ASSOCIATION FOR WOMEN IN MATHEMATICS

Newsletter

VOLUME 53, NO. 1 • JANUARY– FEBRUARY 2023

The purpose of the Association for Women in Mathematics is to create a community in which women and girls can thrive in their mathematical endeavors, and to promote equitable opportunity and treatment of women and others of marginalized genders and gender identities across the mathematical sciences.

IN THIS ISSUE

PRESIDENT'S REPORT

Greetings! I hope everyone had a moment to rest and recover during the holiday season. Being kind to yourself is a daily practice, and the holidays are a good opportunity to commit to that practice. Holidays can be quite emotionally complicated, and/but the break from work gives us space to make intentional choices about how we want to treat ourselves and others, and about which people we want to share our time with. Not to mention it gives us the space to sleep a little more!

I'm pleased to celebrate a few announcements with you. First, the 2023 AWM Research Symposium will be held at Clark Atlanta University in October 2023. It's a short turnaround time between meetings due to the delay of our last symposium to 2022, but we are trying to return to the odd-year schedule.

Next, we recently awarded several prizes:

The 2023 M. Gweneth Humphreys Award for Mentorship of Undergraduate Women in Mathematics is awarded to Erika Camacho, Arizona State University, for her incredible support of mathematicians from a wide range of racial, ethnic, gender, and socioeconomic statuses.

The 2023 Louise Hay Award for Contributions to Mathematics Education is awarded to Nicole Joseph, Vanderbilt University, for her valuable contributions to math education involving analysis of the benefits of taking risks and cultivating academic talent.

The 2023 Joan and Joseph Birman Research Prize in Topology and Geometry is awarded to Kristen Hendricks, Rutgers University, for her work in equivariant aspects of Floer homology theories.

Finally, our inaugural Mary and Alfie Gray Award for Social Justice is awarded to Lily Khadjavi, Loyola Marymount University, for her work changing public policy around racism in policing and providing classroom materials around social justice topics.

Au revoir!

I'm reaching the end of my term as AWM President and will transition to Past President as I pass leadership on to Talitha Washington, who I expect to be spectacular. In this final report, I want to share AWM's major accomplishments during the past two years. These accomplishments are a massive team effort, and for many of them my primary contribution was merely not standing in the way. Many of these items make a strong argument for how an organization like AWM continues to contribute to the mathematical community.

continued on page 2

ASSOCIATION FOR WOMEN IN MATHEMATICS

AWM was founded in 1971 at the Joint Meetings in Atlantic City.

The *Newsletter* is published bi-monthly. Articles, letters to the editor, and announcements are welcome.

Opinions expressed in *AWM Newsletter* articles are those of the authors and do not necessarily reflect opinions of the editors or policies of the Association for Women in Mathematics. Authors sign consent to publish forms.

Circulation: 3500. © 2023, AWM

PRESIDENT'S REPORT *continued from page 1*

Finances:

- We passed a series of policies to make our *fundraising efforts* more successful. We also drafted a description for a fund development position so that we can develop a long-term fund development plan that will be sustainable and realistic for AWM. We will advertise for the position once it is approved by the EC.
- We also developed *guidelines for future staffing*. AWM's volunteers are amazing and brilliant, but some jobs are best done by someone who is being paid for their work and who has a long-term relationship with AWM. We have outlined a staffing plan and also proposed convening a *long-term planning committee* whose role will be to envision a positive future for AWM and provide guidance in how best to reach that future.
- In 2020 NSF awarded AWM with a 3-year, $1.5 million grant, MathCREW, to fund participation at meetings and to support AWM's Aligning Actions at Crossroads workshop to train participants to avoid and disrupt racial and gendered harassment.
- Due to reduced activities during the pandemic, we found ourselves with a one-time budget surplus. We allocated this surplus to fund small grants to members whose professional lives were disrupted by the pandemic. This *Mathematical Endeavors Revitalization Program* (MERP) went live in November and will accept applications for funding until January 15, 2023.

Publications:

- We launched our first research journal, *La Matematica*, that has now published four issues with articles from a broad range of mathematical areas. While we are still working out some kinks, we are doing well with keeping to short review times and providing constructive feedback in reviews. We will begin a formal assessment for the journal in the coming year.
- We published several *new volumes in the AWM-Springer series*, including *50 Years of Women in Mathematics*, *Research Trends in Graph Theory and Applications*, *Using Mathematics to Understand Biological Complexity*, *Women in Numbers in Europe III, Advances in Data Science*, *Research in the Mathematics of Materials Science*, *Research in Computational Topology 2*, *Women in Commutative Algebra*, and *Research Directions in Symplectic and Contact Geometry and Topology*. We also have volumes in the pipeline, including a proceedings volume from the 2022 Research Symposium.
- Our amazing newsletter editor, Anne Leggett, has decided to step down after decades of excellent work leading the newsletter team. We have launched a search for the *next newsletter editor* and should know soon who will be working to fill Anne's extremely large shoes. We've also created a new newsletter position for an *acquisitions editor* to help expand and enhance our current set of articles. We have not yet filled that role.

Membership:

- We overhauled the *categories and pricing schedule* for all forms of membership and also created a new sponsorship type, Sponsoring Institutional Membership, for institutions who want to make substantial contributions to AWM.

- We added a *new institutional category* at a lower cost for two-year colleges and high schools.
- Membership also *revised its charge* to better reflect the work it was actually doing.

Meetings:

- The 2022 *Research Symposium* finally took place in Minneapolis, hosted by IMA and University of Minnesota. For many attendees, it was the first in-person event they had attended since 2020. Feedback after the conference was overwhelmingly positive. Apart from some airline-caused travel disruptions, it was a smashing success!
- *AWM workshops* at JMM, SIAM Annual Meeting, and MAA MathFest were remote for 2021, but only JMM was remote in 2022. The 2022 JMM subcommittee planned two workshops: one for in person, and then a second when JMM moved to a remote format. We are grateful for their willingness and ability to pivot with grace, and we are grateful to all our meetings committees for continuing to support excellent programming in the face of so much uncertainty.

Awards:

- We approved an *awards revocation policy* in case someone who receives an award engages in misconduct after the award is approved.
- We developed a *schedule for evaluating awards* and evaluation processes to ensure that existing awards are recognizing the activities we think they should recognize. The first award to be evaluated is the Alice T. Schafer Prize and changes are currently under consideration. That evaluation will result in some positive changes both in the way the prize is awarded and in how mathematical excellence is evaluated.
- We are also redeveloping the *charge and guidance for the Canvassing Committee* to ensure that nominations for our awards are as strong as they can be and constitute a nominee pool that is representative of the larger mathematical community. We also plan to make sure that nominees are not burdened with developing their own nomination packets.
- We developed and awarded a new prize, the Mary and Alfie Gray Award for Social Justice, to be given to mathematicians whose mathematical work supports the advancement of social justice.

Advocacy:

- We altered the *AWM Mission Statement* to be more gender inclusive.
- We developed an *Action Plan in response to the 2018 Diversity Task Force Report* that targets specific actions AWM will take to improve its ability to support people from a broad range of backgrounds.
- We signed on to the *Equity and Diversity Statement* of the Conference Board of Mathematical Sciences, committing to work for active change around equity in the mathematical community.
- We *issued statements* on a wide range of topics, including AAPI hate crimes, anti-trans state laws, the US Supreme Court's Dobbs decision, the invasion of Ukraine, and supporting increased STEM funding in the US.
- Our social media team helped *highlight all these activities* and more, as well as highlighting excellent work being done by other organizations and individuals.

continued on page 4

Membership Dues
Membership runs from Oct. 1 to Sept. 30
Individual: $70 **Contributing:** $160
Family, new member, and reciprocal (first two years): $35
Affiliate, retired, part-time: $30
Student, unemployed: $20
Outreach: $10
AWM is a 501(c)(3) organization.

Institutional Membership Levels

AWM offers a tiered pricing structure for institutional memberships in six categories. Higher levels are:
Supporting Institutions: $750+ and
Sponsoring Institutions: $3000+
See awm-math.org for details.

Executive Sponsorship Levels

$5000+
$2500–$4999
$1000–$2400
See awm-math.org for details.

Print Subscriptions and Back Orders—Regular and contributing members living in the US may elect to receive a print version of the *Newsletter.* Libraries, women's studies centers, non-mathematics departments, etc., may purchase a subscription for $75/year. Back orders are $20/issue plus shipping/handling ($5 minimum).

Payment—Payment is by check (drawn on a bank with a US branch), US money order, or international postal order. Visa and MasterCard are also accepted.

Newsletter Ads—AWM will accept ads for the *Newsletter* for positions available, programs in any of the mathematical sciences, professional activities and opportunities of interest to the AWM membership, and other appropriate subjects. The Managing Director, in consultation with the President and the Newsletter Editor when necessary, will determine whether a proposed ad is acceptable under these guidelines. *All institutions and programs advertising in the* Newsletter *must be Affirmative Action/Equal Opportunity designated.* Institutional members receive discounts on ads; see the AWM website for details. For non-members, the rate is $130 for a basic four-line ad. Additional lines are $16 each. See the AWM website for *Newsletter* display ad rates.

Newsletter Deadlines
Editorial: 24th of January, March, May, July, September, November
Ads: Feb. 1 for March–April, April 1 for May–June, June 1 for July–Aug., Aug. 1 for Sept.–Oct., Oct. 1 for Nov.–Dec., Dec. 1 for Jan.–Feb.

Addresses
Send all queries and all *Newsletter* material except ads and queries/material for columns to Anne Leggett, amcdona@luc.edu. Send all book review queries/material to Marge Bayer, bayer@math.ku.edu. Send all education column queries/material to Jackie Dewar, jdewar@lmu.edu. Send all media column queries/material to Sarah Greenwald, appalachianawm@appstate.edu and Alice Silverberg, asilverb@math.uci.edu. Send all student chapter corner queries/material to Emek Köse, student-chapters@awm-math.org. Send everything else, including ads and address changes, to AWM, awm@awm-math.org.

- We approved a *Healthy Engagement in Mathematics statement* providing guidelines about how to work toward productive conversations involving difficult topics such as racial and gender discrimination.

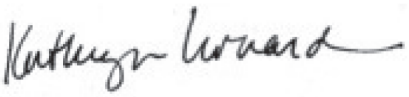
Other:

We *changed our practice* of having the AWM President candidates run unopposed and are now requesting that the Nominating Committee provide two candidates.

We *reorganized our Programs Portfolio*, which had gathered any activity without another obvious home, and constituted a new Research and Publications Portfolio. The Programs Portfolio now contains much of our outreach programming and other activities have moved to a more appropriate portfolio.

