

2020 Lathisms: Latinxs and Hispanics in the Mathematical Sciences

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Lathisms (Latinxs and Hispanics in the Mathematical Sciences, www.lathisms.org) provides an accessible platform that features the outstanding research, teaching, mentoring, and service contributions of Latinxs and Hispanics to the mathematical sciences. Since 2016, Lathisms has featured 122 diverse mathematicians, highlighting one per day during US Hispanic Heritage Month, which is celebrated September 15–October 15. The website, which has been visited more than 250,000 times since its inception, also features some of the honorees in podcast interviews by Evelyn Lamb, and each honoree is featured in freely downloadable posters.

The Latinx community is vibrant and encompasses a multitude of identities, backgrounds, and aspirations. As we

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DOI: <https://dx.doi.org/10.1090/noti2134>

celebrate our fifth anniversary, we are continuously striving to expand the diversity among our honorees, increase their visibility, and honor their stories. Below we present the profiles of five of the 2020 Lathisms honorees. These honorees were selected to illustrate the diversity of those who form the Lathisms community.



**Javier Alejandro
Chávez-Domínguez**

**Javier Alejandro
Chávez-Domínguez,**
Assistant Professor,
The University of
Oklahoma

"For me, Hispanic Heritage Month is an excellent opportunity to stress the immense power of role models. When I was a teenager, I learned that another student from the same high school had gone on to get a PhD in mathematics in the US. This seemingly innocuous bit of information completely changed my life, because it instantaneously gave me the certainty that such a path was possible for myself. One of the greatest privileges of my professional life is the possibility of inspiring younger generations, by being living proof that their dreams can be achieved."

—Javier Alejandro Chávez-Domínguez

Biography: Dr. Javier Alejandro Chávez-Domínguez was born and raised in Guadalajara, Mexico, in a family that always emphasized the importance of education. Fascinated by science since childhood, he was fortunate enough to attend a high school with a strong extracurricular math

program. This led him into the Math Olympiads, which showed him the beauty of the subject and provided a community where he felt right at home. Thus, becoming a mathematician was an easy choice to make.

A scholarship from the Centro de Investigación en Matemáticas allowed him to attend a strong mathematics undergraduate program, obtaining a BSc from the Universidad de Guanajuato in 2004. Afterwards, he received an MSc from the Universidad Nacional Autónoma de México in 2006, and then he moved to the US, where he earned a PhD at Texas A&M University under the direction of William B. Johnson in 2012. Before arriving at the University of Oklahoma, where he is an assistant professor of mathematics, he held positions as an R. H. Bing Instructor at the University of Texas at Austin and as a Severo Ochoa Postdoctoral Researcher at the Instituto de Ciencias Matemáticas in Madrid, Spain.

His research is in functional analysis, with a particular emphasis on the geometry of normed spaces. Since such spaces possess both a linear structure and a metric one, they provide a useful framework for modeling types of real-world data where it makes sense to add things up. He also likes to explore situations where one can achieve the desired goal regardless of the particular normed space being considered. Frame theory is a popular model for signal processing, where, in a nutshell, we gain advantages by, instead of using a basis for a vector space, throwing in extra vectors to create redundancy. In this setting, it is typically assumed that the space is Euclidean. Some of Dr. Chávez-Domínguez's work is dedicated to showing that portions of frame theory actually work in any other normed space. Another area of his research is the geometry of operator spaces, which is related to quantum information theory. The study of which geometric properties of normed spaces have a quantum counterpart is a subject he finds fascinating.

Being interested in mathematics through his involvement in the Math Olympiads, Dr. Chávez-Domínguez's approach to the teaching of mathematics is strongly rooted in problem solving. He finds that this approach helps demystify the proof writing process. This strategy is particularly important for students in his Introduction to Analysis class, which is his favorite class to teach at the University of Oklahoma.

Dr. Chávez-Domínguez strongly believes that mathematical research, even in pure mathematics, is much more accessible to undergraduate students than it may first appear. By giving students simplified versions of problems, motivated students can start proving original results relatively quickly. This experience reveals to the students that they can contribute to the discipline while learning from it. This forever changes their relationship with the subject, because doing mathematics is now a two-way street instead of something that is only handed down to them. He finds joy in a variety of other ways in which he can be of help in

the mathematical journeys of others; be it by mentoring undergraduate researchers, judging poster competitions, mentoring postdocs, or teaching a special class for an incarcerated student.



Jessica Deshler,
Professor, Graduate
Program Director,
West Virginia
University

Jessica Deshler

"Hispanic Heritage month, to me, is a time to reflect on where we came from and what we can accomplish. Particularly for mathematics, it is also a time to reflect on who is supported to be a part of the mathematical community, and where we might need to continue to develop support structures and remove barriers for others."

