Browne (MLB) Scholars Program is an enhanced option for the MS degree that is designed to give students professional knowledge of pure or applied mathematics in order to prepare them for continuing toward a PhD. The program, currently in its tenth year, is named for Dr. Marjorie Lee Browne, who in 1949 became the first African-American woman to earn a PhD in Mathematics at the University of Michigan.

The MLB Scholars program was conceived to impart to the next generation of scholars the foundational skills required to combine a deep knowledge of applied science with solid mathematical, computational, and physical sophistication. It is designed to offer a space for transition from the undergraduate degree to a PhD program. MLB scholars are typically from underrepresented groups.

MLB Scholars are provided the opportunity to receive fellowship funding as well as teaching experience during their time at Michigan. Both the fellowship and teaching provide a

l-r: MLB Program Director Trachette Jackson with recent MLB scholars Lemar Callaway III, Emily Cardin, Daniel Maes, Joanne Dong, Oscar Gonzalez, Annaliese Keiser, Karina Aponte.

stipend, tuition, and health benefits. MLB Scholars are funded in part by a National Science Foundation Building Bridges grant, a program that highlights mentoring and community building to enhance diversity in STEM fields. The grant aims to increase the number of students from historically underrepresented communities, including students of color and students from disadvantaged socioeconomic backgrounds. The program receives additional financial support from the Rackham Graduate School and the Mathematics Department.

View From the Chair's Office
Anthony Bloch

This past year has been a year like no other. I am very grateful to the faculty, students, and staff who helped us get through it. Challenges remain of course but I am hopeful the coming year will be a more normal, enjoyable, and less isolating one.

I am very thankful to everyone in the department for the effort they put in making our department function so well over this period. I would like to acknowledge in particular the contributions of our Associate Chairs: Andreas Blass, Joe Conlon, Sergey Fomin, Kristen Moore, as well as Ralf Spatzier, the head of the Personnel Committee, Mattias Jonsson our Doctoral Chair, Stephen DeBacker, the head of undergraduate program, Kartik Prasanna our head of admissions, Silas Alben, head of the Applied and Interdisciplinary Mathematics Program, Roger Natarajan, Actuarial Program Director, and everyone else who has worked so hard on departmental issues this year. In particular Kristen Moore did an incredible job of keeping our teaching program going. I also want to thank all those faculty and students who worked so hard teaching remotely.

I also want to recognize Doreen Fussman, our Chief Administrator, and her extremely capable staff who worked so hard also to keep things running smoothly on the administrative end.

Other things did continue to move along as described elsewhere but here are a few highlights.

In terms of hiring we are very pleased we were able to bring onboard Charlotte Chan, Alex Perry, Aaron Pixton, and Linh Truong as new Assistant Professors (see page 3). We also welcome a new group of postdoctoral Assistant Professors and a new class of graduate students. It is nice to see the new faces in person this year.

We were very sorry to lose Charlie Doering during this generally stressful year and hope to have a conference in his honor in the future (see page 8).

Faculty News

Professors Jinho Baik, **Bhargav Bhatt, Tasho Kaletha,** and **Aaron Pixton** have been selected as speakers for the 2022 International Congress of Mathematicians. Baik, Kaletha, and Pixton will give invited sectional lectures, and Bhatt will be a plenary speaker.

Professor Bhargav Bhatt received a 2021 New Horizons Prize in Mathematics. Part of the Breakthrough Prizes, the New Horizons Prize rewards significant discoveries across the many branches of Mathematics. The prize recognizes early-career scientists and mathematicians who have already made a substantial impact on their fields. Bhargav was cited for his outstanding work in commutative algebra and arithmetic algebraic geometry, particularly on the development of p-adic cohomology theories.

Professors Dick Canary and **Tasho Kaletha** received Simons Fellowships. The Simons Fellows program extends academic leaves from one term to a full year, enabling recipients to focus solely on research for the long periods often necessary for significant advances.

Professor Daniel Forger and his team created a free app to help mitigate the effects of social distancing on sleep and circadian rhythms. More information is available in this article: news.umich.edu/new-app-analyzes-how-social-distancing-affects-biological-clocks. He has had news features on his collaborative work involving how genetics affects how you respond to daylight saving time, as well as another about tracking circadian rhythms with wearables.

Robert L. Griess Jr., the John Griggs Thompson Distinguished University Professor of Mathematics, was one of the 120 scientists elected to the National Academy of Sciences in 2020. Griess, a member of the UM faculty since 1971, has made pioneering discoveries in the areas of finite groups, finite aspects of Lie theory, vertex algebras, and rational lattices.

Professor Tasho Kaletha received the John Dewey Award from the College of LSA. The John Dewey Award recipients have demonstrated long-term commitment to the education of undergraduate students. Tasho is recognized for his love of teaching at all levels within the Department of Mathematics and beyond. Dewey winners are considered to model the full range of John Dewey's own considerable talents: scholarly productivity, provision of leadership, and engagement with and care for students.

In 2020, **Professor Sarah Koch** was awarded the Harold R. Johnson Diversity Service Award from the University of Michigan Office of the Provost. The award recognizes faculty members for outstanding leadership in the area of cultural diversity. Some of Sarah's many accomplishments in this area include extensive involvement with the Women in Math student group, outreach in the community via Math Mondays at the Ypsilanti Middle School, and establishing the Ypsi Math Corps at UM. Sarah was named a 2021 Arthur Thurnau Professor. Thurnau Professors are recognized for their extraordinary contributions to undergraduate education and demonstrate a strong commitment to teaching and learning, excellence and innovation in teaching, and dedication to working effectively with a diverse student body. Sara was also chosen as the 2021 Michigan Section recipient of the MAA Award for Distinguished Teaching by the Michigan Section of the MAA. The Spring 2021 LSA Magazine included some of Sarah's research in their story about basic science.

Gavin LaRose, the Karen Rhea Collegiate Lecturer and Instructional Technology Program Manager, received a 2020 Distinguished Service Award from the Michigan Chapter of the Mathematics Association of America.

Professor Robert Megginson recently received the Distinguished Mentor Award from the Society for Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS). Each year, SACNAS recognizes two excellent scientists that have made significant contributions to their field and that have a long-standing commitment to diversity and inclusion in STEM.

Assistant Professor Alexander Perry was awarded a 2021 Sloan Research Fellowship. The Sloan Research Fellowships seek to stimulate fundamental research by early-career scientists and scholars of outstanding promise.

