

ASSOCIATION FOR  
WOMEN IN MATHEMATICS

# Newsletter

VOLUME 49, NO. 5 • SEPTEMBER–OCTOBER 2019

## The purpose of the Association for Women in Mathematics is

- to encourage women and girls to study and to have active careers in the mathematical sciences, and
- to promote equal opportunity and the equal treatment of women and girls in the mathematical sciences.

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## PRESIDENT'S REPORT

I'd like to start this column by congratulating all the non-winners in mathematics. Why? Because YOU are doing great things and your continued perseverance in mathematics is critical. It is easy to fill a newsletter with articles about a few who have won awards, or just proved a great theorem, but let us not forget that just being an ordinary mathematician is extraordinary. Most of us do not win, most of us get a lot of rejections, fail to prove a lot of theorems, and may not even really understand the detail of the research of the person two doors down the hall. In recent years the AWM has created many new awards and a Fellows program so that more women are recognized for their accomplishments and receive the public affirmation of success and merit pay that often accompanies national awards. This is great for the winners. But we know that women are more likely to suffer from the imposter syndrome and generally underestimate their abilities. So I want to make sure we (the AWM) are doing right by the non-winners too. We all could use a confidence boost!

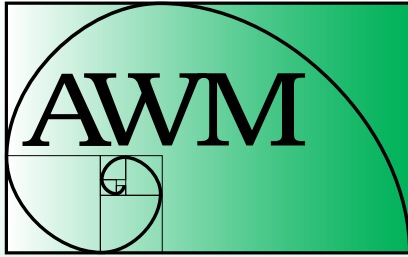
Let me tell you about my activities in the last month. The group projects I engaged with at a recent workshop turned out to be either trivial or already solved. My grant proposal was rejected, my backlog of papers to referee got longer. In other words, I'm having a pretty normal summer. I remain hopeful that my next idea will be a good one, that the Women in Graph Theory workshop next month will lead to new collaborations and a paper or two. And most important, I remain hopeful that the young people I've worked with will weather the usual tumult of a mathematics career and carry on. No matter how mediocre I feel, they see me as a model of success (hey, even if they think I stink it's a win—if *she's good enough I guess I am too*).

A couple of years ago the *Washington Post* ran an article entitled "Women who are elite mathematicians are less likely than men to believe they are elite mathematicians."<sup>1</sup> The article discusses how the underrepresentation of women in STEM may in part be due to women underestimating their abilities, using an example about SAT scores. Similarly, most of us have heard that men apply for a job/promotion when they meet just 60% of the qualifications, but women apply only if they meet fully 100% of them.<sup>2</sup> There are many studies that show that competition

*continued on page 2*

<sup>1</sup>[https://www.washingtonpost.com/news/wonk/wp/2017/08/08/women-who-are-elite-mathematicians-are-less-likely-than-men-to-believe-theyre-elite-mathematicians/?noredirect=on&utm\\_term=.1c68c53bbfe9](https://www.washingtonpost.com/news/wonk/wp/2017/08/08/women-who-are-elite-mathematicians-are-less-likely-than-men-to-believe-theyre-elite-mathematicians/?noredirect=on&utm_term=.1c68c53bbfe9)

<sup>2</sup><https://www.forbes.com/sites/womensmedia/2014/04/28/act-now-to-shrink-the-confidence-gap/#6558af915c41>



**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.

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**PRESIDENT'S REPORT** *continued from page 1*

does not motivate women as much as it motivates men.<sup>3</sup> Men are often more eager to compete, and their performance improves with competition. Not necessarily so for women. Thus I applaud ALL women who work in our competitive field and believe that the robust range of programs the AWM engages in are critical to encouraging all women that mathematics is possible for them.

AWM does so much more than awards. Let me tout just a few other kinds of AWM activities. We continue to run workshops for graduate students and sponsor sessions at major meetings (SIAM and JMM). We do outreach: AWM ran a booth at the National Math Festival (see the article in the preceding newsletter). We enable collaborative research with the NSF sponsored "Women in" research communities. Our Springer book series now has 20 titles in a wide range of mathematical and math education areas. We work toward changing the climate in our workplaces (NSF-funded Moving Towards Action Workshop coming this year to the JMM) and affecting national policy (AWM was mentioned on the House floor by Representative Eddie Bernice Johnson in her opening statement proposing the "Combating Sexual Harassment in Sciences Act of 2019"). All of these activities, and many more, empower and inspire girls and women in the mathematical sciences.