So many people have contributed so much time and effort to bringing these accomplishments to fruition. Some of those people are: Darla Kremer, Samantha Faria, Beth Donovan, Ruth Haas, Talitha Washington, Alejandra Alvarado, Janet Beery, Mary Shepherd, Michelle Snider, Carla Cotwright-Williams, Donatella Danielli, Elena Fuchs, Rebecca Garcia, Courtney Gibbons, Caroline Klivans, Shanise Walker, Anne Leggett, Sarah Greenwald, Alina Bucur, Denise Rangel Tracy, Eva Goedhart, Johanna Franklin, Pamela Harris, Farrah Jackson Ward, Linda Chen, Kavita Ramanan, Katherine Dowd, and Robin Marek. There are also all the AWM committee members, reviewers, and nominators who are essential to our work. And then there are those of you who take the time to email with your opinions and recommendations. Even if we decide not to follow your requested action, I deeply appreciate the time you take to formulate and share your thoughts with AWM.

I am tremendously grateful to all of you whose insights, vision, and contributions of time and expertise makes AWM what it is today. It has been an honor to work with you.



Kathryn Leonard
November 25, 2022
South Pasadena, CA

Kathryn Leonard

CALL FOR SUGGESTIONS

In December 2023 the AWM will be electing the following officers: President-Elect, Treasurer and four At-Large Members. All positions have four-year terms (President-Elect for one year becomes President for two years and then Past President for another). Suggestions for candidates may be made by using the form at https://forms.gle/jNYmN91h4zCgNvmh8 (preferred) or to Kathryn Leonard or Talitha Washington by **February 15, 2023**; the suggestions will go to the Nominating Committee. Your input will be appreciated!

ASSOCIATION FOR WOMEN IN MATHEMATICS

AWM ONLINE

The *AWM Newsletter* is freely available online.

Online Ads Info: Classified and job link ads may be placed at the AWM website.

Website: https://awm-math.org
Updates: webmaster@awm-math.org

Media Coordinator
Denise Rangel Tracy
Denise.Rangel.Tracy@gmail.com

AWM DEADLINES

MERP Applications: January 15, 2023
AWM Essay Contest: February 1, 2023
RCCW Proposals: February 1, 2023
AWM Mentoring Travel Grants: February 15, 2023
AWM Travel Grants: February 15 and May 15, 2023
AWM-Microsoft Research Prize: May 15, 2023
AWM-Sadosky Research Prize: May 15, 2023
AWM Fellows: May 15, 2023
AWM Louise Hay Award: May 15, 2023
AWM M. Gwenyth Humphreys Award: May 15, 2023
AWM Student Chapter Awards: May 15, 2023

AWM OFFICE

Darla Kremer, Executive Director
darla@awm-math.org

Samantha Faria, Managing Director
samantha@awm-math.org

Association for Women in Mathematics
Attn: Samantha Faria
201 Charles Street
Providence, RI 02904
401-455-4042
awm@awm-math.org

2023 AWM Dissertation Prizes

In January 2016 the Executive Committee of the Association for Women in Mathematics established the AWM Dissertation Prize, an annual award for up to three outstanding PhD dissertations presented by female mathematical scientists and defended during the 24 months preceding the deliberations for the award. The award is intended to be based entirely on the dissertation itself, not on other work of the individual.

Jia Shi, **María Soria-Carro**, and **Rajula Srivastava** will be presented with 2023 AWM Dissertation Prizes at the Joint Prize Session at the 2023 JMM in Boston, MA.

Jia Shi

Jia Shi received her PhD in 2022 at Princeton University under the direction of Charles Fefferman and Javier Gómez-Serrano. Her thesis is titled "Integrodifferential Equations for Fluids in Two Dimensions." She is currently a C.L.E. Moore instructor at the Massachusetts Institute of Technology.

Citation for Jia Shi

Shi's interests include fluid mechanics and partial differential equations. Her beautiful thesis proves major results on two separate topics in fluid mechanics, a hard classical field. One part of the thesis concerns uniqueness and analyticity of solutions of the Muskat equations describing the interface between two incompressible fluids in a porous medium. She studied the case when the fluids have the same viscosity but different densities. The other part of the extensive thesis deals with the 2D Euler equation. The results in the thesis settle several open questions about spherically rotating solutions and vortex sheets. The committee was impressed with the new techniques Shi developed to obtain her results. As one of the letter writers said, her work "changed our view of solvability by introducing a new general strategy and applying that strategy with technical virtuosity."

Response from Shi

I am very honored to receive the AWM Dissertation Prize. I would like to show my gratitude to those who nominated me and wrote letters for me. I also gratefully appreciate all the help from my advisors Charles Fefferman and Javier Gómez-Serrano during my graduate school years. I feel extremely fortunate as their student and incredibly thankful for their guidance and generosity. I also sincerely thank my wonderful collaborators Yao Yao and Jaemin Park.

María Soria-Carro. Photo credit: Anna Szczekutowicz

María Soria-Carro received her PhD in 2022 from the University of Texas at Austin under the direction of Luis Caffarelli and co-direction of Pablo Raúl Stinga. Her thesis is titled "Regularity of elliptic transmission problems and a new family of integro-differential operators related to the Monge-Ampère equation." She is currently a Hill Assistant Professor at Rutgers University working with Dennis Kriventsov and Yanyan Li.

Citation for María Soria-Carro

Soria-Carro works in the field of elliptic and parabolic partial differential equations. Her dissertation covers two

continued on page 6

topics. In the first part, she studies the transmission problem for elliptic equations, for example, the Laplacian with interfaces that have minimal regularity. In this, she and collaborators proved optimal regularity of solutions up to the interface via a perturbation method. This is in contrast to the classical theory where the interface is smooth. In the second part of her thesis, she uses tools from convex analysis and symmetrization to study problems related to the nonlocal Monge-Ampère equations. In particular, she shows existence, uniqueness, and regularity of solutions to a particular Poisson problem. The committee was impressed with the enthusiasm of her nomination letter and letter writers, which described her ambition and the creativity of solutions in the thesis.

Response from Soria-Carro

I am very honored and thrilled to receive the AWM Dissertation Prize. I would like to thank the Association for Women in Mathematics for this prestigious award and The University of Texas at Austin, where I had the great opportunity to learn from leading experts in analysis and PDEs. I am deeply grateful for all the guidance and support I had during graduate school. I would like to especially thank my advisor, Luis Caffarelli, for being caring, encouraging, and teaching me the beauty of mathematics from a whole new perspective, and my co-advisor, Pablo Raúl Stinga, for all the help and advice, and for sharing with me all of his expertise. Thank you to Irene Gamba and Donatella Danielli for inspiring and supporting me and my work. Finally, I am very thankful to my family and friends for all the love and support.

Rajula Srivastava. Photo credit: Niclas Technau

Rajula Srivastava received her PhD from University of Wisconsin–Madison in 2022 under the supervision of Andreas Seeger. She is currently a Hirzebruch Research

NSF-AWM Travel Grants for Women

Mathematics Travel Grants. The objective of the NSF-AWM Travel Grants is to enable women mathematicians to attend conferences in their fields, which provides them a valuable opportunity to advance their research activities and their visibility in the research community. Having more women attend such meetings also increases the size of the pool from which speakers at subsequent meetings may be drawn and thus addresses the persistent problem of the absence of women speakers at some research conferences. The Mathematics Travel Grants provide full or partial support for travel and subsistence for a meeting or conference in the applicant's field of specialization.

Selection Procedure. All awards will be determined on a competitive basis by a selection panel consisting of distinguished mathematicians appointed by the AWM. A maximum of $2300 for domestic travel and of $3500 for foreign travel will be funded. For foreign travel, US air carriers must be used (exceptions only per federal grants regulations; prior AWM approval required).

Eligibility and Applications. Please see the website (https://awm-math.org/awards/awm-grants/travel-grants/) for details on eligibility and do not hesitate to contact awm@awm-math.org or 401-455-4042 for guidance. Applications from members of underrepresented minorities are especially welcome.

Deadlines. There are three award periods per year. Applications are due **February 15**, **May 15**, and **October 1**.

Instructor at the University of Bonn and the Max Planck Institute for Mathematics.

Citation for Rajula Srivastava

Srivastava's research is in harmonic analysis. Her dissertation, "Three Topics in Harmonic Analysis: Maximal Functions on Heisenberg Groups, Cotlar-type Theorems and Wavelets on Sobolev Spaces," as the title suggests, covers a broad range of topics. Two of the chapters address the problem of establishing optimal Lebesgue space estimates for local maximal averaging operators on Heisenberg groups. In another chapter, Srivastava determines the range of smoothness of Sobolev spaces for which there exists an unconditional basis of orthonormal spline wavelets of a given order. In yet another part of the dissertation she provides L^p bounds for a Cotlar-type maximal operator under minimal smoothness assumptions. The results have led to four publications in research journals, three of which are single-authored.

Response from Srivastava

I am elated to receive the award. I thank the mentors who wrote the letters of nomination and support, and the AWM and the selection committee for this honor. I remain indebted to my advisor, Andreas Seeger, for his unwavering patience and encouragement, and the opportunity to learn from his brilliant mathematical insight. He has been unbelievably generous with his time and resources throughout my PhD. I wish to thank Betsy Stovall for her deep influence, and Sundaram Thangavelu and Varadharajan Muruganandam for their continued investment in my progress. I am thankful to Joris Roos for a stimulating collaboration which forms a part of the thesis, and to the Harmonic Analysis group at UW–Madison for a collegial learning environment. Finally, I wish to thank my family and friends for their support; in particular, I am grateful to Niclas Technau for his constant companionship.

2023 AWM Schafer Prizes

In 1990, the Executive Committee of the AWM established the annual Alice T. Schafer Prize for Excellence in Mathematics by an Undergraduate Woman. The prize is named for Alice T. Schafer (1915–2009), one of the founders of AWM and its second president. AWM will award the 33rd Annual Alice T. Schafer Prize for Excellence in Mathematics by an Undergraduate Woman to **Faye Jackson**, a senior mathematics major at the University of Michigan. **Anqi Li**, mathematics major at Massachusetts Institute of Technology has been named Runner-up. **Ilani Axelrod-Freed** (Massachusetts Institute of Technology), **Joyce Chen** (Princeton University), and **Veronica Lang** (Smith College) will each receive an honorable mention. The 2023 AWM Alice T. Schafer Prizes will be presented during the Joint Prize Session at the 2023 JMM in Boston, MA.

Faye Jackson is a math major at the University of Michigan. She has made impressive contributions in research, course work and engagement with her community. In Summer 2021 she participated in the SMALL REU at Williams College and played a major role in four different research projects. This work led to one published paper, one accepted paper, three submitted preprints and two papers in preparation. Her mentor praises her creativity, generosity and the clarity of her exposition. In Summer 2022 she participated in the REU at the University of Virginia and coauthored two submitted papers. Her mentor praised the beauty of her work and her impressive contributions to the life of the community.

Faye Jackson

Jackson's instructors are similarly enthusiastic about her abilities and enthusiasm, and they describe her as a delight

continued on page 8

to have in class who helps spark important discussions. They are particularly excited about her contributions to outreach, and they describe her as a talented teacher for the Math Mondays in Ypsi, Super Saturday and Math Corps programs.

Response from Jackson:

First of all, it is a great honor to have been selected for the Alice T. Schafer Prize and I would like to thank the Association for Women in Mathematics for sponsoring this award and for supporting women mathematicians.