—Jessica Deshler

Biography: Dr. Jessica Deshler grew up in Albuquerque, New Mexico, surrounded by family members, and knew she would stay close to her roots while pursuing an education. Her family's roots begin in Central Texas and in the lands of northern New Mexico before the land was part of the US. She knew she would study mathematics from an early age, having some amazing opportunities in middle and high school to pursue creative mathematics. She earned her undergraduate degree from New Mexico Institute of Mining and Technology, and her graduate degrees from the University of New Mexico, all in mathematics. All four of her children were born while she was in graduate school, and she uses this experience to advocate for mathematics students who also want to begin their families. She is now professor of mathematics and graduate program director at West Virginia University (WVU), where she is only the third woman and first Hispanic faculty member to be promoted to full professor. She spent 2015–2016 as a US Fulbright Scholar in Hungary, where she mentored doctoral students.

Her passion for mathematics and teaching led her to change her research path from applied mathematics and fluid dynamics to the field of undergraduate mathematics education during her doctoral program. She has established herself as a leader in the field, especially in the area of graduate student professional growth. She strongly believes that positive experiences in teaching and mentoring while in graduate school have a huge impact on the future careers of mathematics graduate students. She studies how graduate students progress in their teaching philosophies and practices as they participate in various teaching experiences. She also has a passion for supporting students from all backgrounds and has studied the ways in which undergraduate classrooms support, or not, women and underrepresented students. Her work has been supported by the Mathematical Association of America, the National Science Foundation (NSF), and the US Fulbright Commission.

As a graduate student, she received minimal preparation in teaching. Hence, she now strives to advocate for opportunities for graduate students to grow as teachers. She is involved in projects that aim to improve and understand the current state of such opportunities across the US. She also was a coauthor of the Mathematical Association of America's instructional *Practices Guide* (2018).

Dr. Deshler creates teacher preparation opportunities that are centered around knowing that students learn best by being guided through their learning and actively doing mathematics in the classroom. But teaching a class entirely through student-centered instructional strategies can be overwhelming for new instructors. Thus, Dr. Deshler's work has focused recently on supporting new instructors through peer mentoring to implement small-scale practices and activities that they can manage more easily. She has also been involved in programs that support in-service teachers seeking an Elementary Mathematics Specialist Endorsement. This includes being a Co-PI on an NSF-funded project whose aim is to develop mathematics master teachers at the secondary level.

She currently serves as graduate program director and teaching assistant coordinator in her department, overseeing the advising and progress of approximately fifty full-time graduate students, and the professional growth of approximately thirty graduate teaching assistants. She advocates for women in mathematics, especially students who do not believe they can simultaneously be mathematicians and have a family life. Besides serving on department committees, she has served as a faculty associate for the WVU Center for Women's and Gender Studies, a Provost's Fellow in the Office of Graduate Education, and is a member of the WVU Council for Women's Concerns. In her commitment to the state of West Virginia she has worked with in-service elementary and secondary school teachers through a variety of funded projects. Moreover, as dean of students, she has led West Virginia Governor's STEM Institute, a state-sponsored summer residential program for rising eighth-graders.



Alexander Diaz-Lopez, Assistant Professor, Villanova University

Alexander Diaz-Lopez

"Hispanic Heritage Month is a time to celebrate the culture and contribution of Hispanics and Latinxs to the United States of America. In a country that is currently deeply divided among ideologies and whose leader promotes negative stereotypes of our people, this is a time to rally together, support each other, showcase our contributions, and send a message to the world that love, unity,

togetherness, and warmth is and will always be more powerful than hate, insults, and selfishness."

—Alexander Diaz-Lopez

Biography: Dr. Alexander Diaz-Lopez was born and raised in Puerto Rico, spending his early years playing sports, video games, and board games with his cousins and sister. While always fond of mathematics, it was not until senior year of high school that he seriously considered a math career, mainly because he needed to choose a major to apply to college. Not knowing what "mathematics" meant at the time, he decided to major in pure mathematics and get a teaching license. In the process, interactions with professors Drs. Frank Morgan, Reyes Ortiz, Edray Goins, Ivelisse Rubio, and Juan Ortiz made him realize his passion was to study and do research in mathematics and teach students at the collegiate level. After participating in summer undergraduate research experiences at Williams College and at the Mathematical Sciences Research Institute (MSRI), he finished his bachelor's degree at the University of Puerto Rico, Mayagüez, and then his master's and PhD degrees at the University of Notre Dame, under the guidance of Dr. Matthew Dyer. Since then, he has been involved in several initiatives/organizations such as the Society for the Advancement of Hispanics and Native Americans in Science, Lathisms, *Notices of the AMS*, MAA Project NExT, the Kinesis Foundation, Villanova's DREAMS, and Co-MaStER programs. He is currently an assistant professor of mathematics at Villanova University.