**It's membership renewal time!**

Speaking of all the things we do, it's time to renew your membership! As is currently true for many nonprofits and professional organizations, AWM membership is down. Membership dollars are the major source of support for all of our programming. We need people who believe in our mission to support us, by joining us. Join or renew by logging in to (or creating) your AWM account at [AWM-math.org](http://AWM-math.org). While you're there check out our new AWM membership directory. You can control what information appears in your listing under the My Account Tab. You can easily look for other AWM members by a variety of search criteria. Notice someone you know is not currently a member? Why not give them a one-year membership so they learn more about us? First year regular membership is only \$35.

Your membership dollars encourage women and girls, both winners and non-winners, to study and to have active careers in the mathematical sciences, and to promote equal opportunity and equal treatment. That's a win-win for the mathematical community.

I look forward to hearing your thoughts and working with our community.

Ruth Haas  
July 23, 2019  
Mānoa, HI



Ruth Haas

<sup>3</sup> See for example Gender and Competition, Niederle and Verterlund in *Annu. Rev. Econ.* 2011 3:601-30 (doi: 10.1146/annurev-economics-111809-125122).

## PRESIDENTS' REFLECTIONS

Column Editors: Janet Beery, University of Redlands; Francesca Bernardi, Florida State University; Kayla M. Bicol, University of Houston; Cathy Kessel, consultant

This is the fifth in a series of “Presidents’ Reflections,” articles by past presidents of the AWM that are intended to help us take stock of where we are and where we should be going, and to consider what we want the organization to be at its 50th anniversary. As always, the *AWM Newsletter* welcomes your suggestions and comments in letters to the editor.

Bhama Srinivasan was the fifth president of AWM (1981–1983). She gives a brief autobiography in “In Her Own Words: Six Mathematicians Comment on Their Lives and Careers,” *Notices of the American Mathematical Society* (<http://www.ams.org/journals/notices/199109/199109FullIssue.pdf>). For more about Srinivasan, see her web page at the University of Illinois (<http://homepages.math.uic.edu/~srinivas/>) or her Noether lecturer profile (<https://awm-math.org/awards/noether-lectures/noether-lectures-1990/>).

### Reflections of a Former President

*Bhama Srinivasan*

The first two presidents of AWM were Mary Gray and Alice Schafer, and it was clear that theirs would be a tough act to follow. Thus when the time came to choose a new president, there appeared to be no one willing to be a candidate. Everyone that was contacted, including me, declined due to time pressures.

One evening in 1981, I got a call from Alice saying “That’s it, girl. You are it. Have a drink and go to bed.” It was clear to me what “it” was and that “No” would not be an answer that Alice would accept!

My term began early in 1981, and I soon went through a “trial by fire” as Alice put it. The reason, a joyful one, was that AWM was planning an Emmy Noether Centennial conference. The trial was that there was a lot of discussion and dissent regarding who the speakers should be. There were two camps: one saying there should only be women speakers, the other saying the speakers should be the best mathematicians, male or female.

I was relieved that a consensus was reached: there would be more female speakers than male speakers. The conference, organized by Rhonda Hughes, was very successful and the proceedings were published by Springer as *Emmy Noether in Bryn Mawr: Proceedings of a Symposium Sponsored by the Association for Women in Mathematics in Honor of Emmy Noether’s 100th Birthday*.

Recently there appears to have been introspection and questioning among some AWM members as to whether there is a role for the organization, since blatant sexism does not seem to exist. My answer would be yes, by observing AWM meetings. Women, especially young women, seem to be more comfortable asking and answering questions at these meetings, and listening to established women speakers is very encouraging to them. Also of course the AWM Receptions at the Joint Mathematics Meetings are very popular!

### 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

Category 1: \$325

Category 2: \$325

Category 3: \$200

See [awm-math.org](http://awm-math.org) for details on free ads, free student memberships, and ad discounts.

