



2019 Math PUrview

Message from the Department Head

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Fall semester 2019 at Purdue brought to a close the festivities surrounding the 150th anniversary of Purdue's founding. It was a year filled with much to celebrate. The yearlong Ideas Festival brought in a wide range of speakers on space exploration, artificial intelligence, sustainability, and health and longevity. Building projects continued throughout campus, including the new welcome arch leading to the Union, as seen in the picture above (Purdue University photo/Rebecca Wilcox), as well as a new STEM teaching building next to the Elliott Hall of Music.

The Department of Mathematics also had much to celebrate. As in every year, our students and faculty have won prestigious scholarships and awards for research and teaching, and our alumni have made their mark on the world and returned to celebrate with us. We've also added to our ranks, with several highly regarded new faculty members joining us this fall. Most prominently, Trevor Wooley joined our faculty as the Andris A. Zoltners Distinguished Professor of Mathematics. More on that below. Looking forward, mathematics continues to play an important role in data science, with a new building slated to begin construction next year (see right).

Read on to catch up with more of our many activities, or visit our webpage at math.purdue.edu to learn more.

Boiler Up!
Greg Buzzard
Professor and Head

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Planned Data Science Building

Highlights

Professor Donatella Danielli selected as Fellow of the AWM

Professor Donatella Danielli has been selected for inclusion in the 2020 class of Fellows of the Association for Women in Mathematics (AWM).



The AWM Fellows Program recognizes individuals who have demonstrated a sustained commitment to the support and advancement of women in the mathematical sciences, consistent with the AWM mission: “to encourage women and girls to study and to have active careers in the mathematical sciences, and to promote equal opportunity and the equal treatment of women and girls in the mathematical sciences.”

The description of Professor Danielli's contributions leading to her selection as AWM Fellow reads: For her generous and consistent involvement in, and remarkable impact on, a large number of excellent local, national, and international initiatives to support interest and involvement of women in mathematics at all levels; and for remarkable, pioneering contributions positioning her as a role model for more junior mathematicians, particularly women.

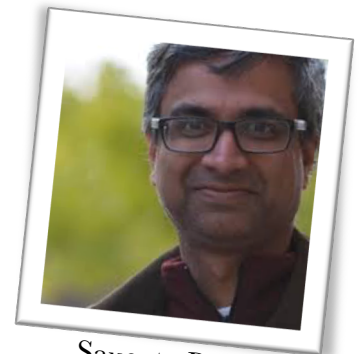
New AMS Fellows: Professor Saugata Basu Professor Sai Kee Yeung

The Fellows program of the American Mathematical Society (AMS) is designed to recognize members who have made outstanding contributions to the creation, exposition, advancement, communication, and utilization of mathematics.

Fellows named recently include Professor Saugata Basu (Class of 2019), cited for his contributions to algorithmic and quantitative real algebraic geometry, computational complexity, and o-minimal structures, and Professor Sai-Kee Yeung (Class of 2020), cited for his contributions to complex differential geometry, combining differential-geometric, complex-analytic and algebro-geometric techniques.



Sai Kee Yeung



Saugata Basu

Sofia Martinez receives NSF Graduate Research Fellowship

Incoming PhD student Sofia Martinez is the recipient of an NSF Graduate Research Fellowship (GRF). Sofia earned a Bachelor's degree from the University of California, Riverside. She spent a summer doing research at the Fields Institute at the University of Toronto, where she focused on algebraic combinatorics; she studied chromatic symmetric functions of graphs and worked on answering questions about graph invariants. In the past year Sofia attended the Field of Dreams and Infinite Possibilities Conference and presented her research at several conferences.



Trevor Wooley named the Andris A. Zoltners Distinguished Professor of Mathematics

The Purdue University Board of Trustees on Friday, December 6, 2019, approved the appointment of Trevor Wooley as the Andris A. Zoltners Distinguished Professor of Mathematics.

Prior to joining Purdue University in August 2019, Professor Wooley was Professor of Mathematics at the University of Bristol, UK, where he served as Head of Pure Mathematics from 2015-16. Prior to that he was Professor of Mathematics at the University of Michigan, where he served as Department Chair from 2002 to 2005. In addition to these positions, he has held visiting positions at Princeton, Harvard, Cambridge, the Max Planck Institute in Bonn, and the Institute for Advanced Study in Princeton, among others.