Assistant Professor Alex Wright was awarded a 2020 Sloan Research Fellowship. Alex also received the 2021 MCA Prize from the Mathematical Council of the Americas. The MCA Prize recognizes excellence in mathematical research.

Notes from the Chair

Many of our activities continued to thrive remotely including our colloquium under the leadership of Lizhen Ji, MCAIM under Lydia Bieri (see page 5), and many wonderful outreach activities including Math Corps run by Sarah Koch and Stephen DeBacker. Our Michigan Math and Science Scholars (MMSS) summer program continued virtually for the second year. Our faculty continued to accrue many honors including grants from the NSF and elsewhere. Karen Smith was elected to the American Academy of Arts and Sciences, and was appointed as a Distinguished University Professor. Bhargav Bhatt will give a plenary talk at the 2022 ICM and Jinho Baik, Tasho Kaletha, and Aaron Pixton will give invited talks. Trace Jackson was named a University Diversity and Social Transformation Professor. Many other honors are listed on our website and in monthly newsletters.

We have been fortunate to receive substantial and continuing support from our alums and friends. The Florian Block and Daisy Beatty Math Fund was recently established as an expendable fund to provide support for graduate students and related activities for them. It has already been used for various return to campus activities for all of our graduate students. Florian Block is a 2011 PhD recipient from UM, who studied combinatorics with Sergey Fomin. We also recently received a bequest from Nathanial Friedman, who received a BA (1959) and MA (1960) in math from UM. He went on to have a long career in academia at the State University of New York at Albany. We are very thankful to have such thoughtful support.

The mathematics community in our department continues to be a wonderful and supportive place and I express the hope that it will continue to be so in the future as we work to advance the frontiers of knowledge in mathematics and to continue our teaching mission to make mathematics and the department in particular welcoming, exciting, inclusive and transformative.

New Faculty

Charlotte Chan

Charlotte Chan joined the department in 2021 as an assistant professor. She completed her undergraduate degree at Stanford, during which she spent a term at Budapest Semesters in Mathematics and a term at Oxford. Charlotte received her PhD in Mathematics from the University of Michigan in 2018 under the direction of Kartik Prasanna. During her graduate studies, she received the Karen Rhea Excellence in Teaching Award and an Outstanding Graduate Student Instructor Award. After receiving her degree, she was an NSF Postdoctoral Fellow at Princeton and then a joint CLE Moore Instructor and NSF Postdoctoral Fellow at MIT. Charlotte's research is in the area of number theory, with an emphasis on representation theory and algebraic geometry.

Alex Perry

Alexander Perry joined the department in 2020 as an assistant professor. He completed his undergraduate degree at Columbia University, and received his PhD in Mathematics from Harvard in 2016. After receiving his degree, Alex was an NSF Postdoctoral Research Fellow at Columbia, and then spent a year at the Institute for Advanced Study. Alex's research is in the area of algebraic geometry, with a focus on derived categories, birational geometry, Calabi-Yau and hyperkähler varieties, and Hodge theory. He is already active in the department as a member of the Graduate Admissions Committee, and has organized several seminars in algebraic geometry. Alex was recently named a Sloan Research Fellow.

Aaron Pixton
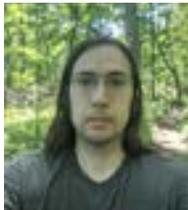
Aaron Pixton joined the department in 2020 as an assistant professor. He completed his undergraduate degree at Princeton, where he was a three-time Putnam Fellow, and received a Morgan Prize and a Churchill scholarship. He continued at Princeton and received his PhD in 2013, after which he was awarded a five year Clay Research Fellowship. He had a postdoctoral appointment at Harvard, and was an assistant professor at M.I.T. In 2017 he was awarded a Sloan Research Fellowship. Pixton's research is in enumerative algebraic geometry. He works on various topics related to counting algebraic objects. This often involves studying moduli spaces and their intersection theory, and he has particular interest in the cohomology of the moduli space of stable curves.

Linh Truong

Linh Truong joined the department in 2020 as a postdoctoral assistant professor, and has been named a tenure-track assistant professor starting in September 2021. She received a BA and MA from the University of Pennsylvania, and earned a PhD in Mathematics from Princeton in 2016. After receiving her degree, Linh was an NSF Postdoctoral Research Fellow at MIT, Columbia, and the Institute for Advanced Study. In 2018-2019 she held a Ritt Assistant Professor position at Columbia. Linh's research is in the area of low-dimensional topology, focusing on topological applications of Heegaard Floer homology and Khovanov homology.

Trachette Jackson Named University Diversity and Social Transformation Professor

Professor Trachette Jackson has been named a 2021 University Diversity and Social Transformation Professor. The designation recognizes senior faculty who have shown a commitment to the university's ideals of diversity, equity and inclusion through their scholarship, teaching, or service and engagement. The professorship is sponsored by the Office of the Provost, and jointly administered by the National Center for Institutional Diversity and the Office of Diversity, Equity and Inclusion. Jackson was cited for an extraordinary commitment to increasing opportunities for girls, women and underrepresented minority students in science, technology, engineering, and math fields through her teaching and leadership.

Jackson has been working to promote diversity and inclusion in mathematics and the sciences for most of her career. Besides directing the MLB scholars program (see page 1), she served as faculty director of M-Sci, a program designed to support and mentor underrepresented students pursuing degrees in STEM fields. Her influence in this area reaches outside of the UM as well. She has participated in several regional and national programs designed to promote Math and Science to underrepresented populations. Within the department, Jackson has been actively mentoring many students at all levels, as well as several postdoc faculty. She regularly teaches the mathematical biology course for the MMSS summer program for high school students.

In 2000, Jackson joined UM Mathematics in the applied area of mathematical biology. Her research uses sophisticated mathematical, statistical, and computational modeling techniques to facilitate a deep understanding of biology, for human benefit and the mitigation of human harm. Within mathematical biology, she specializes in computational cancer research or mathematical oncology.

Jackson has received significant recognition for her research as well as her contributions to diversity within the sciences. Most recently she was named a Fellow of the Society for Industrial and Applied Mathematics. She has received both Sloan and Simons research fellowships, and numerous awards from national associations for her contributions. In 2020, Jackson secured a large grant from the National Cancer Institute to continue her research using modeling to help determine optimal therapy and treatment. She has been featured in several national publications and websites, highlighting her work in both research and outreach. Her work was highlighted in an article from LSA: lsa.umich.edu/lsa/news-events/lsa-magazine/Fall-2020/flip-the-script.html

Karen Smith Named Distinguished University Professor

Karen E. Smith was recently named the William Fulton Distinguished University Professor of Mathematics. This recognition is the highest honor bestowed by the University on current faculty members. She named her professorship after Fulton, who recently retired from UM Mathematics after a long and distinguished career (see page 6).