### Executive Sponsorship Levels

\$5000+

\$2500–\$4999

\$1000–\$2499

### 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 \$10/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.

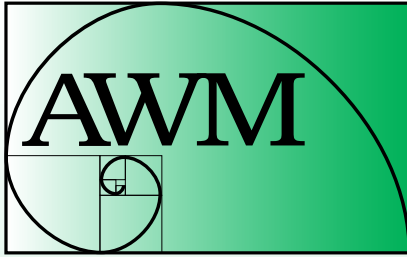
### Newsletter Deadlines

**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

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ASSOCIATION FOR  
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## 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](mailto:webmaster@awm-math.org)

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## AWM DEADLINES

AWM-MAA Falconer Lecture:

Oct. 1, 2019

AWM Alice T. Schafer Prize:

Oct. 1, 2019

AWM Dissertation Prize: Oct. 1, 2019

AWM Travel Grants: Oct. 1, 2019  
and Feb. 1, 2020

Moving Towards Action

Workshop: Oct. 1, 2019

AWM-AMS Noether Lecture:

Oct. 1, 2019

AWM-SIAM Sonia Kovalevsky

Lecture: Oct. 1, 2019

AWM Workshop at SIAM: Oct. 1, 2019

RCCW Proposals: Jan. 1 and July 1, 2020

AWM Essay Contest: Feb. 1, 2020

AWM Mentoring Travel Grants:

Feb. 1, 2020

AWM-Birman Research Prize:

Feb. 1, 2020

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# Birgit Speh Named 2020 Noether Lecturer

The AWM and the AMS are pleased to announce that **Birgit Speh** will deliver the Noether Lecture at the 2020 Joint Mathematics Meetings. Birgit Speh is the Goldwin Smith Professor of Mathematics at Cornell University. AWM established the Emmy Noether Lectures in 1980 to honor women who have made fundamental and sustained contributions to the mathematical sciences.

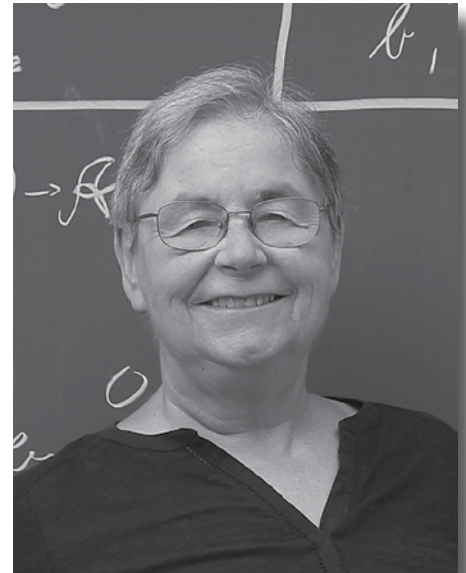
Birgit Speh was born in a small town in the south of Germany not far from Erlangen, the home town of Emmy Noether. After completing her undergraduate education in Heidelberg and Bonn, she received her PhD from MIT in 1977, under the supervision of Bertram Kostant. She held postdoctoral positions at the University of Chicago and the University of Wuppertal before joining the faculty at Cornell University in 1980. In 1983 she became the first woman to earn tenure in the Cornell University Department of Mathematics.

Speh is known for her work on the representation theory of reductive Lie groups and its relationship to automorphic forms and the cohomology of arithmetic groups.

In her thesis she classified the unitary representations of low dimensional general linear groups and then in her early work introduced a special class of unitary representations of general linear groups over the real numbers that now bear her name.

Speh's research over the years has explored connections between unitary representations, automorphic forms, and the geometry of locally symmetric spaces. In recent work, Speh has studied restrictions of representations of reductive groups to non-compact reductive subgroups. This work on "symmetry breaking" has led, in joint work with Kobayashi, to proofs of conjectures of Gross-Prasad for some pairs of orthogonal groups.

Speh has made outstanding research contributions for over 40 years and has been the recipient of many honors and awards, including a Sloan Fellowship in 1981 and a Humboldt Research Award in 1996. In 2006 she was an invited speaker at the International Congress of Mathematicians in Madrid and in 2013 was in the Inaugural Class of Fellows of the American Mathematical Society. She held visiting appointments at the Max Planck Institut für Mathematik in Bonn, the Institute for Advanced Studies in Princeton, MSRI in Berkeley, the Tata Institute in Mumbai and the Graduate School of Mathematical Sciences at the University of Tokyo. Over the last few years, she has spent several



*Birgit Speh. Photo credit:  
Archives of the Mathematisches  
Forschungsinstitut Oberwolfach*

weeks per year at the Mathematisches Forschungsinstitut Oberwolfach in their Research in Pairs program.