The mathematical community at the University of Michigan has influenced my understanding of mathematics as well as what it means to be a mathematician more deeply than I can express with words. The vibrancy, inclusivity, and collaborative spirit which characterizes the community there has made my past four years incredible. This is in no small part due to a few key professors. I am quite blessed to know Professors Sarah Koch and Stephen DeBacker, who have molded that community by pouring their souls into it. Their passion for teaching and outreach is constantly inspiring. They have also been incredible mentors to me in both my finest and my worst moments. I would not be where I am without them. Sarah Koch's dynamism in particular sparks my excitement for mathematics whenever I am around her, and Stephen DeBacker provides me with the space and the resources to pursue whatever idea I have towards improving the department community. I would also like to thank Professor Jenny Wilson, who fostered my love of algebraic topology during an especially difficult academic year over Zoom. Her clear teaching style and love for the subject was not hampered in the slightest by these conditions.

I am deeply grateful for Professor Steven J. Miller, who has been a key mentor for me since I attended the SMALL REU in 2021. He is so deeply dedicated to his students that it astounds me, and he has pushed me to show the same dedication to my students and also to my work. As I constantly tell him, his advice is invaluable. Furthermore, the REU showed me how incredible mathematical research can be, and I would like to thank the entire cohort of the SMALL 2021 REU. I would also like to thank Professor Ken Ono for showing me the beauty of number theory. Through the University of Virginia REU I grew immensely as a researcher and developed an appreciation for a field of mathematics which had previously been foreign to me. I would like to thank my cohort at the Virginia REU as well. I would specifically like to thank my coauthor Misheel Otgonbayar, whose brilliance and kindness continually astounded me throughout the program, and who made me laugh more times than I could count. I would also like to thank my roommate Catherine Cossaboom, who provided me with invaluable support whenever I was at my wit's end with my research or when I was struggling personally.

Finally, I would like to thank my family for their love and support throughout my college career. Specifically, my mother's sense of service has extended to my passion for outreach, and I would not be who I am without her. Likewise, my father's dedication to his work and to other people always astounds me. I would also like to thank my partner, Cassandra Prokopowicz, for supporting me for the past four years. Whether I am on top of the mountain after conquering

CALL FOR PROPOSALS

Research Collaboration Conferences for Women

The AWM works to establish and support research networks for women in all areas of mathematics research. In particular, the AWM RCCW Committee provides mentorship and support to new networks wishing to organize a Research Collaboration Conference for Women (RCCW). The Committee offers help finding a conference venue, developing and submitting a conference proposal, and soliciting travel funding for participants. Thanks to a National Science Foundation grant, some funding may be available through the AWM to support new RCCWs, especially interdisciplinary proposals and proposals that bring together researchers from traditionally underrepresented populations.

Mathematicians interested in organizing the first conference of a new RCCW are invited to submit a proposal to the AWM describing the conference topic, potential co-organizers and project leaders, and potential participants. Proposals should be no more than one page (PDF files only, please) and should be sent to awm.rccw@gmail.com. Deadlines for submission: **February 1** and **July 1**.

More information about Research Collaboration Conferences for Women, existing RCCW networks, and related initiatives can be found at http://awm-math.org/programs/advance-research-communities/.

a problem or at the bottom of it after falling from the cliffs, she has always been there for me, and that has allowed me to achieve so much.

Anqi Li is a math major at Massachusetts Institute of Technology. She has participated in three summer research experiences. The first was the NYC Discrete Math REU at Baruch College, City University of New York. In that summer she wrote a paper that has been accepted by the *European Journal of Combinatorics*. In Summer 2021 she participated in the MIT Math Summer Program in Undergraduate Research and co authored a paper her mentor describes as remarkable work. This paper was recognized as the top project from the summer program. In Summer 2022, Li participated in the REU at the University of Minnesota Duluth, leading to three more papers in preparation. In addition to these summer projects, Li has sought out research experiences during the academic year and has two current projects with faculty at MIT.

Li's mentors praise her for deeply understanding challenging material, for asking insightful questions and for a willingness to try anything. They describe working with her as like working with an advanced graduate student.

Response from Li:

It is an honor to be recognized by the Association for Women in Mathematics for the Alice T. Schafer prize. I would like to thank the Association for their support of early career women researchers and their important work in promoting gender representation in mathematics.

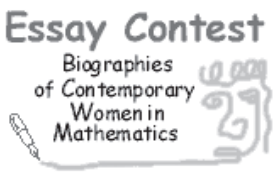
I am deeply grateful for the guidance of my mentors, who have shaped me into the student and researcher I am today.

Anqi Li. Photo credit: Margaret Zheng

I would like to start by thanking Professor Yufei Zhao for his unwavering guidance throughout my mathematics journey at MIT and his many insights into academia and beyond. I am also sincerely grateful for the opportunity to work under the patient mentorship of Professor Lisa Sauermann, who has been one of my biggest role models as a woman mathematician. I also draw deep inspiration from the fruitful conversations I have had with my research collaborators and professors, and in particular thank Professor Dor Minzer for our many intellectually stimulating discussions and his influence on my current research directions.

I also extend my gratitude to the numerous other faculty I have interacted with over the years, including

continued on page 10



To increase awareness of women's ongoing contributions to the mathematical sciences, the Association for Women in Mathematics holds an annual essay contest for biographies of contemporary women mathematicians and statisticians in academic, industrial, and government careers. AWM is pleased to announce that the 2023 contest is sponsored by Math for America, www.mathforamerica.org.

Essays will be based primarily on an interview with a woman currently working in a mathematical career. The AWM Essay Contest is open to students in the following categories: **grades 6–8**, **grades 9–12**, and **undergraduate**. At least one winning entry will be chosen from each category. Winners will receive a prize, and their essays will be published online at the AWM website. Additionally, a grand prize winner will have their entry published in the *AWM Newsletter*. For more information, visit awm-math.org/awards/student-essay-contest/. The deadline for electronic receipt of entries is **February 1, 2023**. To volunteer to be interviewed, please visit the website awm-math.org/awards/student-essay-contest/ and sign up using the link at the bottom of the page.

AWM
ASSOCIATION FOR WOMEN IN MATHEMATICS

MfA Math for America

Professors Henry Cohn and Davesh Maulik, as well as my postdoc and graduate student collaborators who constantly inspire me to reach greater heights. I am also thankful for opportunities through the CUNY Baruch Combinatorics REU, MIT Summer Program in Undergraduate Research+ (SPUR+) and University of Minnesota Duluth REU, which were instrumental in shaping my research interests in combinatorics. I would especially like to acknowledge Professor Adam Sheffer for getting me started on my university research journey.

Last but not least, I would like to express my deepest appreciation to my loved ones, whose unconditional support motivates me every day.

Ilani Axelrod-Freed

Ilani Axelrod-Freed is a mathematics major at MIT. They have participated in three REUs in Duluth, Minnesota Twin Cities, and New York Discrete Math. The topics of their research projects span combinatorics and discrete geometry. They have an impressive single-author publication stemming from one of these REUs and published in *Enumerative Combinatorics and Applications*, and another joint paper with a mentor accepted in *Discrete & Computational Geometry*. In one of these REUs, Axelrod-Freed worked on three different research projects and impressed their mentors with their ability to balance their time between them.

Axelrod-Freed is also praised as a very active contributor to collaborative meetings, including online ones during the pandemic. Their mentors praised their oral and written mathematical communication skills as demonstrated by their presentations during the REUs as well as their strong coursework.

Response from Axelrod-Freed

I would like to thank the AWM for supporting underrepresented genders in mathematics. Thanks to Professor Alexander Postnikov for introducing me to mathematics research at MIT, Professor Joseph Gallian for making Duluth the amazing REU and community that it is, Professor Pablo Soberón for his supportive mentorship and collaboration, and thank you to all my incredible mentors at the Twin Cities REU who made me so excited to do math every day. I would like to thank HCSSiM for sustaining my love of math and introducing me to the mathematics community in high school. I would like to thank all my friends who have worked on math problem sets and research with me and who listen patiently to my excited rambles about my latest proofs. Finally, eternal gratitude to my parents for their endless support, particularly to my dad for giving me exciting math problems ever since I was young that always inspire me to keep learning more.

Joye Chen is a senior mathematics major at Princeton University. She participated in the SMALL REU during the summer of 2022 where she worked on hyperbolic knot theory and coauthored three publications (two already on ArXiv and one in preparation). Chen contributed significantly in proving several key results on hyperbolic knotoids and generalized knotoids, in particular giving a complete classification of hyperbolic alternating links in thickened surfaces-with-boundary. Her instructors are impressed by her dedication to conveying these ideas through developing a deep understanding of the material.

Joye Chen. Photo credit: Melody Pan

As well as conducting research during her time at the SMALL REU, Chen has excelled in becoming familiar with modern topics in topology and has taken several graduate courses, including ones on algebraic topology and knot Floer and Khovanov homologies. In previous summers, she also worked on reading courses in representation theory, Lie algebras, and grid homology. She is consistently described as working at a graduate student level with impressive initiative to develop her own knowledge and understanding. In addition, Chen previously served as the advising co-chair of the Princeton Math Club and currently serves as a Peer Math Advisor.

Response from Chen:

It's an honor to be selected as a Schafer Prize Honorable Mention. I am deeply indebted to the many, many people who inspired me and supported me along my mathematical development. In particular, I want to thank Professor Colin Adams for his mentorship and enthusiasm for hyperbolic 3-manifolds, as well as my collaborators at SMALL for many insightful conversations. I'm also immensely grateful to Professors David Gabai, Ian Zemke, and Peter Ozsváth for their invaluable guidance and encouragement, and to my peers at Princeton for their constant support and presence in the Fine Common Room. Many thanks to the PROMYS program and to my UIL teachers, John Biros and Dawn Geshwender, for getting me started. And lastly, thank you to my family for their unconditional love.

Veronica Lang

Veronica Lang is a mathematics major at Smith College. She has participated in an REU program at the University of Minnesota Twin Cities and has engaged in research at Smith College as well. Lang is interested in a variety of mathematical research topics spanning algebra, combinatorics, and topology. Her research work led to two papers that are in preparation for submission, with potential follow-up results. Her work was described as independent by all of her mentors, and comparable to the level of graduate students and even postdocs.

Lang has also excelled in advanced courses in different topics and pursued graduate-level coursework through final projects and independent study. Her mentors praised her creativity in research as well as her oral and written mathematical communication skills. She is described as "more of a colleague than a student" by her mentors, and is particularly recognized for being able to work with people from diverse backgrounds and form effective teams.

Response from Lang:

Thank you to the AWM for celebrating women in math and to the professors and students who make the Smith math and physics communities so supportive. I am particularly indebted to Professor Julianna Tymoczko for introducing me to math research, and to Professors Pau Atela, Patricia Cahn and Christophe Golé for their wonderful advice and teaching. I also want to thank the University of Minnesota Twin Cities REU for an amazing summer research experience. I am especially grateful to my mentors Sarah Brauner and Claire Frechette, TAs Patty Commins and Carolyn Stephen, and student collaborators Ilani Axelrod-Freed and Judy Chiang for being spectacular mathematicians and human beings to work with. Finally, I would like to thank my family and non-mathematician friends for their support and for acting impressed when I say the word "eigenvector."