Smith received her bachelor's degree from Princeton, and came to UM to pursue her PhD. Studying under Mel Hochster, she did pioneering work in the area of commutative algebra. Her dissertation was astonishing: she solved two outstanding problems in commutative algebra in what was then a relatively new area, tight closure theory, and almost immediately became recognized as one of the world's leading experts in the field. This type of work on understanding singularities of algebraic varieties has generated enormous interest and become a field in its own right. Smith's research over the years has continued to be some of the most groundbreaking in the area of commutative algebra and algebraic geometry. More recently she has been doing work in the area of birational geometry.

While a graduate student here, Smith won a Rackham Distinguished Dissertation Award, an Outstanding Teaching Assistant Award, and the Mathematics Department's Sumner Myers prize for her dissertation. She has had much recognition over her career, including receiving the Lynne Satter Prize from

Math Puzzle

Although these six stripes all have the same width, each one covers a different fraction of the M. For example, the blue stripe across the middle covers more of the shape than any other stripe. Overall, is more of the shape colored blue, yellow, or orange?

Puzzle courtesy of Catriona Agg. Answer elsewhere in the ContinuUM.

Karen Smith *(continued)*

the American Mathematical Society, being an invited speaker at the International Congress of Mathematicians, and achieving membership in the National Academy of Science and the American Academy of Arts and Sciences.

Besides being an outstanding teacher and mentor, Smith's service to the profession and the department has been impressive. She has chaired and served on several committees, and was Associate Chair for Graduate Studies from 2017-2020. She has supervised more than 20 PhD students and mentored 18 postdoctoral faculty in the department. Smith shows great concern with diversity and climate in the Mathematics Department as well as the profession in general. This includes promoting the representation of women and ethnic minorities at all levels and across all areas of mathematics. In 1999, Smith organized the first Marjorie Lee Browne Colloquium in the department in recognition of Martin Luther King, Jr. Day. She continues to be active in assuring the event's success.

MCAIM Center Expands Its Scope

The Michigan Center for Applied and Interdisciplinary Mathematics (MCAIM) at the University of Michigan serves as a focal point integrating mathematics with the sciences and engineering across the University and worldwide. The primary aim is to enhance research and education in these areas. The Center promotes collaborative research to develop and apply new mathematics to complex problems in the sciences, engineering, medicine, communication, and society at large. The objective is to spur transformational change in mathematics as well as in the related fields, and to enable new applications that have previously been out of reach. Towards this goal, MCAIM brings researchers together to work on cutting-edge developments.

MCAIM supports its mission by organizing global topical workshops to initiate and foster interdisciplinary research and by hosting a short-term visitors program. These activities bring global experts to UM to interact with the local faculty and students. It manages the Van Loo Postdoctoral Fellowship program and holds advanced summer schools for graduate students and postdoctoral fellows. The Center also promotes mathematical research at UM by other means, such as by aiding searches for external funding and facilitating collaborative interactions. Towards this end, MCAIM brings together researchers from across campus and collaborates with other centers to build capacity in these areas. A recent example is an initiative in deep learning together with the Michigan Institute for Computational Discovery and Engineering (MICDE) and the Michigan Institute for Data Science (MIDAS).

Founded in 2016, the Center has successfully enhanced interdisciplinary collaborations at all these levels. In 2019 MCAIM dramatically expanded its footprint in the Department of Mathematics from a small number of committed faculty members working in traditional

applied mathematics to a broad coalition with no constraints on specific research areas. During the last two years, the Center has also significantly enhanced its international interactions. In particular, MCAIM has established new programs and has set up new collaborations with other institutions worldwide.

In 2020, the Center introduced the MCAIM Colloquium, a distinguished lecture series featuring global experts presenting their research to a broad interdisciplinary audience. It also started the MCAIM Graduate Seminar, organized by students for students.

MCAIM is governed by the director and the steering committee. The Center counts members from a broad spectrum of departments.

In its programs, MCAIM encourages the participation of underrepresented groups. The Center has funded and supported workshops designed for specific underrepresented groups. It is crucial to provide an inclusive work environment, to help people thrive, and to guarantee equal opportunities to everyone.

In our modern world, an increasing number of complex challenges require deep mathematical knowledge. These problems range from natural sciences to engineering, data science, artificial intelligence, medicine and biology, climate, economics, political or social sciences, and beyond. More than ever collaborations between these fields and mathematics are crucial to make progress.

MCAIM is ideally placed to increase its services for UM and the mathematical-scientific community in the future in the fast-growing areas at the interface of mathematics and its applications.

For more information on MCAIM, please visit our website: mcaim.math.lsa.umich.edu/

Lydia Bieri
Director, MCAIM

Faculty Retirements

William Fulton

William Fulton, the Oscar Zariski Distinguished University Professor of Mathematics, retired from active faculty status. Fulton received his undergraduate degree from Brown University, and his PhD from Princeton. He joined UM Mathematics in 1998, following a distinguished career at Brown University and the University of Chicago. He was elected to the National Academy of Sciences in 1997, and to the American Academy of Arts and Sciences in 1998. In 2000 he was named a Foreign Member of the Royal Swedish Academy of Sciences.

Although his interests are very broad, most of Fulton's research has been in the field of algebraic geometry and neighboring areas, and he is considered one of the top leaders in the field at the international level. He has made major contributions to many of the currently most important areas of algebraic geometry, including intersection theory, toric varieties, Schubert calculus, and quantum cohomology. In all of these areas, he has had a strong influence not only through his research but also through exposition and teaching. Fulton's presence at Michigan has helped to develop the Mathematics Department into a leading center of algebraic geometry. He has been instrumental in attracting many top young scholars to faculty and postdoctoral positions, as well as a large number of graduate students. In his long and distinguished career, he mentored 24 graduate students, many of whom have become leaders in the field themselves.