*The 2020 Joint Mathematics Meetings will be held January 15–18 in Denver, Colorado. The lecture honors Emmy Noether (1882–1935), one of the great mathematicians of her time. She worked and struggled for what she loved and believed in. Her life and work remain a tremendous inspiration. Recent Noether Lecturers include Barbara Keyfitz, Raman Parimala, Georgia Benkart, Wen-Ching Winnie Li, Karen E. Smith, Lisa Jeffrey, Jill Pipher, and Bryna Kra.*

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## STUDENT CHAPTER CORNER

Coordinator: Emily Sergel, [esergel@math.upenn.edu](mailto:esergel@math.upenn.edu)

### AWM Student Chapter Awards

AWM sponsored its annual Student Chapter Awards competition, with awards given in four categories: scientific excellence, professional development, fundraising/sustainability and community outreach. We thank all who participated this year for their attention to their proposals and congratulate them on the strength of the activities they are pursuing to create productive environments for women in mathematics. The four chapter winners were recognized at MathFest, July 31–August 3 in Cincinnati, Ohio.

#### University of Kentucky, Winner of the Community Outreach Category

The AWM Student Chapter at the University of Kentucky is receiving this award in recognition of its outstanding work in developing the Appalachian Initiative for Mathematics and for its concerted effort at integrating often isolated undergraduate women into the larger university mathematical community. A goal of the Appalachian Initiative is to increase diversity by reaching out to neighboring schools without graduate programs to give their students first-hand information about graduate school and research mathematics. The initiative serves to create a larger, more cohesive environment for the nearby cohort of undergraduates and faculty, while also providing the University of Kentucky's graduate students with opportunities to present their own research projects to undergraduate audiences, to act as mentors, and to establish relationships with faculty at different institutions.

#### Florida Atlantic University, Winner of the Fundraising/Sustainability Category

The AWM Student Chapter at Florida Atlantic University is receiving this award for a second consecutive year, this time in recognition of its winning a Postdoctoral Ambassadorship from the Women and Mathematics Program (WAM) at the Institute for Advanced Study, made possible by the generous financial support of Lisa Simonyi. Augmenting this with contributions from the FAU Department of Mathematical Sciences and the Charles E. Schmidt College of Science Office of the Dean, they raised \$4,500 to fund the very first Florida Women in Mathematics Day and follow-up activities. FWIMD was a one-day conference designed to promote women in mathematics, including a half-day immersion experience for girls interested in mathematics. The conference featured research talks, networking opportunities, mentoring across all levels, a career panel, and a hands-on mathematics activity for local high school students.

#### Colorado School of Mines, Winner of the Professional Development Category

The AWM Student Chapter at the Colorado School of Mines is receiving this award in recognition of the breadth and success of its program to develop students' professional involvement in mathematics. The chapter does this through workshops, panels, discussions, and social events on a biweekly schedule, providing opportunities for students interested in a career in mathematics and a space for students to feel comfortable in discussing topics related to women in mathematics. Their goal is not only to expose students to a variety of different career options, mathematical paths, and general professional advice, but also to empower them with the professional skills and confidence they will need as they move into the next stages of their careers.

#### University of Houston, Winner of the Scientific Excellence Category

The AWM Student Chapter at the University of Houston is receiving this award for organizing and presenting the highly distinguished 3rd Annual Texas Women in Mathematics Symposium (TWIMS). This is a regional

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conference that has rotated around universities in the Texas area since 2016. This past year it hosted an inclusive group of over 70 attendees. Conference activities included 19 research talks (including a plenary talk by Professor Sunčica Čanić), 8 poster presenters, a salary negotiation workshop, a career panel of academics and industrial professionals, and breakout sessions on applying for graduate school, selecting an advisor, work/life balance, maternity leave in academia, and ideas for AWM student chapter activities. TWIMS 2018 was financially supported by UH College of Natural Sciences and Mathematics, UH Department of Mathematics, and the Mathematical Association of America (MAA) Tensor Women and Mathematics Grant.

**Student Chapter Awards 2020:** What projects, events, or programs could your student chapter undertake in this new school year? We love hearing about and featuring these programs. And be sure to nominate your institution for the 2020 Student Chapter Awards.