BOOK REVIEW

Book Review Editor: Margaret Bayer, University of Kansas, Lawrence, KS 66045-7523, bayer@math.ku.edu

x + y: A Mathematician's Manifesto for Rethinking Gender, by Eugenia Cheng, Basic Books, 2020. ISBN 978-1-5416-4650-6. Hardcover.

Reviewer: Elizabeth A. Lamprecht, Adrian College, Adrian, MI 49221, elamprecht@adrian.edu

As a long-time mathematics professor, and more recently a member of the Women and Gender Studies Program at Adrian College, I was intrigued by the title of Eugenia Cheng's *x + y: A Mathematician's Manifesto for Rethinking Gender*. Of course, my initial thought was: What contribution could a mathematician possibly make to such a discussion? Indeed, I am aware that gender is a sensitive issue and that, in recent years, it has become a political one. But how can mathematical thinking be used to address the issues surrounding gender? After a moment's hesitation, I realized that the author is, most likely, someone like me, an individual with a deep appreciation for the beauty and relevance of mathematics. And haven't I, in a professional sense, "branched out?" After all, I currently teach a writing-intensive humanities course entitled Women in Science and Mathematics. I concluded that the author has important insights to share, and I decided to read the book.

Eugenia Cheng is a British mathematician and pianist who is currently a Scientist in Residence at the School of the Art Institute of Chicago, and as a mathematician and musician, I felt a connection to her almost immediately. To be sure, I value artistic expression, and I can relate to the struggles of being a woman in the male-dominated field of mathematics. Looking back, it was often quite challenging to be the lone woman in the room. Undoubtedly, things have improved since my undergraduate and graduate school days. However, there is still a long way to go.

In the Introduction to her thought-provoking book, Eugenia Cheng states, "This is rooted in my personal experience as a mathematician, but it extends beyond that to all of my experiences: in the workplace beyond mathematics, in general social interactions, and in the world as a whole, which is still dominated by men—not in sheer number, as in the mathematical world, but in concentration of power" (p. 6). Furthermore, she notes, "I tried to be successful according to existing structures and a blueprint handed down to me by previous generations of academics." Indeed, by all accounts, Eugenia Cheng is successful. She has earned multiple academic degrees and has held several prestigious positions. However, she "didn't *feel* successful" (p. 6). In fact, she realized that society's definition of "success" does not align with her own. So, she decided to change the way she looked at things, and learned a lot in the process, especially in "the way we think about gender issues" (p. 7).

So how does mathematics factor in? What is this mathematical approach? The author asserts that "mathematics is most satisfying" when problem-solving and theory-building "come together" (p. 8). She intends to "address the divisiveness of arguments around gender equality" (p. 9). She does this by introducing some new terminology. Moreover, in doing so, she introduces a new dimension, and "that dimension deals with the ways people relate to one another" (p. 26). Furthermore, even though these ways of relating "are particularly relevant to the inclusion of women in society," she approaches "this in a way that doesn't need to be directly tied to gender" (p. 26). Interestingly, her approach is "based in the ideas of category theory" (p. 20).

Eugenia Cheng notes that, in mathematics, we typically start with some basic definitions, and then we build a theory. We justify this theory by demonstrating ways in which it might be helpful. Will it allow us to solve some problems? Will it help us to think more clearly? The author asserts that her theory will do both (p. 12). So, what is this new terminology? And how can this new vocabulary and new way of thinking ultimately benefit society as a whole?

In Chapter 3 of *x + y*, the author discusses "the current one-dimensional approach": "Instead of considering gender and character separately, we are doing various confused things … women are encouraged to be more like men … and men are encouraged to get in touch with their 'feminine' side" (p. 81). Cheng observes that "in this case the gender dimension comes with embedded bias: inequality gets built into the system by a tendency to overvalue traits traditionally associated with men and undervalue ones traditionally associated with women." Unfortunately, this leads to a "skewed single dimension" (p. 84).

Citing multiple real-life examples, Eugenia Cheng successfully convinces the more open-minded reader of the need for a "new, ungendered language in order to separate character traits from gender" (p. 119). Undeniably, both men and women suffer from societal pressures to conform to traditional masculine or feminine roles. But "not all men are aggressive, competitive, risk-taking, and unempathetic" (p. 119), and even "the word 'feminism' is gendered and thus divisive in many situations" (p. 128).

The author proposes the use of two new terms, "ingressive" and "congressive," to "break our prior associations with gender" (p. 132). In her characterizations, she notes that ingressive behavior involves "focusing on oneself over society and community … emphasizing independence and individualism." Moreover, ingressive individuals are "more competitive and adversarial than collaborative." Congressive behavior, on the other hand, involves "focusing on society and community over self … emphasizing interdependence and interconnectedness." Furthermore, congressive individuals are "more collaborative and cooperative than competitive" (p. 135).

Eugenia Cheng observes that "this is not a clean dichotomy.… It's a way to evaluate behavior in a flexible and dynamic way" (pp. 135–136). She notes that "in category theory, abstract mathematicians are very interested in describing things by the role they play in a context rather than by their intrinsic characteristics" (p. 139). In addition, she observes that "society favors ingressive behavior, with the result that men are more powerful and successful." Furthermore, she argues "that congressive behavior is actually better for society, so we should favor congressive behavior instead." Cheng asserts "this will automatically change the gender balance of power in society without us having to take action along the gendered dimension" (p. 144). This is an innovative approach!

In her Preface, the author notes that the "contrast between individualistic thinking and community-minded thinking is the major theme throughout this book" (p. ix). In fact, in Chapter 5, she explores how "ingressive structures are … perpetuated, ways in which they are bad for us, and what we could do instead" (p. 145). She familiarizes the reader with her own life story. Interestingly, Cheng had taught "traditional math" at "traditional ingressive universities … before switching to teaching math to art students at the School of the Art Institute of Chicago" (pp. 145–146). This has provided her with various opportunities to develop congressive ways to teach mathematics.

x + y: A Mathematician's Manifesto for Rethinking Gender provides a wealth of information for the interested reader. For example, I enjoyed learning about Finland's "essentially congressive" educational system, which "focuses on collaboration, cooperation, and student well-being" (p. 155). Cheng details important features of the Finnish system: an absence of standardized testing, free school meals, health care, and counseling. Teachers also have professional autonomy. Interestingly, "Finland has girls doing better than boys in math and science as well, according to various measures" (p. 158). In addition, Cheng reminds us that "many scientific discoveries came about through collaborative work rather than teams competing to be first." As an example, she discusses the network of telescopes, called the Event Horizon Telescope, which resulted in the first-ever image of a black hole (p. 179).

Eugenia Cheng left behind "the standard ingressive academic environment" and built herself "a congressive new career based on sharing" her love of mathematics (p. 185). I have done this myself, in some small way. Many years ago, I convinced my then-colleagues of the need for an alternative, freshman-level course; I simply did not think that the traditional course in Intermediate Algebra was meeting the needs of our students in the arts and humanities. As a consequence, I developed a course entitled Mathematics for the Liberal Arts. Then, around mid-career, I received training in writing instruction. This enabled me to introduce a writing-intensive course, History of Mathematics, into the college curriculum. Lastly, several years ago, I taught, for the first time, Women in Science and Mathematics. This experience has forced me to step outside of my comfort zone, and to explore issues of diversity in an historical and cultural context. Undoubtedly, this opportunity has encouraged me to consider new ways of teaching.

While Cheng asserts that "small-scale congressive interactions could gradually influence society to become more congressive" (p. 189), I remain skeptical that large-scale change is possible. Unfortunately, ingressive behavior is rewarded in our society and ingrained within our culture. Nevertheless, I agree that we should "find ways to operate congressively within an ingressive society" (p. 184). Undeniably, "congressive role models of any gender are extremely important" (p. 194). In fact, Cheng herself draws inspiration from individuals such as Professor John Baez. "A physicist and prolific blogger," he "started sharing his understanding of physics way back in 1993, when the internet was barely known." His weekly column "was a congressive way of helping the world and himself at the same time" (p. 193).

Eugenia Cheng invites us "to question any received wisdom or advice about how to be successful and ask whether it is making ingressive assumptions." If so, we "could try reframing the advice in a congressive way," or perhaps find "a congressive way to approach the same sort of outcome" (p. 207). Moreover, she stresses the importance of having boundaries and discusses how to neutralize ingressive energy congressively. In addition, she considers a subtle way of shifting the balance of power. Of course, we should strive to be more congressive ourselves and to encourage congressive behavior in others. However, our long-term goal should be

continued on page 14

to "create a more congressive and thus more inclusive world." This is the subject of her final chapter, Dreams for the Future (p. 213).

In Chapter 7, Cheng considers "ways we could restructure the whole of society to be more congressive." She asserts: "This is my answer to all that is written about feminism that says we need to change the entire system but doesn't suggest how we could do that." Equipped with the new ideas presented in Part II of the book, she addresses the various problems presented in Part I (p. 216). She states, "we can now move away from pseudo-feminism … in which women are exhorted to become more like men in order to be successful." Furthermore, we can move away from "reverse sexism," where women are deliberately favored to make up for past oppression (p. 217). Indeed, changing the power structure of the status quo is a more ungendered approach to feminism.

Remarkably, Cheng draws from various fields in this wonderfully crafted book. I certainly appreciated her insightful discussion of the mathematical thought process, as well as her emphasis on the advantage of abstraction. Her use of logic to illuminate the flaws in our thinking is rather compelling, and although statistics are often informative, "life is not a controlled experiment" (p. 68). I also agree with Cheng's assertion that "what is much more important than looking for gender differences is to look for character traits that are at the root of different people responding differently to different situations" (p. 69). And, as Cheng notes in her discussion of Native American cultures, "it appears that congressive society isn't something new … but something old we need to restore" (p. 241).

In *x + y: A Mathematician's Manifesto for Rethinking Gender*, Eugenia Cheng addresses numerous topics that, at first glance, might seem unrelated. For example, she identifies pitfalls of ingressive identity politics and advocates for "restorative versus punitive justice" (p. 237). Likewise, her discussion regarding the "dichotomy between research and teaching" in academia is quite thought-provoking (p. 225). So how does the author accomplish all of this? The answer is simple: She proposes "a theory that only looks at how people relate to one another, without trying to impose genders on those behaviors" (p. 20).

It's difficult to convey the subtleties of Cheng's mathematical approach, and a careful analysis is best left to the interested reader. I should note, however, that the author provides numerous diagrams to help elucidate her points, and I found these illustrations to be particularly helpful. The practical suggestions found in the Appendix, as well as the examples of "congressive role play," also enhance the book.

In summary, "most writing about gender is from the point of view of sociology, anthropology, biology, psychology, or outright feminist theory" (p. 7). Eugenia Cheng, on the other hand, takes full advantage of the power of mathematical thinking and presents a more nuanced, and unbiased, approach. I appreciate her contribution to this important endeavor.