Hugh Montgomery

Hugh L. Montgomery, Professor of Mathematics, retired from active faculty status. In 1966, Professor Montgomery received a Marshall Scholarship to study at the University of Cambridge, was elected a Fellow of Trinity College in 1969, and earned his PhD in pure mathematics in 1972. He joined the University of Michigan Department of Mathematics in 1972 as an assistant professor, and was named a professor in 1975. He gave an invited address at the 1974 International Congress of Mathematicians, and was awarded the Prix Salem that same year. He received a Sloan Foundation Fellowship, received the Henry Russel Award in 1975, and was named a Fellow of the American Mathematical Society in 2013.
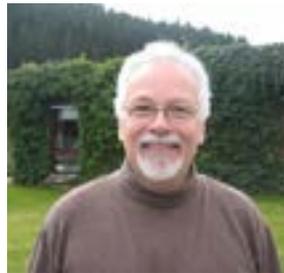
Montgomery's research is in number theory and in harmonic analysis. He specializes in analytic number theory, with emphasis on the distribution of prime numbers, properties of the Riemann zeta function, and the distribution of its zeros. He is well known for his formulation of a pair correlation conjecture for Riemann zeta zeros, and for developments of the large sieve method. Montgomery has 98 scholarly publications, and has authored or coauthored five books in the areas of number theory, harmonic analysis, multiplicative number theory, Fourier analysis, and the Riemann zeta function. Within the Mathematics Department, Montgomery is active in mentoring young mathematicians. He supervised 18 PhD students, and provided academic and research assistance to many young postdoctoral faculty.

Carl Simon

Carl P. Simon, Professor of Mathematics, Economics, and Complex Systems in the College of Literature, Science, and the Arts, and Professor of Public Policy in the Gerald R. Ford School of Public Policy, retiresdfrom active faculty status. Simon received his PhD in Mathematics from Northwestern University in 1970 and joined the UM Department of Mathematics as an assistant professor in 1972. In 1978 he was named an associate professor of Mathematics and Economics, and in 1988 he became professor of Mathematics, Economics, Complex Systems, and Public Policy. From 1999-2009 he was the founding director of the Center for the Study of Complex Systems, and from 2011-2016 he was the director of the UM Science, Technology, and Policy Program in the Ford School of Public Policy. He was named the LSA Distinguished Senior Lecturer for 2007 and received the UM Distinguished Faculty Achievement Award in 2012.

The broad range of Simon's research centers on the theory and application of dynamical systems. He has published well-cited research in many different fields, including the theory of chaotic dynamical systems, economic mechanisms for price adjustment, optimal Presidential term length, evolution of ecological systems and of literary genres, sex-differences in smoking initiation, a systems approach to the spread of crime, and most intensely, the spread of communicable diseases such as HIV, influenza, malaria, and gonorrhea. He and his research group were among the first to estimate the contagiousness of HIV. Simon has mentored eight PhD students and many junior faculty mem-

bers. He was active in undergraduate advising and teaching. For 30 years he taught large calculus courses in the Ford School that were famous for his algebraic aerobics.

John Stembridge

John Stembridge, Professor of Mathematics, retired from active faculty status. Stembridge received his PhD in 1985 from the Massachusetts Institute of Technology, receiving a Sloan Predoctoral Fellowship his final year. He was a Hedrick Assistant Professor at the University of California, Los Angeles prior to joining the UM Mathematics faculty in 1988 as an assistant professor. He was named a professor in 1995. His honors include a Presidential Young Investigator Award, a Guggenheim Fellowship, and a Sloan Research Fellowship.

Recognized as a leader in the field of algebraic combinatorics, Stembridge has a special interest in representation theory, Coxeter groups, root systems, symmetric functions, and enumeration, as well as in computational problems that arise in these areas. In 2007, he was a member of an international team of 18 mathematicians and computer scientists who successfully mapped the Lie group E8, one of the largest and most complicated structures in mathematics. Within the Mathematics Department, Stembridge is active in mentoring young mathematicians. He supervised eight PhD students, and served on the thesis committees of several other students. He has been a mentor to more than 16 postodctoral faculty. Stembridge was active in department administration as chair and member of the Doctoral Committee, Associate Chair for Regular Faculty, and a long serving member of the computer committee. He has held

editorial board positions on numerous prestigious mathematics journals over his career, and has published over 66 research papers.

David Winter

David J. Winter, Professor of Mathematics, retired from active faculty status. In 1961, Winter received a BA in Mathematics from Antioch College. He earned his PhD from Yale University in 1965. After receiving his degree, he was an Instructor at Yale University, an NSF Lecturer at Bowdoin College, and an NSF Postdoctoral Fellow at Universität Bonn. Winter joined the UM Department of Mathematics in 1968 as an assistant professor, and was named a professor in 1974. He has been a visiting faculty member at the California Institute of Technology and the University of Chicago.

Winter's research is primarily in algebra where ongoing research areas include Lie algebras, algebraic groups, birings, Galois theory of fields and rings (commutative and non commutative), and foundations of mathematics. He has 55 scholarly publications, and has authored three books and coauthored two books in the areas of Lie algebras, structure of fields, matrix theory, and linear algebra. Within the Mathematics Department, Winter is active in mentoring young mathematicians. He supervised three PhD students, and mentored many masters and undergraduate students. Winter has served the department in many capacities over his career, including long-standing assignments as Master's Committee Chair and faculty secretary, and serving a term as Associate Chair of Graduate Studies. He was active on the transfer credit evaluation committee and the undergraduate counseling committee.

MLB Scholars Program

Professor Trachette Jackson is the program's director. The MLB program aims to address some of the obstacles underrepresented students may encounter while pursuing higher degrees. "Some of the barriers that appear most often in the literature are the lack of a culturally supportive environment either on campus or within their own departments," Jackson said. "Students often want to feel a sense of belonging, but sometimes feel unwelcome when they enter STEM education."

To help address some of these obstacles, students in the program are paired with specially-selected faculty and graduate student mentors who help them adjust to graduate education. Tutoring is provided to assist students in the successful completion of coursework, and all students have the opportunity to participate in cutting edge research. There are special enrichment workshops on career development, personal finance, technical writing, and many other topics provided to MLB scholars, and they also have access to all of the seminars and opportunities provided by the department as a whole.

The program and some of its students were highlighted in a recent article published by Michigan Impact. impact.govrel.umich.edu/bridge.

Michigan Reception
2022 Joint Mathematics Meetings

**Thursday, January 6, 2022
6 pm to 7:30 pm**

RSVP to math.mich@umich.edu

All are welcome! See you in Seattle!

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*Solution to Math Problem:
The three colors cover equal portions of the M.*

In Memoriam

Charlie Doering

Charles Rogers Doering, 65, died in May, 2021, after a challenging year battling esophageal cancer. Charlie joined the UM Mathematics department in 1996, and was an integral part of establishing the Applied and Interdisciplinary Mathematics program.