## Sonia Kovalevsky Days: The Potential to Inspire

*Laura P. Schaposnik and James Unwin, University of Illinois at Chicago*

Sonia Kovalevsky overcame adversity to become the first woman to receive a PhD in mathematics and has since become a role model for young women interested in math and science. AWM members have organized Sonia Kovalevsky (SK) Days at colleges and universities throughout the country for almost three decades; the days typically consist of a program of workshops, talks, and problem solving sessions designed for students aged 7–17. The activities of the SK Days are intended to encourage young women to continue their studies in mathematics and to help them learn about educational possibilities.

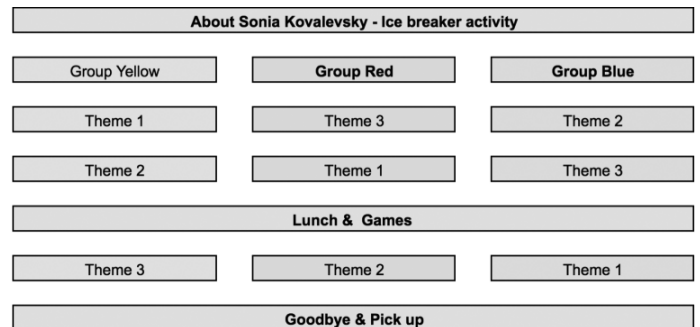
With some guidance, organizing these events can be done very smoothly, and the whole experience can be extremely rewarding not only for the students, but also for the organizers and volunteer helpers. Indeed, witnessing the enthusiasm of the students for learning new mathematics is priceless. In what follows we would like to give some advice on how to make these events successful and encourage colleagues to host similar series of events at their institutions.

Most of what we will explain here is based on our experience running the SK Days at the University of Illinois

at Chicago. A website for the Sonia Kovalevsky Days at UIC, which we have run annually since 2015, is hosted at: <http://schapos.people.uic.edu/Sonia.html>. The site includes an educational paper containing material for running different outreach events for young students. We ourselves learned a lot about how to run successful events from Michelle Delcourt and her volunteers during our time together at UIUC.

**The structure of the day.** After a short registration period during which parents sign any relevant forms, our events begin with one of the volunteers giving an introduction to the AWM for the students and accompanying parents and teachers, and a brief presentation on the life and achievements of Sonia Kovalevsky. The presentation focuses in particular on highlighting the remarkable obstacles that Kovalevsky was able to overcome during her life. The students are then presented with some icebreaker activities which allow them to learn each other’s names and to get comfortable in the setting.

After the introduction, participants are separated into groups to do the activities of the day in smaller classrooms—experience has shown that groups of about 12–15 people are best, with one volunteer for every 5 or 6 students. Hence, depending on the number of girls registered, one can have 1, 2 or 3 parallel sessions.



After a few years of modifying the schedule, it seems that sessions of 45 minutes work best, with 5 to 10 minutes breaks in between, and an hour lunch break (typically pizza!). We’ve usually run the program on Saturdays from 10:30 a.m. to 3 p.m., to accommodate families coming from outer Chicago; in a smaller city, the program could be longer.

**Before the event.** There are five main tasks to take care of before the event, which can be done as little as a month in advance. In order of priority these are:

*I. Set the date and book rooms.*

The most successful days will be Saturdays that don’t coincide with holidays or school activities. Contacting a few

parents beforehand to check school calendars has proved to be the most efficient way of choosing the date—once this is done the rooms for the event should be booked. At UIC, we have run these events in May and November.

### *II. Find volunteers.*

It is useful to start looking for volunteers early (sometimes, if volunteers appear first, their schedule can be taken into account when setting the date). This is a great activity for AWM student chapter members. The easiest approach is to reach out to the student chapter and to graduate and undergraduate communities within the mathematics and physics departments—at UIC, we make an effort to include both departments.

The majority of volunteers are usually female students. We try to maximize the opportunities for the young girls to find role models amongst the volunteers, so we prioritize women for the teaching tasks. We also welcome participation by non-female students, but it should be noted that too many volunteers can make the participants shy and the classes less interactive. We have found that two or three volunteers per room is ideal. Finally, universities typically require background checks for anyone working with minors, and the details for those planning to be present during the event must be given to the department officers several weeks in advance.

### *III. Advertise the event.*

A theme for the SK Day should be chosen after setting the date for the event, in order to begin advertising. For this, a poster should be made, as well as a website with the relevant information including date, place, schedule, parking directions, poster, and sign up form (e.g., Google form). Emails to departmental members asking to promote the event have always been very helpful, and contacting the school district offices for them to send an announcement to all schools in the area appears to be the best way to reach a wide range of participants.