CALL FOR NOMINATIONS

The Association for Women in Mathematics Student Chapter Awards

In September 2016, the Executive Committee of the Association for Women in Mathematics established the Student Chapter Awards, to be awarded annually at the MAA MathFest. The purpose of these awards is to recognize outstanding achievements in chapter activities among the AWM student chapters.

Awards will be given out in up to four categories: (1) scientific excellence, (2) outreach, (3) professional development, and (4) funding/sustainability. More details about each category can be found on the AWM website awm-math.org.

Any chapter may nominate itself for awards in one or two categories. The nomination should include: 1) A cover letter: The cover letter should summarize the chapter's qualifications for the award category to which it is nominating itself. If the chapter is applying in two categories, it should ensure that both categories are clearly included in one cover letter. 2) An activities report: The activities report, 500–1000 words in length, should give a detailed description of the particular work for which it is seeking an award. If the chapter is applying in two categories, a separate activities report is required for each. Nomination materials should be submitted online at MathPrograms.org. The submission link will be available 45 days prior to the nomination deadline. Nominations must be received by **May 15, 2023**. If you have questions, phone 401-455-4042, email awm@awm-math.org, or visit https://awm-math.org/awards/awm-student-chapter-awards/.

EDUCATION COLUMN

Education Column Editor: Jackie Dewar, Loyola Marymount University, jdewar@lmu.edu

Mathematics Pathways and Corequisite Reforms

Megan Breit-Goodwin, Mathematics Instructor, Anoka-Ramsey Community College, Megan.Breit-Goodwin@anokaramsey.edu

Completing a college-level mathematics course is an important metric predicting student academic success and program completion (Jenkins & Bailey, 2017; Lin et al., 2020). However, many students are required to take developmental mathematics courses prior to enrolling in college-level courses, and a large proportion of students who are referred to developmental mathematics never make it to a college-level mathematics course (U.S. Department of Education, 2017). Developmental mathematics courses are pre-college level courses designed to provide students with foundational mathematics content to support their success in college-level courses. Students of color are disproportionately placed into developmental mathematics courses (Hodara, 2019). Further, developmental models built around multiple algebra-focused prerequisite courses perpetuate the equity gaps that exist in mathematics education, evidenced by significant and persistent outcome disparities across race (Bahr, 2010; Bailey et al., 2010).

Mathematics pathways and corequisite models have emerged as promising structural reforms that address two interrelated structural barriers to equitable student access and success in college mathematics: misaligned curriculum for academic programs, and long sequences of developmental mathematics coursework. Mathematics pathways are courses and course sequences that align to the academic and career goals of students. Corequisite models pair a college-level gateway[1] course with a developmental course that students who do not meet traditional placement metrics for the college-level course co-enroll in. The corequisite course provides meaningful support for students that directly connects with the content of the college-level course. These reforms increase the likelihood of developmental students completing a college-level math course, accelerate college-level math completion, and reduce equity gaps (Bickerstaff et al., 2018; Brathwaite et al., 2020; Ran and Lin, 2019).

You may be in a state where major developmental reforms have recently occurred or are currently underway. Math pathways and corequisite models might be a regular topic of discussion in your department meetings, system office, or on the floors of your state legislature. As of April 2021, 24 states have systems of higher education that either allow or require the use of corequisite models within developmental education (Whinnery & Odekar, 2021).

The American Mathematical Association of Two-Year Colleges (AMATYC) approved two position statements in November 2021 recommending mathematics programs offer math pathways aligned to programs of study for all students, and advocating for the implementation of well-designed corequisite models as a proven alternative to traditional prerequisite developmental model (AMATYC, 2021a & 2021b). The Mathematical Association of America (MAA) recommends that faculty and departments develop multiple mathematics pathways including calculus, statistics, and quantitative reasoning (MAA, 2020a); encourages faculty and departments to be aware of potential diversionary effects of prerequisite developmental models for STEM majors and encourage the consideration of corequisite models (MAA, 2021); and advocates that mathematics departments should have primary responsibility in setting policies related to these practices (MAA, 2020b).

These reforms are big, and they are sticking around. We need to be talking about them, and working on them together. In this column I will provide some of the national context around these reforms, and share my own transformation in thinking and why I support them.

Traditional Developmental Mathematics

College algebra has historically served as the default college-level gateway course for all students and academic programs in higher education. Because of this framing, developmental mathematics courses and sequences have traditionally been algebra-based, designed to prepare students for college algebra and, eventually, calculus. However, many programs of study use topics that differ from those addressed in traditional developmental and college algebra courses (AMATYC, 2019; Saxe & Braddy, 2015; Transforming Postsecondary Education in Mathematics [TPSE Math], 2017). Math pathways ensure that developmental experiences for students are supportive and relevant to their college-level gateway course, whether that is an algebra-based course (e.g., for STEM programs), statistics course (e.g., for

continued on page 16

[1] Gateway courses earn college credit that applies to the requirements of a degree program.

allied health programs), a quantitative reasoning course (e.g., for fine arts programs), or other program-specific options.

Traditional approaches to developmental mathematics assign students to prerequisite courses or sequences of courses that do not carry college-level credit. This model has a demonstrated diversionary effect, causing students to delay progress to their college goals (Jaggers & Stacey, 2014). Corequisite models, on the other hand, place all students directly into a credit-bearing, college-level gateway course and provide additional support to students who did not meet traditional placement standards. In a corequisite model, the curriculum is designed so that the mathematics readiness competencies for the college-level course are directly linked to the learning outcomes of the corequisite course. Rather than cramming all of the content of an algebra-based prerequisite course (e.g., intermediate algebra) into a corequisite course, there is an intentional alignment of curriculum between the two courses so that students can access development mathematics content in a way that is relevant, rigorous, and immediate for their college-level course. Additional supports such as advising, tutoring, and other student services are integral to corequisite models.

Outcomes of Traditional Developmental Mathematics Models

My recent teaching load centered on prealgebra, which is a developmental mathematics course. This course begins with arithmetic of whole numbers and progresses through proportionality and linear relationships. After completing prealgebra, students need to complete one more algebra-based developmental course before enrolling in a college-level statistics or liberal arts math course. For students whose program requires college algebra, prealgebra is the first of three developmental courses required prior to enrolling in the college-level course.

Most developmental mathematics students never make it to a college-level math class, and even fewer earn a degree or a diploma, or transfer (U.S. Department of Education, 2017). Throughput analysis[2] from a study that analyzed course-taking trajectories of 63,650 students from 57 community colleges in the United States showed the percentage of students who persisted through a three-course developmental sequence and enrolled in a college-level math class was just 13%. Only 35% of the original students left the sequence by either not passing or completing a course. However, 52% of students left the sequence by either not enrolling immediately after receiving a mathematics placement that requires a sequence of three developmental courses, or not enrolling in the next course after passing a developmental course along their sequence (Jaggars & Stacey, 2014).

When I first saw this data, it took my breath away. These are not just proportions to me. In these numbers I see my students, my classroom, and my teaching. My prealgebra students must complete a sequence of three developmental mathematics courses to enroll in college algebra, and it is heartbreaking to know that such a small proportion of my students are likely to make it to their gateway course.

Shifting Paradigms

Traditional developmental mathematics policies and practices are broken, and within that brokenness are a host of ways our individual and collective actions reinforce the status quo. This is not acceptable. To actualize the changes that need to occur, we must work both at a systems level and at the personal level to address the structural problems of developmental mathematics. If successful, mathematics would shift from a role of gatekeeper in higher education, to a more meaningful and integrated component of a broader range of academic programs.

The mathematics pathways and corequisite model reforms rest on significant paradigm shifts that require us to suspend long-held beliefs about what students need to be successful in college-level math and their academic programs. The reforms challenge the algebra-for-all framework and the notion that long sequences of prerequisite courses are necessary for students to meaningfully learn mathematics. They also make implicit biases and deficit mindsets explicit, and that feels uncomfortable. I know this because I am challenged by this every day. We need to lean into that discomfort. I personally have discovered a deeper joy in my teaching by engaging in this discomfort, and it has helped me become a more authentic educator.

Evidence of Improvement

A large body of studies, using a variety of both causal research designs and state-level populations of students, are generating compelling evidence that mathematics pathways and corequisite model reforms work for students. I'll highlight three studies that show the promise of the reforms in course success and progression to higher level mathematics,

[2] This analysis examines "throughput rates," which are the percentage of students who complete an entire sequence of required courses, starting from their first placement into a developmental course through a college-level mathematics course in a defined period of time (e.g., within one year of first enrollment).

impacts of the reforms across race and mathematical preparedness, and the intersecting impacts of mathematics pathways and corequisite models.

City University of New York

Researchers at the City University of New York conducted a randomized, controlled trial in 2013 that examined student success in a corequisite statistics pathway compared to a traditional algebra-based prerequisite remediation model. In this study, the corequisite group of students passed the statistics course at a rate of 55.7%. Students assigned to the traditional remediation model passed the college-level course at a rate of 36.8% (Logue et al., 2016). Follow-up analysis showed that students in the corequisite course saw greater success in later, higher-level mathematics courses, courses in other disciplines, and an 8.8% higher three-year graduation rate for associate degrees (Logue et al., 2019).

University System of Georgia

The University System of Georgia (USG) adopted a full-scale corequisite model of developmental mathematics across its 26 universities and colleges in Fall of 2018. Analysis of student success and progression data from first year of implementation of the corequisite model revealed a threefold increase in the percentage of students who passed a college-level math class within one academic year of their enrollment in relation to a comparison cohort that had enrolled in a traditional prerequisite model in 2013. This increase in course completion was similar across levels of preparedness as measured by ACT Math score. Notably, for the least prepared students (ACT Math score below 14), the college-level course success rate was more than three times the proportion of similarly prepared students in the comparison cohort (Denley, 2021).

During the first two years of full implementation of the corequisite model, comparison of completion rates of college-level mathematics courses across the USG system showed no statistically significant difference across Black, Hispanic/Latinx, and White students (the three largest IPEDS[3] racial groups among the USG student population) when controlled for preparedness level (again, measured by ACT Math score). However, in a comparison made across a broader population of students that included students without standardized preparation scores (ACT Math score), several differences emerged. In the mathematics corequisite model, the overall success rate of Black students was significantly lower than the overall success rates of Hispanic/Latinx students and White students. On the other hand, the overall success rate of Black students in the corequisite model was more than 3.5 times higher than the comparison cohort of Black students who had enrolled in the prerequisite model in 2013. Similar improvements in student success rates and reduction of equity gaps were also achieved by other student sub-populations including low-income students and adult learners (Denley, 2021).

continued on page 18

[3] IPEDS stands for Integrated Postsecondary Education Data System; see https://nces.ed.gov/ipeds.

NSF-AWM Mentoring Travel Grants for Women

Mathematics Mentoring Grants. The objective of the NSF-AWM Mathematics Mentoring Travel Grants is to help junior women to develop long-term working and mentoring relationships with senior mathematicians. This relationship should help the junior mathematicians to establish their research programs and eventually receive tenure. Each grant funds travel, accommodations, and other required expenses for an untenured woman mathematician to travel to an institute or a department to do research with a specified individual for one month. The applicant's mentor's research must be in a field which is supported by the Division of Mathematical Sciences of the National Science Foundation.