Born in Philadelphia in 1956, Charlie grew up in Norman, OK, Fairfax, VA, Annapolis, MD and Schenectady, NY before leaving home for Antioch College where he studied many things culminating in a BS degree in mathematics and physics in 1977. He

continued his studies in physics at the University of Cincinnati, receiving his MS in 1978, after which he moved to the San Francisco Bay area, first to play music with remnants of his college band, and ultimately to work as a research scientist in Silicon Valley.

Scientific curiosity drove Charlie to enroll in the University of Texas at Austin where he earned his PhD in mathematical physics in 1985. Following a year of postdoctoral research at Los Alamos National Laboratory, a faculty position in the physics department at Clarkson University in Potsdam NY, and a return to Los Alamos as research staff, Charlie was recruited to the University of Michigan as professor of mathematics in 1996. At the time of his passing, Charlie was the N.D. Kazarinoff Collegiate Professor of Complex Systems, Mathematics and Physics.

Research and teaching brought Charlie tremendous joy. He delighted in shared discoveries and insights, and perhaps most of all in the satisfaction of learning from his many wonderful collaborators and from students at all levels. Charlie was a big Grateful Dead fan who loved to travel and visit with collaborators and friends all over the world. He especially enjoyed spending summers with collaborators, friends and family in Woods Hole, MA. Cape Cod held a special place in his heart. He loved Michigan football and could be seen biking around town in his yellow suit on football Saturdays.

A memorial gathering and conference in his honor will be held at a later date.

Peter Duren

Peter Larkin Duren, professor emeritus of mathematics at the University of Michigan, died on July 10, 2020 in Superior Township, MI after a long and courageous struggle with Parkinson's disease.

Peter was born and raised in New Orleans, the eldest child of William L. Duren Jr. and Mary Hardesty Duren. Following his father into mathematics, he graduated cum laude from Harvard University in 1956. He and his future wife, Grace ("Gay") Adkins, met in college singing together in Gilbert and Sullivan operettas. They were married in 1957. Three years later Peter earned his PhD from Massachusetts Institute of Technology.

From 1962 until his retirement in 2010, Peter taught mathematics at UM. He supervised the PhD theses of more than two dozen students at UM. Teaching and mentoring motivated students was his special joy. He often said that he felt truly fortunate for having figured out a way to make a living doing what he loved.

Peter was a prolific mathematical writer. He served as an editor for several professional journals, including the Michigan Mathematical Journal and the American Mathematical Monthly. His own publications included *Theory of H_p Spaces* and several other books advancing the frontiers of his field, complex analysis; the textbook *Invitation to Classical Analysis*; and more than a hundred research papers. An avid traveler, Peter served as a visiting professor or scholar in many parts of the world during his UM tenure.

Ever a collector and keeper of lists, his wide range of interests and hobbies included hiking, reading, listening to classical music, birding, gardening, photography, stamp collecting, carpentry, and astronomy. In all things, he carried his mathematician's passion for accuracy and precision. Mathematical history became a new research focus late in his career. Peter was the principal editor of the three-volume historical collection A Century of Mathematics in America, published by the American Mathematical Society on the occasion of its Centennial in 1988.

Passionate about civil liberties and academic freedom, Professor Duren served as treasurer on the board of the UM's Academic Freedom Lecture Fund from 2001 to 2016, helping bring illustrious speakers to campus in honor of the three professors purged by the UM in the McCarthy era for alleged Communist leanings.

Graduate Program Highlights

Don Jones

Donald Akers Jones, associate professor emeritus of mathematics, passed away in June 2021 at the age of 90.

Born in Topeka, Kansas, Don received his BS degree in mathematics from Iowa State College and his MS and PhD degrees from the State University of Iowa. He joined the mathematics department at the University of Michigan as assistant professor in 1959 and was promoted to associate professor in 1965. He retired from UM in 1989.

For many years, Don headed the undergraduate actuarial science program, many of whose graduates are among the leaders of the insurance industry. Don provided these students with a unique college learning environment and also made major contributions to actuarial education nationally. His book, *Actuarial Mathematics*, co-authored with N. Bowers, H. Gerber, J. Hickman, and C. Nesbitt, was the basic text for Actuarial Mathematics for many years.

Don was an early participant in and supporter of the annual actuarial research conferences, which have been held for the past 26 years. He introduced concepts and applications of Bayesian statistics to the actuarial profession in North America, and he was a proponent of applying statistical theory in research collaborations with Professors A Mayerson, N. Bowers, and H. Gerber. Don co-authored papers with Professor Gerber on credibility theory, dividends for group insurance, and stop-loss insurance premiums. He remained as a consultant for the Society of Actuaries examination on risk theory. In 1990 Don moved to Corvallis, Oregon and joined the Oregon State University faculty as an Actuarial Math Professor where he worked until his retirement in 1998.

Top: Marjorie Lee Browne Scholar Annaliese Keiser. Bottom: Recent PhD recipient Farrah Yhee; Recent PhD recipient Haoyang Guo at the Statue of Liberty.

The graduate program in the department continues to thrive. The program has a strong retention rate, with well over 80% of the graduate students eventually finishing with the PhD. While there were some challenges over the past academic year, it also presented some opportunities to engage with the students and provide mentorship in different areas. It is wonderful to be able to welcome back this cohort of graduate students to the department.

In the Mathematics program, there are currently 99 PhD students, and 9 Master's students. This includes 22 new students in September 2021. There are 43 students in the Applied and Interdisciplinary Mathematics PhD program, with 5 seeking AIM Master's degrees. The AIM program welcomed 10 new students this year.

The department has a Graduate Student Advisory Committee (GSAC), an elected body of graduate students, who address and discuss various matters of importance to the graduate student community. This committee was active in various areas over the past year, including providing input and advice on remote teaching and learning, and helping to address diversity, equity and inclusion topics. Our students helped to create virtual mentoring and resource sharing opportunities such as "JAM sessions" (Jobs in Academia for Mathematicians) dedicated to various aspects of academic job search. Our department is now an institutional member of the Erdős Institute. This program provides career assistance and learning opportunities for graduate students in math who are potentially interested in industry jobs.

During 2020-2021, the department had 28 PhD recipients. All but one have reported that they are employed in academia or industry. A listing is available on page 11, as well as on our website here.

We were able to provide support for many of our students over the past year through awards and fellowships. Some highlights are included on page 10, and a complete list of departmental award winners is available in our May departmental newsletter, posted on our website in the news section lsa.umich.edu/math/news-events.html.