Wooley has made fundamental contributions on a variety of topics related to number theory, most notably related to the Hardy-Littlewood circle method and Waring's problem. Waring's problem is a particular example of a Diophantine equation, which is a polynomial equation to be solved using only integers. Such equations influence the development of codes and cryptosystems for use in DVDs, in mobile phones, and in banking security. Key to their practical utility is the illusion of randomness; although deterministic in nature, the solutions of these equations in integers should appear randomly distributed to an outsider. One therefore seeks to provide assurance that hidden patterns underlying these solution sets do not unravel their usefulness. A significant portion of Wooley's work has focused on the study of Diophantine equations using seemingly unrelated methods from Fourier analysis to make deep connections between harmonic analysis and number theory.

Wooley's research accomplishments have been recognized in the US and abroad throughout his career. He has been supported by a Sloan Fellowship and a Packard Fellowship (given at that time to 20 scientists and engineers across the US, with roughly one per year to a mathematician), a Royal Society Wolfson Merit Award, and several NSF grants in the US.

Additional honors include a 45-minute invited address at the 2002 International Congress of Mathematicians, election to the Fellowship of the Royal Society (the UK version of the National Academy of Sciences), the Salem Prize, and the Junior Berwick Prize of the London Mathematical Society. He was invited for a rare second 45-minute invited lecture at the 2014 International Congress of Mathematicians and has also received the Fröhlich Prize of the London Mathematical Society



Wooley has more than 140 publications in excellent journals and has a remarkably high profile in the mathematics community as indicated by his many distinctions and his lectures at top universities and conferences throughout the world.

About the donor: The position of the Andris A. Zoltners Professorship is made possible in part by Andris A. Zoltners, Founder of ZS Associates, who is Frederic Esser Nemmers Distinguished Professor Emeritus of Marketing at the Kellogg School of Management at Northwestern University, where he served as a faculty member for more than 30 years. In 1983, Professor Zoltners and former Kellogg colleague, Prabha Sinha, founded ZS Associates, a consulting firm with over 1,000 people, across 17 offices, who work closely with sales and marketing organizations, typically Global 500 companies and their affiliates around the world, to develop optimal strategies and to implement them. The success of ZS was recognized by induction of the founders into the Chicago Entrepreneurship Hall of Fame in 2005.

Prior to joining the faculty at Kellogg, Professor Zoltners was a member of the Business School Faculty at the University of Massachusetts. He received his Ph.D. from Carnegie-Mellon University and an M.S. in Mathematics from Purdue University.

New Assistant Professors Fall 2019



Shawn (Xingshan) Cui has a joint appointment between the Dept. of Mathematics and the Dept. of Physics and Astronomy. He obtained a PhD in mathematics from University of California Santa Barbara in 2016 under the supervision of Zhenghan Wang, then was a postdoc at Stanford University. He served as assistant professor at Virginia Tech before joining Purdue.

Cui's research lies in the area of quantum mathematics. Among other subjects, he is interested in topological quantum field theories, higher categories, low dimensional topology, and topological quantum computation.

Manuel Rivera received a PhD from the CUNY Graduate Center under Dennis Sullivan, then was a postdoc at Institut de Mathématiques de Jussieu in Paris, France. From 2015- 2018, he held a joint Research Assistant Professorship between the University of Miami and CINVESTAV in Mexico City.

Manuel studies algebraic and combinatorial structures arising in topology and geometry using tools from algebraic topology such as abstract homotopy theory, homological and homotopical algebra, the theory of operads, and higher category theory. More specifically, he uses these tools to understand and compute structures coming from topological quantum field theories, string topology, and symplectic topology.

Originally from Puerto Rico, Manuel is also interested in discussing and developing initiatives, policies, and ideas that promote diversity in mathematics and make quality research and education accessible to all.



Margaret Thomas obtained her DPhil degree at the University of Oxford, UK under Alex Wilkie. She then held visiting positions at the University of Manchester, UK, the University of Konstanz, Germany, MSRI, and the Fields Institute. She joins Purdue University from McMaster University, Canada, where she was an Assistant Professor.

Professor Thomas' research expertise lies in applying model theory, a branch of mathematical logic, to a wide variety of areas of mathematics. She is especially interested in the far-reaching scope of o-minimality, a framework for 'tame geometry', and has worked on problems at the interface of o-minimality with real analytic geometry, number theory, topology, functional analysis, dynamical systems and combinatorics.