His research is in the area of Coxeter groups, particularly from an algebraic combinatorics point of view. Coxeter groups can be realized as groups of reflections of certain geometric structures called root systems. Lately, he has been studying peaks of permutations, peak and descent polynomials, and their analogues to other Coxeter groups.

His teaching philosophy and goals are heavily shaped by two axioms (originally shared by Dr. Federico Ardila): first, mathematical potential is distributed equally among all members of society; second, provided the right environment and mentorship, everyone can have a successful and meaningful experience with mathematics. It is then his goal to use mathematics to help and encourage every student to have a richer, more humane, more interesting, and more intellectual life. To achieve his goal, he has set a list of smaller goals that guide his teaching decisions. He wants his students to be intellectually curious, have the confidence that they can solve problems and understand things, learn from mistakes, be resilient and persistent, develop creative problem-solving skills, improve how they work with others, and love and enjoy learning.

Dr. Diaz-Lopez has served as a mentor for several groups of students. Notably, he has mentored students that participated in MSRI's Undergraduate Program 2013, Summer Academy for Math and Science 2014, Villanova's

2018–2019 Center for Undergraduate Research in Mathematics Research Group, and participants of the 2018 and 2019 DREAMS and 2019–2020 Co-MaStER program. He is passionate about providing opportunities for students to explore and engage in meaningful mathematical experiences.



Matilde Lalín,
Professor, Université
de Montréal

Matilde Lalín

"My culture and my heritage are an essential part of me and influence how I view the world and how I do mathematics. I welcome the opportunity to get to know other members of the Hispanic community, to learn from their struggles, and to celebrate their contributions and achievements, both in life and in an ever-evolving and increasingly complex mathematics world."

—Matilde Lalín

Biography: Dr. Matilde Lalín grew up in Buenos Aires, Argentina. She has been interested in science since an early age, and in elementary school she dreamed of being an astronomer. She became particularly keen on mathematics during high school, when she started participating in the Argentinean Mathematical Olympiad. She earned a *licenciatura* (BS) at the University of Buenos Aires in 1999 and a PhD under the guidance of Dr. Fernando Rodriguez-Villegas at the University of Texas at Austin in 2005, as a Harrington Fellow. She was a member at the Institute for Advanced Study; a visitor at the Mathematical Sciences Research Institute, Institute of Advanced Scientific Studies, and the Max Planck Institute; and a Pacific Institute for the Mathematical Sciences postdoctoral fellow at the University of British Columbia. In 2007, she started as an assistant professor at the University of Alberta, and in 2010, she moved to Université de Montréal, where she is currently a professor and a member of the Centre de Recherches Mathématiques.

Her research interests in number theory revolve around the study of L -functions, which can be described as generalizations of the Riemann zeta function, and elliptic curves. Her work involves working with the Mahler measure, a height that can be defined on polynomials, and she studies relations between special values of L -functions and Mahler measures. Her work contributes to the understanding of general statements such as the Beilinson conjectures. These questions have led her to the study of polylogarithms and regulators and to applications to low-dimensional topology. She has also been very interested in distribution questions around L -functions, and questions in arithmetic statistics of function fields involving the distribution of the number of points and of zeta zeroes in families of curves and moments of L -functions.

She has taught over a dozen different university courses, including Discrete Mathematics, Galois Theory, Group Theory, Algebraic Number Theory, Elliptic Curves, and Modular Forms. She is proud to have taught in three different languages. Dr. Lalín likes challenging students with stimulating problems whose aim is to make connections between different topics. Her goal is to have a fun and supportive classroom environment. She has also taught mini-courses in several undergraduate summer schools and has been a frequent speaker at the local Mathematics Club and other outreach venues, where she has shared her research and love for the Rubik's cube with undergraduate and high school students. She has supervised the research of more than forty-five undergraduates, graduate students, and postdocs, and has written fifteen articles with her mentees.