Selection Procedure. All awards will be determined on a competitive basis by a selection panel consisting of distinguished mathematicians appointed by the AWM. A maximum of $5000 per award will be funded.

Eligibility and Applications. Please see the website (https://awm-math.org/awards/awm-grants/travel-grants/) for details on eligibility and do not hesitate to contact us at awm@awm-math.org or 401-455-4042 for guidance. Applications from members of underrepresented minorities are especially welcome.

Deadline. There is one award period per year. Applications are due **February 15**.

Tennessee Board of Regents Community Colleges

The Tennessee Board of Regents implemented a mathematics pathways and corequisite model at scale across their community colleges in 2015. An investigation into the causal effects of corequisite remediation for students on the margin of college readiness (as measured by ACT Math score), compared the outcomes of student cohorts from prerequisite models (Academic Year 2010–2011) and corequisite models (Academic Year 2017–2018).

Students placed into corequisite models were 15 percentage points more likely to pass their college-level gateway mathematics course within one year of enrollment than the comparison cohort that had been assigned to prerequisite models. Students who enrolled in the corequisite math course were just as likely as their peers who placed directly into the gateway course without corequisite support to complete their gateway course. After completion of a college-level math course (e.g., college algebra), students who enrolled in the corequisite model courses were equally likely to enroll in subsequent mathematics courses (e.g., precalculus) as students in the comparison cohort who had enrolled in the prerequisite models. Moreover, students who had enrolled in the corequisite course were more likely to enroll in subsequent math courses than their peers who placed directly into a college-level math course.

The statistics and math for liberal arts pathways showed the most positive effects of the corequisite reforms in Tennessee. For the algebra-calculus pathway there were no significant differences between the corequisite and prerequisite models. These results suggest that the coordination of the math pathways reforms with corequisite models are instrumental to the maximum impacts of the reforms (Ran & Lin, 2019).

Taking Action

As compelling as the data is, what caused me to embrace mathematics pathways and corequisite models was a shift in my mindset. It took me nearly six years to begin to understand the depths of the structural problems in traditional developmental mathematics and identify my own complacent and active contributions to a broken system. My students should have positive mathematical experiences that leverage the strengths and understandings they bring to the classroom. I want my students to be successful, and this just isn't possible within a traditional prerequisite, algebra-based developmental mathematics model.

A first step to entering this work is to examine current practices, structures, and outcomes at your college or university. It is essential that disaggregated data be used to identify equity gaps in student course-taking patterns and outcomes (Bensimon et al., 2016). Student outcomes are best measured with throughput rates, as opposed to individual course success rates. The Charles A. Dana Center at the University of Texas at Austin has an attrition and throughput equity analysis worksheet that can help with this examination. (Richardson (2021) provides a "toolkit" for this.) Where are students leaving your course sequences? Who is making it through the sequences? Who is not?

It is important to learn about the developmental mathematics reforms that are taking place across the country and within your local context. Some resources to support you and your college or university in this work include the Center for the Analysis of Postsecondary Readiness,[4] the Community College Research Center at Teacher College, Columbia University,[5] Strong Start to Finish at the Educational Commission of the States,[6] and the Dana Center.[7]

Mathematics pathways and corequisite models are ways we can begin to dismantle a broken system that has kept our classrooms and our programs a privileged space for mostly white students and faculty. Research is showing that these reforms create stronger courses and course sequences for students by opening access to college-level mathematics with integrated developmental supports that respect students' prior learning, honor their desire to learn, and build on their successes. We need to investigate the impacts of these reforms and dig into the nuances of how the new developmental models can provide meaningful and effective learning experiences for students. Importantly, faculty engagement and leadership is needed for implementing these models with fidelity and advocating for best practices in the contexts of our diverse campuses.

This is hard work, but it is important that we rise to this challenge and work on it together. Our students are counting on us to do so.

---

[4] https://postsecondaryreadiness.org/
[5] https://ccrc.tc.columbia.edu/
[6] https://strongstart.org/
[7] https://www.utdanacenter.org/

References

American Mathematical Association of Two-Year Colleges [AMATYC]. (2019). *Position Statement of the American Mathematical Association of Two-year Colleges: The Appropriate Use of Intermediate Algebra as a Prerequisite Course*. https://amatyc.org/page/PositionInterAlg

American Mathematical Association of Two-Year Colleges [AMATYC]. (2021a). *Pathways Position statement*. https://amatyc.org/page/PositionMathematicsPathways

American Mathematical Association of Two-Year Colleges [AMATYC]. (2021b). *Corequisite Position statement*. https://amatyc.org/page/PositionCorequisiteMathematicsCourses

Bahr, P. R. (2010). Preparing the underprepared: An analysis of racial disparities in postsecondary mathematics remediation. *The Journal of Higher Education,* 81(2), 209–237.

Bailey, T., Jeong, D. W., & Cho, S. (2010). Referral, enrollment, and completion in developmental education sequences in community colleges. *Economics of Education Review,* 29(2), 255–270.

Bensimon, E. M., Dowd, A. C., & Witham, K. (2016). Five principles for enacting equity by design. *Diversity and Democracy, The Equity Imperative*. https://www.aacu.org/diversitydemocracy/2016/winter/bensimon

Bickerstaff, S., Chavarin, O., & Raufman, J. (2018). *Mathematics pathways to completion: Setting the conditions for statewide reform in higher education*. New York, NY: Columbia University, Teachers College, Community College Research Center.

Brathwaite, J., Fay, M. P., & Moussa, A. (2020). *Improving Developmental and College-Level Mathematics: Prominent Reforms and the Need to Address Equity*. CCRC Working Paper No. 124. Community College Research Center, Teachers College, Columbia University.

Chen, X. (2016). Remedial Coursetaking at U.S. Public 2- and 4-Year Institutions: Scope, Experiences, and Outcomes (NCES 2016-405). U.S. Department of Education. Washington, DC: National Center for Education Statistics. Retrieved 11/1/2022 from http://nces.ed.gov/pubsearch

Denley, T., (2021). *Scaling co-requisite developmental education, University System of Georgia Academic Affairs* (Technical Brief No.1). Complete College Georgia: The University System of Georgia. https://www.completegeorgia.org/scaling-co-requisite-developmental-education

Hartzler, R., & Blair, R. (Eds.) (2019). *Emerging issues in mathematics pathways: Case studies, scans of the field, and recommendations*. Austin, TX: Charles A. Dana Center at The University of Texas at Austin.

Hodara, M. (2019). *Understanding the developmental mathematics student population: Findings from a nationally representative sample of first-time college entrants*. Paper prepared for the Workshop on Increasing Student Success in Developmental Mathematics, Washington, DC.

Jenkins, D., & Bailey, T. (2017). *Early momentum metrics: Why they matter for college improvement* (CCRC Research Brief No. 65). New York, NY: CCRC: Community College Research Center at Teachers College, Columbia University. https://ccrc.tc.columbia.edu/media/k2/attachments/early-momentum-metrics-college-improvement.pdf

Lin, Y., Fay, M., & Fink, J. (2020). *Stratified trajectories: Charting equity gaps in program pathways among community college students* (CCRC Working Paper No. 126). New York, NY: CCRC: Community College Research Center at Teachers College, Columbia University. https://ccrc.tc.columbia.edu/media/k2/attachments/stratified-trajectories-program-pathways.pdf

Logue A.W., Douglas D., & Watanabe-Rose M. (2019). Corequisite mathematics remediation: Results over time and in different contexts. *Educational Evaluation and Policy Analysis*, 41(3), 294–315.

Logue, A. W., Watanabe-Rose, M., & Douglas, D. (2016). Should students assessed as needing remedial mathematics take college-level quantitative courses instead? A randomized controlled trial. *Educational Evaluation and Policy Analysis*, 38(3), 578–598.

Mathematical Association of America [MAA]. (2020a). *Guideline Statement #3: Best Practices for Student Support*. "Best Practices" Statements from the MAA Committee on Faculty and Departments. https://www.maa.org/node/2166166

Mathematical Association of America [MAA]. (2020b). *Guideline Statement #4: Best Practices for Curriculum and Teaching*. "Best Practices" Statements from the MAA Committee on Faculty and Departments. https://www.maa.org/programs-and-communities/professional-development/committee-on-faculty-and-departments/guideline-statement-4

Mathematical Association of America [MAA]. (2021). *Guideline Statement #6: Best Practices for Justice, Equity, Diversity, and Inclusion*. "Best Practices" Statements from the MAA Committee on Faculty and Departments. https://www.maa.org/node/3487772/

National Governors Association Center for Best Practices, Council of Chief State School Officers. (2010). *Common core state standards for mathematics*. Washington D.C.: Author. http://www.corestandards.org/Math/

continued on page 20

Ran, F. X., & Lin, Y. (2019). *The effects of corequisite remediation: Evidence from a statewide reform in Tennessee* (CCRC Working Paper No. 115). New York, NY: CCRC: Community College Research Center at Teachers College, Columbia University. https://ccrc.tc.columbia.edu/publications/e!ects-corequisite-remediation-tennessee.html

Richardson, C. (2021). *Corequisite Mathematics Toolkit: Tools and resources for the design and implementation of equitable and effective support courses*. The University of Texas at Austin, Charles A. Dana Center: Author. https://strongstart.org/resource/corequisite-mathematics-toolkit/

Saxe, K., & Braddy, L. (Eds.). (2015). *A common vision for undergraduate mathematical science programs in 2025*. Washington, DC: Mathematical Association of America.

Transforming Post-Secondary Education in Mathematics. (TPSE Math). (2017). Home page. http://www.tpsemath.org

U.S. Department of Education, Office of Planning, Evaluation and Policy Development. (2017). *Developmental Education: Challenges and Strategies for Reform*, Washington, D.C.: Author. https://www2.ed.gov/about/offices/list/opepd/education-strategies.pdf

Whinnery, E., & Odekar, V. (2021). 50-State comparison: Developmental education policies. Education Commission of the United States. https://www.ecs.org/50-state-comparison-developmental-education-policies/

MEDIA COLUMN

In addition to longer reviews for the Media Column, we invite you to watch for and submit short snippets of instances of women in mathematics in the media (WIMM Watch). Please submit to the Media Column Editors: Sarah J. Greenwald, Appalachian State University, appalachianawm@appstate.edu and Alice Silverberg, University of California, Irvine, asilverb@math.uci.edu.

Marry Me Movie Review

Saida Atmaca, PS/IS 49 The Dorothy Bonawit Kole School

This past summer, on my way home from Europe, during a very long plane ride, I had the chance to watch the movie *Marry Me*. I had heard that the plot included a math teacher, which had caught my attention, so when I saw the movie as one of the options in the menu, I used the opportunity (and the abundance of hours) to watch it. The movie was released in February 2022 (after two delays due to the COVID-19 pandemic). It is an easy to watch romantic comedy that received mixed reviews, with an average review of 6.1/10 in Internet Movie Database (IMDb). The main characters are superstar Kat Valdez (Jennifer Lopez) and math teacher Charlie Gilbert (Owen Wilson).