Haizhao Yang received his PhD from Stanford University in 2015 under the direction of Lexing Ying, then held a postdoctoral position at Duke University, where he worked with Ingrid Daubechies and Jianfeng Lu. He then served as Assistant Professor in the Institute of Data Science at the National University of Singapore before joining Purdue.

Professor Yang's research interests include the mathematics of machine learning and data science, applied and computational harmonic analysis, high-performance scientific computing, high-frequency wave propagation, inverse problem, signal and image processing. He has over 25 journal publications on machine learning, signal and image processing, and methods and applications of scientific computing.



Awards and Honors

Baiying Liu honored with NSF CAREER Award

The CAREER Award is the National Science Foundation's most prestigious award for early-career faculty. Professor Liu's research focuses on the Langlands Program, which predicts surprising connections between arithmetic (e.g., properties of integers) and analysis (e.g., solutions to certain differential equations). Baiying will continue his work on the Langlands program and incorporate several educational initiatives, including undergraduate and graduate research activities and graduate curriculum development.



Zhilan Feng to serve as NSF Program Director

Professor Zhilan Feng will serve as Program Director at the National Science Foundation for 2 years. In this role she will have responsibility for several programs that align with Professor Feng's research in mathematical biology. In her role as Program Director, she will make recommendations about which proposals to fund, influence new directions in science and education, support cutting-edge interdisciplinary research, and mentor junior research members. She plans to return to Purdue following her appointment at NSF.



Zhiqiang Cai awarded the College of Science Research Award

Zhiqiang Cai was one of 3 recipients of a 2019 College of Science Research Awards, which recognize impactful research. Professor Cai has been on the Purdue faculty since 1996. His research focuses on numerical solutions of partial differential equations, with a recent focus on accuracy control of computer simulations and self-adaptive numerical methods for complex systems.



Guang Lin selected as University Faculty Scholar

The University Faculty Scholar program recognizes outstanding early-career professors. Professor Guang Lin, with previous awards including the NSF Career Award and the Mathematical Biosciences Institute Early Career Award, was selected for his research in accurate, large-scale numerical algorithms and predictive modeling for critical decision making in complex physical and biological complex systems.



Donatella Danielli and Aaron Yip inducted into Book of Great Teachers

The Book of Great Teachers bears the names of past and present faculty members who have devoted their lives to excellence in teaching and scholarship. Inductees for 2018 include Mathematics Professors Donatella Danielli and Aaron Yip.



2018-19 Ruth and Joel Spira Faculty Teaching Awards

Four faculty members received teaching awards made possible through a generous donation by Ruth and Joel Spira. Shown from left to right are Giulio Caviglia, Freydoon Shahidi, Donu Arapura, and Philip Mummert.



Awards and Honors

Lecturers receive Open Access Award

Mathematics Lecturers Owen Davis, Huimei Delgado, David Norris, Patrick Devlin, and Timothy Delworth were among those honored with the Leadership in Open Access Award from Purdue University Libraries and the Office of the Provost. With assistance from Dave Huckleberry of Purdue IT, they transitioned their courses from proprietary published textbooks and homework systems to LON-CAPA, an open source, open access courseware system. Shown here are Patrick Devlin, Rhonda Phillips (Interim Dean of Purdue Libraries), Dave Huckleberry, and Huimei Delgado.



Nate Veldt receives Chorafas Award



Nate Veldt, a 2019 PhD in Mathematics advised by Professor David Gleich, received the prestigious Chorafas Award, which recognizes research for its high potential for practical application. Veldt's research focuses on mathematical models and algorithms for identifying clusters of related objects in complex systems that can be modeled by a graph or network, with applications to biological networks, MRI scans, and social networks in universities. Veldt is currently working as a postdoctoral associate in the Center for Applied Mathematics at Cornell University.

2018-19 Excellence in Teaching Awards

The Department of Mathematics proudly recognizes six Graduate Teaching Assistants for their outstanding contributions to instructional excellence. From left to right are Emma Reid, Kelsey Walters, Lindsey Hill, and Michael Kaminski. Not shown but also receiving awards were Alex Carignan and Lusine Kamikyan. Certificates of Merit for Graduate Teaching were given to Nicholas Egbert, Zachary Letterhos, Matthew Weaver, and Harrison Wong.