2021 Graduate Fellowships & Awards

Allen L. Shields Fellowship
Karen Butt

G. Cleaves Byers Award
Robert Cochrane

Arthur H. Copeland Memorial Fellowship
Carsten Peterson

Wirt and Mary Cornwell Prize
Konstantinos Tsouvalas

Cameron & John Courtney Scholarship
Patrick Kelley

E.S. & A.C. Everett Memorial Fund
Binglin Song

A. V. Flint Memorial Scholarship
Christina Athanasouli

Donald J. Lewis Fellowship
Yifeng Huang

Juha Heinonen Memorial Fellowship
Yonatan Shelah

Marjorie Lee Browne Scholars
Emilee Cardin
Cyril Cordor
Joanne Dong
Ram Ekstrom
Orlando Ferrer
Oscar Gonzalez
Annaliese Keiser
Jose Esparza Lozano

Edwin Wilkinson Miller Award
Nicholas Wawrykow

National Science Foundation Fellow
Shelby Cox
Mark Greenfield
Alana Huszar

Daniel Maes
Devlin Mallory
Carsten Sprunger
Farrah Yhee
Teresa Yu

Carroll V. Newsom Award
Joanne Dong

Peter Smereka Thesis Award
William Clark
Alexander Zaitzeff
Nathan Vaughn

Prasad Family Fellowship
Shubhodip Mondal

Rackham Outstanding GSI Award
Christina Athanasouli

Gabrielle & Sophie Rainich Fellowship
Jiayu (Jason) Liang

Joel Smoller Graduate Fellowship
Yueqiao Wu

Sumner B. Myers Memorial Prize
Emanuel Reinecke

Mathematics Outstanding Teaching Award
Christina Athanasouli

The Karen Rhea Excellence in Teaching Award
Yiwang Chen

The Mort Brown Excellence in Teaching Award
Nawaz Sultani

The Pat Shure Excellence in Teaching Award
Elizabeth (Lizbee) Collins-Woodfin

Usha Sharma Bhalla Fund
Jingjie Zhang

Quant Program Scholarships

The winners of the Quant Program Merit Scholarship represent the three students with the top academic performance after the first two semesters for each cohort. In past years, this award has been based on overall GPA, but due to the modified grading policies and other irregularities of the 2020-2021 academic year, this year's award was determined by the total grade points (A+=4.3, C- = 1.7) earned in the program's seven required courses completed so far, based on unmasked grades. Winners are awarded a one-time scholarship in the amount of $2,000. The 2021 recipients are Chao Jin, Bingi Li, and Ruohong Li. Their exceptional academic performance was achieved while being enrolled remotely from China last year. The recipients for 2020 were Rui Deng, Yanqing Li, and Hiroyuki Makino. Each of them achieved a GPA above 4.0 in the previous academic year.

Below: Sumner Myers Prize winner Emanuel Reinecke. Right: Recent PhD recipient David Schwein.

Timely Research
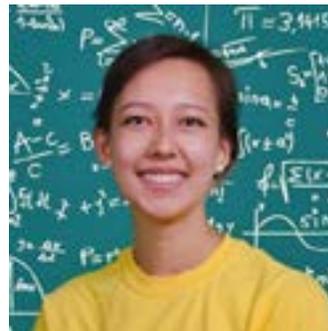
Applied Mathematics Ph.D. student April Nellis (left), along with faculty members Erhan Bayraktar and Asaf Cohen, developed mathematical models to help in determining lock-down protocols and effectiveness related to the pandemic. Her research garnered much attention across and outside the University, and is highlighted in this article.

news.umich.edu/do-the-math-mask-use-social-distancing-leads-to-shorter-lockdown-lower-death-rate/

Recent Doctorate Degrees

Amanda Bower, *Dealing with Intransitivity, Non-Convexity, and Algorithmic Bias in Preference Modeling*, (M. Strauss & L. Balzano), Twitter, Inc.

Can Chen, *Multilinear Control Systems Theory and its Applications*, (A. Bloch & I. Rajapakse), Harvard Medical School.

Gilyoung Cheong, *Cycle Indices in Arithmetic Geometry*, (M. Zieve & M. Mustata), University of California - Irvine.

Angus Chung, *A Factorization of the Coefficients of Exponential and Logarithm Series for Function Fields*, (K. Prasanna), University of California - San Diego.

Saibal De, *Fast Solvers and Simulation Data Compression Algorithms for Granular Media and Complex Fluid Flows*, (S. Veerapaneni & X. Huan), Sandia National Labratories.

Mark Greenfield, *Some New Directions in Teichmüller Theory*, (L. Ji), SIG, LLC.

Haoyang Guo, *Cohomology of Non-Smooth Rigid Analytic Spaces*, (B. Bhatt), Max Planck Institute.

Jia Guo, *Three Problems in Stochastic Control and Applications*, (E. Bayraktar & S. Stoev).

Jacob Haley, *Some Results on Tori in p-adic Groups*, (S. DeBacker), Penn State University.

Fanchen He, *Towards a New-Generation Numerical Scheme for the Compressible Navier-Stokes Equations with the Active Flux Method*, (S. Karni & P. Roe), COMSOL, Inc.

Mitul Islam, *Rank One Phenomena in Convex Projective Geometry*, (R. Spatzier), Heidelberg University, Germany.

Zhan Jiang, *Test Elements, Analogues of Tight Closure, and Size for Ideals*, (M. Hochster), Google, LLC.

Monica Lewis, *The Closed Support Problem over a Complete Intersection Ring*, (M. Hochster), NSF, University of Minnesota.

Yuchen Liao, *Topics in Interacting Particle Systems and Random Schrödinger Operators*, (J. Baik & R. Nadakuditi), University of Warwick, UK.

Claire Lin, *Efficient Model-based Reconstruction for Dynamic MRI*, (A. Gilbert & J. Fessler), KLA, Inc.

Devlin Mallory, *Singularities of Birational Geometry via Arcs and Differential Operators*, (M. Mustata), University of Utah.

Eamon Quinlan-Gallego, *Bernstein-Sato Theory in Positive Characteristic*, (K. Smith), University of Utah.

David Schwein, *Formal Degree of Regular Supercuspidals*, (T. Kaletha), University of Cambridge.

Yonatan Shelah, *A Spectral Exploration of the Leray Transform in Two Different Settings in C^2*, (D. Barrett).

Rishi Sonthalia, *Metric and Representation Learning*, (A. Gilbert & R. Nadakuditi), University of California - Los Angeles.

Konstantinos Tsouvalas, *Anosov Representations, Strongly Convex Cocompact Groups and Eigenvalue Gap*, (R. Canary), IHES - University of Paris.