Overall, *Marry Me* was predictable and somewhat entertaining if you just want to pass the time. I really loved the fact that they included a math teacher in the story. I also liked the fact that a teacher was portrayed as a human being, with his own struggles. Very often students, parents, etc. forget that teachers are humans who have a life outside of the school building. We too go through some tough days, have our own struggles, and have responsibilities that require our attention outside the school day. In the movie, Charlie was a single dad working hard to impress his daughter as she enters the teenage years and doesn't really think that he is cool anymore. However, sometimes the main attention of Charlie in the movie is his daughter rather than mathematics or his other students, so that was a little discouraging. I guess it reinforces the notion that a teacher should not be teaching their own children. Overall though, it was a relief that the movie portrayed doing math as fun and exciting. As a woman, it was also important for me to portray girls who enjoy doing math and were having a great time solving math problems. Growing up, I enjoyed mathematics. It came very naturally to me; however I never showed it off. I acted very modestly and although I did get excited about solving a math problem, I mostly kept the excitement to myself because I felt it was not okay for me, as a girl, to display such emotions, when it came to math at least. So seeing the excitement level high was awesome. However, I thought of two major things that could have been done better. One, the school population (students and teachers) could have been more diverse. Second, the way the math coach was portrayed in the competition near the end of the film could have been more positive.

The setting of the movie is New York City (NYC) and Charlie's school is located in the borough of Brooklyn.

Watching the movie as an NYC math teacher, it wasn't clear to me whether this was a middle school or a high school, and whether it was a public or private school. "Fall semi-formal" dances are not very common in NYC public schools. They are more typical of either private or suburban schools. In any case, I felt that the diversity of the school does not best represent NYC public schools. While there is some representation of ethnicities and races represented in the math club, that is not very true of the students in the hallways and at the dance. Most of the students were white with few Asian and Indian students. There is only one Black girl, Esther (Taliyah Whitaker), who takes Charlie's daughter Lou (Chloe Coleman) under her wing at the beginning of her time in the new school. I did like the inclusion of LGBTQ community in the population of the school though. This was evident in the couples that were arriving at the dance.

The diversity of the staff in the school was not evident. The main teachers in the storyline, Charlie, his friend Parker (Sarah Silverman), and the music teacher Jonathan (Stephen Wallem), are all white. There was more diversity at the math competition though, as the adult who scored this contest in Peoria is Black, and the rival coach was played by Utkarsh Ambudkar, whom imdb.com calls "an American actor of South Asian/Indian heritage" but who doesn't show up until the end of the movie. While there was some representation of the Latina/o community in the movie as some of the dialogue spoken and songs sung by Kat and Bastian (Maluma) were in Spanish, I would have liked to see it being represented in the academic setting as well. In addition, while the students have a good gender diversity, the coaches are all male. I did like, though, that the movie portrayed girls being excited to be part of a math club. There was also inclusion of students with disabilities in the math club and I was happy with the girls playing a major role in the math team.

In the duration of the movie there were a couple of scenes of the math team, Math Pi-thons, practicing for the upcoming competition in Peoria. I did like the progression of the types of questions the team was practicing. In one meeting, they seem to be working on prime factorization. In subsequent practices, there are a variety of questions displayed on the board such as the area of an annulus, with a related equation that solves for a variable. Finally in the competition, Lou gets asked a question about a circle inscribed inside an ellipse. I felt they were appropriate middle school level competition questions. One thing I didn't like from the math team meetings was the drill of a student reciting the digits of π (and some of the latter digits were incorrect anyways). While some schools still hold competitions of remembering the digits of π, usually on March 14, aka Pi Day, I think that is such an undervaluation of the beauty of π, its importance in the mathematics world, and the beauty of mathematics in general. Thus, I don't think it should have been part of the movie.

An important point that I'd like to mention is the environment at the math competition. Charlie's team makes it to the sudden death round, meaning that once a team gets the question wrong the other team wins. On a side note, the sudden death round doesn't really work that way. If the team that goes first doesn't answer the question correctly, the second team must go next and answer the question correctly in order for the second team to be declared a champion. Going back to the competition, Charlie's daughter is next and as the announcer lets them know what will happen next, the opposing team's coach talks to Charlie and tries to talk him into conceding as a way to protect Lou since the year before she had gotten bad stage fright and froze on stage and therefore couldn't answer her question. I understand the movie producers are trying to make a dramatic scene but that is very untypical of students and coaches in math competitions. I have been in many math competitions at the county and city level such as MATHCOUNTS, Pi5NY, and MoMathlon. In all of them, students are always cheering for everyone on stage and at the very least supporting their own teammates. I have never seen a student trying to make an opposing team member uncomfortable or to ridicule them in any way. Coaches also never interact in a negative or discouraging way. In individual and group rounds of the competitions, coaches usually proctor or help grade. In the final sudden death rounds, coaches (and parents) usually sit with their teams and cheer all the students on stage. Although there could be friendly competition between coaches, teachers and coaches never want anything less than the best for not just their students, but all the children they come in contact with.

A final comment on the movie is the presence of a few "adult themed" scenes. One of them is towards the beginning of the movie when Charlie, Parker and Lou arrive at the concert. The song "Church" that Kat sings to kick off her wedding concert might be a little offensive to some religious groups as the costumes and dances are a bit provocative for the church theme. The second scene is one of the times when Kat visits Charlie at school after they become romantically involved. It shows Kat closing the blinds to the classroom and leaves the rest to the imagination. That is not an association that anyone would like to have with a classroom setting. Therefore, parents will need to make their own decision whether or not it is appropriate for their children.

AWM at JMM 2023
Joint Mathematics Meetings, Boston, MA

Hynes Convention Center, Boston Marriott Hotel, & Boston Sheraton Hotel
January 4 – 7, 2023

For a pdf of AWM events at JMM 2023, with additional details, see
https://awm-math.org/wp-content/uploads/2022/11/AWM-Events-at-the-2023-JMM.pdf.

Tuesday, January 3, 2023 **9:00 a.m. – 1:30 p.m.**	AWM Executive Committee Meeting Beacon D, Sheraton Boston Hotel
Wednesday, January 4, 2023 **8:00 a.m. – 12:00 p.m.**	AWM Special Session on Celebrating the Mathematical Contributions of the AWM I 311, Hynes Convention Center
Wednesday, January 4, 2023 **9:00 a.m. – 12:00 p.m.**	AMS-AWM Special Session on Complex and Arithmetic Dynamical Systems I 303, Hynes Convention Center
Wednesday, January 4, 2023 **2:30 p.m. – 5:30 p.m.**	AMS-AWM Special Session on Complex and Arithmetic Dynamical Systems II 303, Hynes Convention Center
Wednesday, January 4, 2023 **3:45 p.m. – 4:15 p.m.**	AWM Business Meeting 306, Hynes Convention Center
Wednesday, January 4, 2023 **4:25 p.m. – 5:25 p.m.**	Joint Prize Session Ballroom AB, Hynes Convention Center
Thursday, January 5, 2023 **8:00 a.m. – 12:00 p.m.**	AWM Special Session on Recent Developments in the Analysis of Local and Nonlocal PDFs I 102, Hynes Convention Center
Thursday, January 5, 2023 **10:05 a.m. – 11:05 a.m.**	AWM-AMS Noether Lecture Ballroom AB, Hynes Convention Center
Thursday, January 5, 2023 **1:00 p.m. – 2:30 p.m.**	Joint Committee on Women Panel 311, Hynes Convention Center
Thursday, January 5, 2023 **2:00 p.m. – 5:00 p.m.**	AMS-AWM Special Session on Complex and Arithmetic Dynamical Systems III 303, Hynes Convention Center
Thursday, January 5, 2023 **3:00 p.m. – 4:00 p.m.**	AWM Panel: Women in Math Leadership 200, Hynes Convention Center
Friday, January 6, 2023 **1:00 p.m. – 5:00 p.m.**	AWM Special Session on Women in Graph Theory I 210, Hynes Convention Center

Friday, January 6, 2023 **1:00 p.m.–5:00 p.m.**	AWM Special Session on Women in Graph Theory I 210, Hynes Convention Center
Friday, January 6, 2023 **2:15 p.m.–3:40 p.m.**	AWM Panel: Non-Traditional Academic Careers in Math 103, Hynes Convention Center
Friday, January 6, 2023 **5:00 p.m.–6:30 p.m.**	AWM Reception and Awards Presentation Constitution A, Sheraton
Saturday, January 7, 2023 **8:00 a.m.–11:00 a.m.**	AWM Special Session on Women, Art, and Mathematics: Mathematics in the Literary Arts and Pedagogy in Creative Settings I 210, Hynes Convention Center
Saturday, January 7, 2023 **8:00 a.m.–12:00 p.m.**	AWM Special Session on Women in Graph Theory II 302, Hynes Convention Center
Saturday, January 7, 2023 **9:00 a.m.–11:30 a.m.**	Association for Women in Mathematics Special Session on AWM Workshop: Women in Commutative Algebra (WiCA) I Constitution B, Sheraton Boston Hotel
Saturday, January 7, 2023 **1:00 p.m.–5:00 p.m.**	AWM Special Session on Women in Graph Theory III 302, Hynes Convention Center
Saturday, January 7, 2023 **1:00 p.m.–4:00 p.m.**	AWM Special Session on Women, Art, and Mathematics: Mathematics in the Literary Arts and Pedagogy in Creative Settings II 210, Hynes Convention Center
Saturday, January 7, 2023 **1:30 p.m.–4:30 p.m.**	Association for Women in Mathematics Special Session on AWM Workshop: Women in Commutative Algebra (WiCA) II Constitution B, Sheraton Boston Hotel

Many Thanks

Special thanks to the AWM 2023 JMM Organizing Committee: Catherine Bénéteau (University of Southern Florida), Matthew Krauel (California State University, Sacramento), Alice Mark (Rutgers University), Kelly McKinnie (University of Montana), Claudia Miller (Syracuse University), Julie Rana (Lawrence University), Radmila Sazdanovic (North Carolina State University), Chair, Janet Striuli (Fairfield University), and Isabel Vogt (University of Washington). Thanks also to the many other committed volunteers that make AWM events great. The AWM Workshop was organized by the Research Network WiCA and is supported by NSF-DMS Grant #2113506. Participants in the Graduate Student Poster Session are supported by NSF-DMS #1953892. One poster presenter will be selected to attend a workshop at one of the Mathematical Sciences Institutes. This prize is made possible by the Mathematical Sciences Institutes Diversity Committee.

2024 AWM Prizes and Awards Call for Nominations

AWM will accept nominations for the following AWM prizes and awards between April 1 and **May 15, 2023** on mathprograms.org. They will be presented during the Joint Prize Session at the Joint Mathematics Meetings in San Francisco in 2024.