She has also been involved in various programs aimed at encouraging the participation of women in mathematics and has served on committees or collaborated with the Association for Women in Mathematics, the Committee for Women in Mathematics from the International Mathematical Union, and the Women in Mathematics Committee of the Canadian Mathematical Society (CMS). She is a member of the steering committee for Women in Numbers, a community that promotes the participation of women in number theory research. She has served as a coordinator in three International Mathematical Olympiads, as a member of the Canadian Mathematical Olympiad committee of the CMS, and as a Putnam coach in her department. She is currently the vice president (Quebec) of the CMS. She serves on the Board of Directors of the Banff International Research Station and has served in the Natural Sciences and Engineering Research Council of Canada Discovery Grant Mathematics and Statistics Evaluation Group. She has been a member of several scientific committees, including those of BIRS and CRM. She is an editor for the *Publications Mathématiques de Besançon—Algèbre et Théorie des Nombres*.



Virginia Naibo,
Professor,
Mathematics
Department, Kansas
State University

Virginia Naibo

"I am grateful for the excellent education that I received in Argentina and to the people who have inspired me throughout my professional career. By showcasing the accomplishments of Latinas, Latinos, and Hispanics in the mathematical sciences, Hispanic Heritage Month brings role models to the attention of current and future generations and emboldens them to pursue careers in STEM disciplines. This important endeavor contributes to a culturally enriched and diversified mathematical community."

—Virginia Naibo

Biography: Dr. Virginia Naibo grew up in Rosario, Argentina. She discovered her love for mathematics in high school and was inspired by her parents and teachers to pursue her passions. She earned a *licenciatura* (BS) in mathematics from Universidad Nacional de Rosario and her doctorate in mathematics from Universidad Nacional del Litoral. She held a three-year postdoctoral position at the University of Kansas and was a tenure-track assistant professor at Rose-Hulman Institute of Technology for a year before joining the mathematics faculty at Kansas State University, where she is a professor and associate department head.

Dr. Naibo's research interests are in Fourier analysis, which, in a broad sense, facilitates the study of signals, such as sounds and images, by breaking them down into fundamental pieces. Her more recent work concerns different aspects of linear and bilinear pseudodifferential operators and singular integrals, Leibniz-type rules, commutator estimates, and function spaces. Applications of her work include pointwise multiplication properties of function spaces; well-posedness results for Euler, Navier-Stokes, and Korteweg-de Vries equations, as well as for the ideal magnetohydrodynamic equations; smoothing properties of Schrödinger semigroups; and scattering properties of solutions to systems of partial differential equations associated to local and nonlocal operators. Her research has been funded by the NSF and her work has been published in internationally recognized journals.

She has taught a diverse set of classes that range from undergraduate courses in calculus, mathematics for elementary school teachers, applied matrix theory, and digital image processing, to graduate-level courses in measure theory, Fourier analysis, partial differential equations, and topics specific to her research. She believes that active learning plays a central role in developing conceptual abilities and analytical skills, so she makes sure that students are engaged during class by using questions throughout the lecture to guide thinking and evaluate comprehension. She is an advocate for the use of technology in instruction, creating and developing courses in topics on digital image processing and applied matrix theory that include computer lab components. She has been nominated for teaching awards at the college and university levels and featured in the educational project "Science in Kansas—150 years and counting" sponsored by the Ad Astra Kansas Initiative.

Dr. Naibo has served as the doctoral advisor of three graduate students and the mentor of a postdoctoral fellow. She has supervised undergraduate research projects in topics such as the development of Fourier analysis techniques in digital image processing as well as in interdisciplinary collaborations in chemistry and mathematics. Most of these students have continued to pursue doctoral degrees in STEM. She has extensively trained undergraduate students for mathematics competitions, including the Putnam

Competition, the Mathematical Contest in Modeling, and the Kansas Collegiate Mathematics Competition. She has participated in the curriculum development of her department through the creation of novel courses and a graduate certificate in applied mathematics.

She is currently one of the organizers of the Prairie Analysis Seminar, an NSF-funded annual international conference. Her outreach activities include the organization of workshops for K–12 students, such as Sonia Kovalevsky Day and The First MathPhysChem Symposium for Middle School Students in Kansas, as well as collaborations with the Kansas State Office for the Advancement of Women in Science and Engineering through the Girls Researching Our World Program. She served as the director of the Kansas State Center for the Integration of Undergraduate, Graduate and Postdoctoral Research from 2010 to 2013. She served as chair of the Kansas Section of the Mathematical Association of America from 2012 to 2013. She is currently a member of the Human Resources Advisory Committee of the Mathematical Sciences Research Institute at Berkeley.

ACKNOWLEDGMENTS. We would like to extend our deep gratitude to the Mathematical Association of America for their continued support of Lathisms via a 2020 Tensor-SUMMA grant. We also thank the AMS and, in particular, Annette Emerson for her support promoting Lathisms. Last, but not least, we thank Richard Diaz for his continued web work which makes Lathisms.org possible.

Credits

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