Ningyuan Wang, *Modeling and Simulation Methods of Neuronal Populations and Neuronal Networks*, (D. Forger & V. Booth), University of Tokyo/RIKEN.

Yuxin Wang, *Local Well-posedness of Free Boundary Relativistic Barotropic Fluid in Minkowski Space-time*, (S. Wu), SIG, LLC.

Leighton Wilson, *Development and Application of Numerical Methods in Biomolecular Solvation*, (R. Krasny & P. Zimmerman), Northrop Grumman, Inc.

Farrah Yhee, *Counterexamples in the Theory of Ulrich Modules*, (M. Hochster), Purdue University.

Jingjie Zhang, *Problems in Mathematical Finance Related to Time Inconsistency and Mean Field Games*, (E. Bayraktar & I. Mitra), University of International Business & Economics.

Xin Zhang, *Topics in Stochastic Analysis and Control*, (E. Bayraktar), University of Vienna.

Hai Zhu, *Integral Equation Methods-Based PDE Solvers and Application in Fluid Optimization Problems*, (S. Veerapaneni & E. Johnsen), University of Michigan.

Left: Current PhD student Yiwang Chen with his daughter, Clementine. Below: Recent PhD recipient Claire Lin.

2021 Undergraduate Awards and Scholarships

UM Undergraduate Mathematics Competition
Matthew Wang - First Place
Ramchandra Apte - Tied for Second Place
Omer Siddiqui - Tied for Second Place

CAS Case Study Competition
Andy Lee & Vincent Lee - First Place
Jacqueline Dimonte & Eric Huang - Second Place
Joshua Gordon & Arman Vaswani - Third Place

Evelyn O. Bychinsky Award
Henry Fleischmann
Sophie Kriz
Rodrigo Medina Cespedes
Yingzi Yang

Marc Altschull Actuarial Award
Vincent Lee

Arthur Herbert Copland, Sr., Memorial Award
Hao Chen
Yubing Cui
Joshua Messing
Teo Mikelthun
Jonah Nan
Ka Yu Wong

Marylin and Stewart Gloyer Award
Alex Cepo
Joseph Meston
Nikash Prakash

Leon P. Zukowski Prize for Math Lab Mentoring
Maiya Yu

Mathematics Alumni/Alumnae Scholarship
Faye Jackson

Jack McLaughlin Award in Algebra
Yingzi Yang

Wilfred Kaplan Award in Applied Mathematics
Rodrigo Medina Cespedes

William LeVeque Award in Number Theory
Jishi Sun

Frank Raymond Award in Geometry and Topology
John Haviland

George Piranian Excellence in Mathematical Writing Award
Sophie Kriz

Sumner B. Myers Award in Analysis
Joshua Messing

Outstanding Achievement in Mathematics
Yuxuan Chen
Jacob Kowalcyzyk
Thomas Larsen
Zhihan Liu
Minhao Sun
James Walrad
Zixuan Wang
Haozhi Xu

2021 graduate Noah Luntzlara getting the jab.

Ziyi Zhang
Ziyuan Zhao
Zhang Zijian

Otto C. Richter Prize for Actuarial Science
Ishpreet Kohli
Ramana Ramanathan
Tianhe Zhang

Natarajan Family Award for Actuarial Science
Ananya Sridharani

Lois Zook Levy Award for K-12 Teaching
Seth Greenfield

Alice Webber Glover Award
Elicia Rong

Margaret S. Huntington Prize in Actuarial Research
Evalicia Chavez
Po-Tsun Chen
Emma Dimilia
Matthew Dykstra
Shreya Gummadapu
Zhaoyuan Jiang
Yerine Kwon
Kyle Langworthy
Jusn Liu
Madison Morelli
Maximillian Roman
Amanda Snyder
Thomas Striblen

Michigan Mathematics Merit Scholar Award
Junshan Chen
Ethan Cohen
Zekun Jia
Omar Siddiqui
Kenneth Wang
Wenyi Wang

Outstanding Graduating Seniors
Fangu Chen
Noah Luntzlara
Alexander Vidinas
Wanqiao Xu
Alex Wang

Wirt and Mary Cornwell Prize in Mathematics
Fangu Chen

Richard and Dorothy Carter Scholarship
Sudhan Annamalai
Nicholas Fannin

L.C. Cortright Memorial Scholarship
Fizza Ahmd
Joshua Gordon
Nameer Hirschkind
Eric Huang
Owen Langejans
Bochem Pham
John Yang

Frank H. and Agnes A. Davis Scholarship
Mark Cappaert
Ming Hint Chui
Henry Fleischmann
Haihan Gao
Mingxuan Ge
Shreya Gummadapu
Abigail Hess
Brandon Kirkendall
Ishpreet Kohli
Amanda Krick
Jinyi Lan
Minki Lee
Alexander Manthous
Connor Novak
Maggie O'Meara
Yash Podar
Riley Rich
Erica Rong
Ananya Sridharan
Andrew Stomper
Shihao Su
Jishi Sun
Minhao Sun
Matthew Wang
Fangzhou Yu
Xinyu Cindy Yu
Tianhe Zhang
Zhanning Judy Zhu

Ben Dushnik Scholarship
Jing-Yi Liu

Carl Hahn Fischer Scholarship
Ishpreet Kohli
Ramana Ramanathan

J.W. Glover Scholarship
Joel Greenfield
Hemanth Mannem
Ashvin Pai
Elizabeth Plotner

David G. Hartman Actuarial Scholarsip
Raina Zwolinski
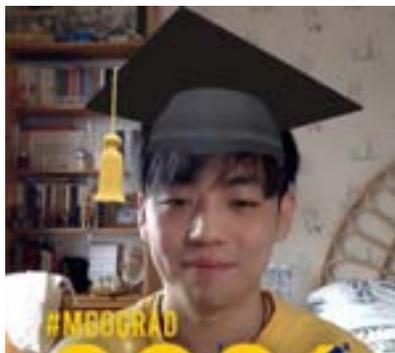
Mathematics Honors graduate and commencement speaker Jekun Jia.