Sue Lee receives 2019 Gilman Scholarship



Undergraduate Mathematics-Computer Science double major Sue Lee was awarded a Gilman Scholarship for study abroad at St. Andrews University in Scotland. The Gilman Scholarship Program is run by the US Department of State and is designed to broaden the student population that studies and interns abroad. The program encourages students to study and intern in a diverse array of countries or areas and world regions and to study languages, especially critical need languages (those deemed important to national security).

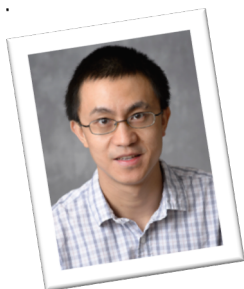
Early Career Award for Mathematics Alumna Christine Berkesch



Christine Berkesch was recognized this past spring with an Early Career Award. Christine earned a PhD in Mathematics from Purdue in 2010, then held distinguished visiting positions at Stockholm University and Duke University before starting a tenure track position at the University of Minnesota in 2013. Her research focuses on combinatorial aspects of algebra and geometry and has been well-funded by the National Science Foundation. In addition to her research, teaching, and supervision of graduate and undergraduate students at Minnesota, she is a mentor for the National Math Alliance and the Association for Women in Mathematics, as well as a panelist at the 2017 Field of Dreams Conference and a plenary speaker at the 2016 EDGE Reunion Weekend. Christine maintains a busy speaking schedule, with recent talks in Germany, Canada, the UK, and California, among other locations.

Faculty Promotions

Jingwei Hu was promoted from Assistant Professor to Associate Professor, effective Fall 2019. Professor Hu received her PhD from the University of Wisconsin, then held a postdoctoral position at the University of Texas at Austin before joining Purdue. Her research focuses on computational mathematics, with an emphasis on problems that span multiple scales in space and/or time. Professor Hu is supported by an NSF CAREER Award, which recognizes her contributions to research and education in mathematics.



Chi Li was promoted from Assistant Professor to Associate Professor, effective Fall 2019. Professor Li received a PhD from Princeton University, then served as a Simons Instructor at Stony Brook University before joining Purdue. His research centers on complex geometry, with a particular focus on understanding curvature in manifolds and various problems related to what are known as Kähler-Einstein metrics. In 2017, Professor Li was selected as a Sloan Research Fellow; his research is also funded by the NSF.

Faculty Retirement



Leonard Lipshitz was named Professor Emeritus after retiring in July 2019. Professor Lipshitz received his PhD from Princeton University and came to Purdue in 1972 as an Assistant Professor. He served the Mathematics Department in a remarkable array of capacities. He had a successful research career, with dozens of high-profile research articles on aspects of mathematical logic and model theory, he was a highly-regarded instructor for a wide array of courses (appearing more than once on the list of top 10 instructors in the College of Science), and he shaped many aspects of the department through multiple administrative roles, including two terms as chair of the graduate program and two 5-year terms as Department Head.

In Memoriam

Professor Terry Zachmanoglou received his PhD in Applied Mathematics from the University of California, Berkeley in 1962 and started as Assistant Professor of Mathematics at Purdue the same year. He was promoted to Associate Professor in 1965 and to Professor in 1970. He retired in 2014 after more than 50 years on the Purdue faculty and was appointed Professor Emeritus. His research focused on partial differential equations, particularly wave propagation and mechanics. He served as Associate Department Head for more than 10 years and devoted a great deal of energy to improving the content and delivery of calculus courses. He was selected multiple times as one of the “10 best teachers” in the College of Science.

Professor Clarence Wilkerson earned a PhD in Mathematics from Rice University, then held positions at the University of Hawaii and the University of Pennsylvania before joining the faculty of Wayne State University in 1978. During his time at Wayne State, he was selected as a Sloan Research Fellow and held a number of distinguished visiting positions, including at IHES, the Institute for Advanced Study, and the University of Chicago. He also served as Department Chair for 2 years. He joined the Purdue faculty in 1989 as a full professor; he was named Professor Emeritus upon his retirement in 2010. Professor Wilkerson’s research focused on algebraic topology, which studies geometric objects using more tractable algebraic information. He is particularly known for his part in resolving fundamental problems in this area that were open for nearly 60 years. In recognition of his mathematical contributions, he was inducted into the inaugural class of Fellows of the AMS.

Keep us up to date

Send us news of your professional accomplishments, adventures in mathematics, and any other noteworthy items. Send to Kristi Stroud at kstroud@purdue.edu or by regular mail at
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