2024 Class of AWM Fellows

The Association of Women in Mathematics Fellows Program recognizes members of any gender who have demonstrated a sustained commitment to the support and advancement of women in the mathematical sciences, consistent with the AWM mission: "to create a community in which women and girls can thrive in their mathematical endeavors, and to promote equitable opportunity and treatment of women and others of marginalized genders and gender identities across the mathematical sciences." For more information visit https://awm-math.org/awards/awm-fellows/.

2024 Louise Hay Award

The Louise Hay Award for Contributions to Mathematics Education recognizes outstanding achievements in any area of mathematics education, to be interpreted in the broadest possible sense. The annual presentation of this award is intended to highlight the importance of mathematics education and to evoke the memory of all that Hay exemplified as a teacher, scholar, administrator, and human being. For more information visit https://awm-math.org/awards/hay-award/.

2024 M. Gweneth Humphreys Award

The M. Gweneth Humphreys Award recognizes outstanding mentorship activities. This prize is awarded to a mathematics teacher who has encouraged women undergraduate students to pursue mathematical careers and/or the study of mathematics at the graduate level. M. Gweneth Humphreys (1911–2006) taught mathematics to women for her entire career, first at Mount St. Scholastica College, then for several years at Sophie Newcomb College, and finally for over thirty years at Randolph-Macon Woman's College. This award, funded by contributions from her former students and colleagues at Randolph-Macon, recognizes her commitment to and her profound influence on undergraduate students of mathematics. For more information visit https://awm-math.org/awards/humphreys-award/.

2024 Microsoft Research Prize in Algebra and Number Theory

The AWM Microsoft Research Prize in Algebra and Number Theory highlights outstanding research by a woman early in her career in algebra or number theory. Made possible by a generous contribution from Microsoft Research, this prize has been awarded every other year since 2014. For more information visit https://awm-math.org/awards/awm-microsoft-research-prize/.

2024 Sadosky Research Prize in Analysis

The AWM Sadosky Research Prize in Analysis recognizes exceptional research in analysis by a woman early in her career. The prize, awarded in even years since 2014, is named for Cora Sadosky, a former president of AWM and made possible by generous contributions from Cora's husband Daniel J. Goldstein, daughter Cora Sol Goldstein, friends Judy and Paul S. Green and Concepción Ballester. For more information visit https://awm-math.org/awards/awm-sadosky-research-prize/.

CALL FOR PROPOSALS

Mathematical Endeavors Revitalization Program

Recognizing that professional effects of the COVID-19 pandemic were felt most strongly by women, members of other marginalized genders, and members of minoritized racial and ethnic groups, the Association for Women in Mathematics (AWM) has set aside a pool of funds to help revitalize professional activities of its membership. AWM will make awards in the amount of either $3000 or $7000 per person to subsidize any cost incurred in support of re-engaging in mathematical endeavors that were disrupted by the pandemic, including travel to visit collaborators, funding for childcare, cost of an off-site location to work free from distraction, fees for professional training, and more. The award will be in the form of a stipend to be paid directly to the awardee.[1] The award period is from the date of initial award notification until September 15, 2024. Only one proposal per person will be considered. Deadline: **January 15, 2023**

Eligibility criteria:

- AWM member on January 15, 2023
- Active in a career in the mathematical sciences or related field (where a career is defined to begin in the first year of a PhD program) on March 1, 2020

To apply, please submit a proposal via google form. You will be asked to provide:

- Personal details (name, address, position, field, demographics, etc.)
- Budget level for project ($3000 or $7000)
- Explanation of how your mathematical career was disrupted by the pandemic
- Explanation of the proposed project
- Timeline for project and project activities, being as specific as possible
- Explanation for how this project will help address the pandemic disruption on your career
- Description of other funding available to you (e.g., external private or federal grants, departmental or institutional funding)
- CV (for AWM records only—will not be included in review material)

Proposals will be reviewed based on expressed need for financial support, degree of professional disruption from the pandemic, and potential for positive effect on career if funded. All reviews will be doubly anonymous both to increase fairness of the review and also to protect confidentiality of pandemic disruption.

Note that your proposal will be compared with other proposals at the same budget level.

Successful proposals will require a letter of commitment at the start of the award period stating the agreed upon funded activities, the requirement for a final report, and committing to acknowledge AWM in any presentations, products, or other materials related to the project supported by this grant.

At the end of the funding period, all recipients will be required to submit a short report. The report will ask for a brief description of:

- Activities you completed as part of the grant
- Any presentations, products, or other materials supported by the grant
- Plans for future work
- Overall value of the grant to you and its impact on your professional life

Note that grant recipients who fail to submit a final report may not be eligible for future funding from AWM.

[1] The stipend may be subject to state and federal income tax.

Announcements

National Math Major Survey

The National Science Foundation Division of Equity for Excellence in STEM supports and promotes activities that seek to strengthen STEM education for underserved communities, broaden their participation in the workforce, and add to our knowledge base about programs of inclusion. The Undergraduate Knowledge of the Mathematics Graduate School Application Process project is funded by this division (Knowledge-GAP, NSF Award # 2126018) and aims to illuminate how undergraduate student knowledge about the graduate school application and admissions processes acts as a barrier to earning advanced degrees in mathematics for students historically underrepresented in STEM disciplines. The project aims to answer several broad research questions: (1) What percentage of undergraduate mathematics majors are interested in going to graduate school in mathematics? What do undergraduate mathematics majors know about the graduate school application process? (2) What features of mathematics departments and universities contribute to undergraduate knowledge about graduate mathematics programs and their application process? (3) Do mathematics majors have access to the resources needed to apply to graduate mathematics programs? (4) Do knowledge of the graduate school application process and access to application resources differ by socioeconomic status, ethnicity, and gender of the students? The evidence expected to be produced by this research could be used to create or enhance strategies for improving student access to knowledge about the graduate school application process and could broaden participation of underrepresented students in graduate mathematics.

Principal Investigator Tim McEldowney is inviting undergraduate mathematics majors (ideally in their 3rd or 4th year) to complete a survey. If you are an undergraduate who is interested or a faculty member who could share with your students, please contact Tim directly at tim.mceldowney@mail.wvu.edu.

New AMS-Simons Grants Fund PUI Faculty Research

Mathematics faculty members at primarily undergraduate institutions (PUIs): If you have an active research portfolio, the American Mathematical Society and the Simons Foundation may have $9000 in funding for you. The new AMS-Simons Research Enhancement Grants for PUI Faculty will foster and support research collaboration by mathematicians employed full-time at institutions which do not award doctoral degrees in the mathematical sciences. Applications on Mathprograms.org will be open from January 2, 2023 to March 20, 2023.

Each year for three years, awardees will receive $3000 to support research-related activities. In addition, annually for three years, the awardee's institution will receive $300 for administrative costs and the awardee's department will receive $300 in discretionary funds.

"Faculty at all types of institutions actively engage in mathematics research, and modest amounts of grant funding can have an outsized effect on the success of a project," said Bryna Kra, incoming AMS president. "I'm excited to see the AMS partner with the Simons Foundation to support the research of mathematicians at primarily undergraduate institutions with the creation of flexible grants funding visits for collaborations, conference travel, and other research-related expenses."

Starting in 2023, the AMS expects to award at least 40 grants annually, funded by the Simons Foundation. Funds for the first round of grants will be disbursed in July 2023. Tenured and tenure-track mathematicians with an active research program who have earned a PhD degree at least five years before the start of the grant will be eligible to apply.

"Impactful mathematics research is being conducted by faculty at primarily undergraduate institutions across the country, and the AMS is so pleased that the Simons Foundation is supporting this work," said Catherine Roberts, AMS executive director.

For more information, email ams-simons@ams.org.

For Women in Science Fellowship

The L'Oréal USA for Women in Science fellowship program honors female scientists at a critical stage in their careers. You could be awarded $60,000 for research in a STEM field. Since 2003, 95 postdoctoral women scientists have been awarded almost $5 million in grants. L'Oréal is seeking five exceptional female scientists looking to advance their research and serve as role models for the next generation of girls in STEM.

Candidates must have completed their PhD and have started in their postdoctoral research position by the application deadline. They must be a US citizen or permanent resident to apply. Applications are due by 5:00 pm ET on **January 27, 2023**.

Visit https://www.loreal.com/en/usa/pages/group/fwis/ to learn more and apply.

8th Lake Michigan Workshop on Combinatorics and Graph Theory

May 13–14 2023, University of Notre Dame

https://sites.nd.edu/lmw8-2023/

Tutorial lectures will be given by **Stephanie van Willigenburg** (UBC) and **Will Perkins** (Georgia Tech). We hope to have funding available for early-career participants; see website in early spring for details.

BSM
BUDAPEST SEMESTERS IN MATHEMATICS

Spend a semester (or two) studying mathematics with eminent Hungarian scholar-teachers in Budapest, Hungary. Join a select group of math-minded undergraduates from across the United States and Canada for a fall, spring, or summer semester. Founded in 1985 by friends of Paul Erdös, the program encourages student creativity, a key element in the highly successful Hungarian method of mathematics instruction. Follow in the footsteps of more than 2,500 undergraduates who have participated in Budapest Semesters in Mathematics, the preeminent study abroad program in mathematics.

BSM classes are held at the College International, a Hungarian-based educational institution focusing on international students studying in Budapest. Fall and spring semesters comprise 14 weeks of teaching plus one week of exams. The summer program is eight weeks long.

Eligible students typically:
• have at least sophomore status
• are in good academic standing
• have completed one semester of Real Analysis or Abstract Algebra by the start of the program
• are highly motivated to study mathematics

Selection for the program is competitive and based on the following 3 application components:
• 1 BSM application (electronic)
• 2 mathematics faculty recommendation letters
• 1 official transcript

We accept applications on a rolling basis. Applications are reviewed as they are completed until 2/3 of the class is filled; thereafter all applications are held until the application deadline.

Application Deadlines:
Fall Semester – April 1 (also the deadline for participating in both Fall & Spring semesters)
Spring Semester – October 15
Summer Semester – March 1

Apply here: https://www.budapestsemesters.com/

Budapest Semesters in Mathematics, North American Office
1520 St. Olaf Avenue
Northfield, MN 55057
Email: budapestsemesters@gmail.com
Phone: 507-786-3114

AWM
PO Box 40876
Providence, RI 02940

NONPROFIT ORG
U.S. POSTAGE PAID
MERRIFIELD, VA
PERMIT NO. 2333

ASSOCIATION FOR WOMEN IN MATHEMATICS

Printed in the U.S.A.

ASSOCIATION FOR WOMEN IN MATHEMATICS

Volume 53, Number 1, January–February 2023

ADDRESS CORRECTION FORM

☐ Please change my address to:
☐ Please send membership information to my colleague listed below:
☐ No forwarding address known for the individual listed below (enclose copy of label):
(Please print)

MAIL TO:

AWM
PO Box 40876
Providence, RI 02940

or E-MAIL:

awm@awm-math.org

Name _____

Address _____

City _____ State _____ Zip _____

Country (if not U.S.) _____ E-mail Address _____

Position _____ Institution/Org. _____

Telephone: Home _____ Work _____