Miner S. Keeler Scholarship

Robert Buhring
Liam Clancy
Maryan El-Hage
Andrew Gadbois
Scott Guest
Alec Korotney
Noah Luntzlara
Grace O'Brien
Wen Plotnick
Shankar Prabhu
Nathan Rosenberg
Alexander Saigeon
Matthew Supran
Alexander Tew
Kenneth Wang
Xun Wang
Zheng Yang
Ziyi Zhang

Virginia McCulloh Scholarship

Adam DeHollander
Haoyu Du
Faye Jackson
Caroline Slack

Willilam F. Poorman Scholarship

Grace An
Sam Beenstock
Mark Cappaert
Yuxuan Chen
Ming Hint Chui
Trevor Kelterborn
Sun Youp Lee
Gavin Li
Minhao Sun
Harshith Tenepalli
Corrine Tessin
Hecong Wang
Songting Wu
Yixuan Wu
Fangzhou Yu
Rongqing Zhu
Zhanning Judy Zhu
Raina Zwolinski

Undergraduate Program Highlights

We are excited to be implementing more normal, in person undergraduate teaching and learning in fall 2021. While we had many challenges and changes last year, the program continued to thrive and we strived to build community by embracing activities aimed at reaching some of our isolated students. For example, regular remote meetings for meals were held with students who may not have had any other social interaction. A walking club was started to encourage groups of students to go out and explore the area. The walking events continue during the school year.

The department has resources to provide some funding for our students. In the past several years, we averaged 85 students on scholarships, and the total amount disbursed to them was about $313,500. In 2020 we created an Emergency Scholarship for students with strenuous financial struggles due to the pandemic. These one time scholarships ranged from $1000 to $6,500. We awarded 11 of these scholarships totalling $26,900.

Mathematics currently mentors between 800 and 1000 major and minor students each year. For the past decade mathematics has been one of the ten largest majors by department in the College of LSA and one of the three largest minors. In the academic year 2020-2021, the department graduated around 221 majors and 181 minors (final numbers pending). Roughly 58% of math majors receive at least one additional bachelor's degree with double majors spread over 35 different areas. We have held two virtual commencement ceremonies that turned out to be rather successful. A video of the 2021 commencement efforts, which included real time interaction with faculty, students and families, is available on our website. lsa.umich.edu/math/undergraduates/graduation.html

Thanks to the extraordinary efforts of the mathematics department staff, events such as the Major/Minor expo and the Career Fair were again suc-cessfully executed. A dozen or so high school students met with faculty here during the students' (virtual) tours of the nation's finest colleges. The department continues to enjoy a reputation among high school students for doing a good job with its students and for having a strong community of math majors. We recently produced a promotional video featuring freshly minted graduates providing insight about the importance of a degree in Mathematics. www.youtube.com/watch?v=6_hFYSM08pU

Our students continue to be recognized with various awards and recognition, both from the University and from national organizations. John Haviland received the 2021 Astronaut Scholarship. Undergraduate students Henry Fleischmann, John Haviland, and Sophie Kriz received Barry Goldwater Scholarships. These scholars are recognized for their strong commitment to a research career in the natural sciences, mathematics, and engineering. Several of our graduating Mathematics majors have secured NSF Graduate Research Fellowships. They are going on to study in various academic fields.

Sabrina Corsetti (Physics & Astronomy)

Jeremy D'Silva (Life Sciences)

Shiliang Gao (Mathematics)

Eric Winsor (Machine Learning)

Maiya Yu (Life Sciences)

University recognition for our students has also been abundant. Fang Chen and Annie Xu receive the Stephen Smale Award in Mathematical Sciences from the Honors Program. The UM Stem Research Career Award was presented to Annie Xu.

We were able to hold a virtual awards ceremony, attended by many of the recipients. In 2021 we allocated 65 awards for a total amount of $89,400. Many of these monetary awards are made available through the generous contributions of our alumni base. Thank you for your support.

Where's Your Math T-shirt Been?

When you get your math T-shirt, find a fun spot to take a picture and upload it to our website lsa. umich.edu/math/undergraduates/extracurricular-activities.html. The button "Where in the World is Your Math T-shirt" has links to a Google drive to add your photo, as well as a map (below) where you can indicate where in the world you displayed your mathematics pride: padlet.com/mathundergradoffice/worldtshirts. You can also send them by email to math-undergrad-office@umich.edu.
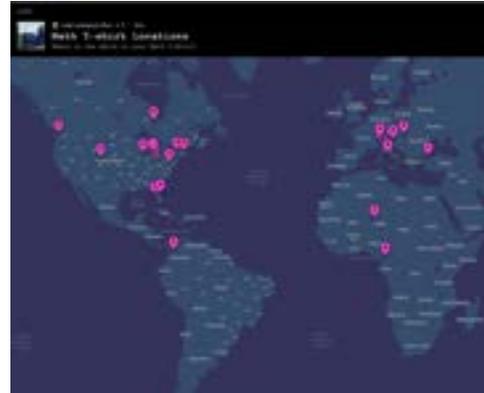
First row, l-r: Alexander Wang (2020) on election day; Jonathan Thomas (2019) at Hobiton in New Zealand. Second row, l-r: Nicholas Wawrykow, Karen Butt, Ryan Kohl, and Brad Zykoski; Deniz Bilman, Peter Miller, Dave Smith at the Great Wall of China; Grant Barkley at NASA. Third Row: A group of Math majors skating at Yost Arena flanked by Stephen DeBacker (l) and Sarah Koch (r). Left: Sophie Hourihane (2020) and Natalia Jenuwine (2020) at Union Station, Washington DC. Right: Professor David Speyer and family are excited for their Math T-shirts.

Top row, l-r: Lawrence Teng (2018) at Guatape, Antioquia, Colombia; Joe Rabinoff and Kirsten Wickelgren voting. Second row, l-r: Michael Rosenberg (2018) rides a camel; Students Faye Jackson, Cassie Prokopowicz, and Jonah Nau at Sarah Koch's office hours amid her Forest of Learning.

Want Your Own Math T-Shirt?

Here is your chance to represent the UM Math Department in the stylish shirts highlighted on the previous page. Complete the order form below by placing a number (signifying the quantity desired) in the appropriate boxes (sizes are standard adult), complete your address information, and return to the address at right along with your check or money order (payable to the Department of Mathematics). **T-shirts are $10 each, shipping and handling is included.**

	Blue	Pink	Yellow	Grey
Small				
Medium				
Large				
X-Large				
Onesies 12 month				n/a

Where should we mail your t-shirt?

Name:_____

Address1: _____

Address 2:_____

City:_____ State: _____ Zip:_____

Amount Enclosed: _____

Total T-shirts Ordered: _____

E-mail Address: _____

Send this form with payment to:

The University of Michigan
Department of Mathematics
Undergraduate Office
530 Church Street
2082 East Hall
Ann Arbor, MI 48109-1043

Online ordering and payment available at
lsa.umich.edu/math/alumni-friends/math-t-shirts.html

Watch for our email on March 16, 2022!