### *IV. Secure funding.*

An SK Day can be held with very little funding, most of it being needed for providing lunch—pizzas delivered to the event can make life easier, leading to about \$8 a person. If more funding were available (e.g., through an NSF grant, start-up funds, or the department's outreach program), it could be dedicated to purchasing breakfast treats, pens, small notebooks and stickers with a small poster for the cover. Moreover, giving girls T-shirts with the logo of the SK Day has made participants very happy and allows

volunteers to be recognized. These extra things can add \$10 per participant/volunteer.

### *V. Prepare materials.*

Organizing the SK Day becomes much easier if as much as possible is done some weeks in advance, and this includes taking care of:

- Choice of themes and preparation of notes for volunteers and students
- Event folders with notes, notebook, pens and a few printouts about the AWM and the hosting university's programs
- Leaving survey for students
- Background checks
- Image release forms for parents
- Posters and flyers
- T-shirts for event
- Arrival sign up list of students
- Lunch time entertainment volunteer
- Room and building booking/arrangements

**The themes.** The SK days are organized with one overall theme and three related lectures. Over the years we have found that mixing mathematics with real life problems or geometric ideas is a great way to get students interested. We have now run the following themes:

- Games on Surfaces:
  - (1) Billiards
  - (2) Non-orientable Surfaces
  - (3) Sphere Packing
- Games of Chance:
  - (1) Non-transitive Dice
  - (2) Sums of Dice
  - (3) The Monty Hall Problem
- Knots and Graphs:
  - (1) Graph Colouring
  - (2) Mathematical Knots
  - (3) Bridges of Königsberg
- Mathematics in the Sea:
  - (1) Seaweed Tangles
  - (2) Fractal Coastlines
  - (3) Geometry of Seashells
- Mathematics and Magic:
  - (1) Flexagons
  - (2) Card Tricks
  - (3) Magic Squares

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## STUDENT CHAPTER CORNER *continued from page 7*

Each of these themes should be prepared with a set of notes that include overall goals for the hour, additional bibliography on the subject, and a list of 5–10 problems of different difficulties for the students, particularly to account for the age range. Material for the above subjects and the manner by which it was presented to students and volunteers can be seen at <https://schapos.people.uic.edu/Outreach.html>, and a summary of this year's "Mathematics in the Sea" theme will appear in the next issue of this newsletter.

For some of the classes we gave the students some objects they could take home with them—e.g., for learning about knots and dice we gave them ropes and non-standard dice (made by us). Once the notes for the chosen themes are prepared, it is useful to have an organizational meeting with the volunteers prior to the event.

**During the Event.** When the SK day arrives, it is useful to have the volunteers come an hour earlier to help set up the main room: displaying the sign-up sheet (attendance is usually 50%-70% of those who filled out the Google form), the photo release forms to be signed by parents, the T-shirts and the activity folders. The main room is used for the presentation on Sonia Kovalevsky's life, the ice breaker, the lunch break and final participants' pick up.

During the whole day it is useful for the main organizers to go around the different rooms, taking photos, helping encourage the girls to interact with each other, and

making sure the schedule is being followed and to get lunch set up. At lunch time, someone entertaining the participants can be a highlight—at UIC we have had Lou Kauffman and his students do magic tricks. At the end of the day, the participants are asked to complete a short anonymous questionnaire about their experiences of the event (an example is given at the website), to identify any highlights or weaknesses that might be improved in future events. These surveys are then used to make an Event Report.

**Concluding remarks.** The participants have been universally happy with the event, with 100% positive replies on all aspects of the program every year. Moreover, they have always given a strong indication that they would return to future events and encourage others to participate. Moreover, by mixing volunteers from mathematics and physics, many new friendships have been made. To thank the volunteers, we usually take them for lunch some weeks after the event, to hear about their thoughts on the event and give any career advice they may need.

**Acknowledgements.** The authors thank the Simons Center for Geometry and Physics for hospitality and support. LPS is supported by the Humboldt Foundation and NSF grants DMS 1509693 & CAREER DMS 1749013.

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## 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/awm-grants/travel-grants/>) for details on eligibility and do not hesitate to contact Steven Ferrucci at 401-455-4042 for guidance.

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



## BOOK REVIEW

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

**The Ascent of Mary Somerville in 19th Century Society**, by Elisabetta Strickland, Springer (Springer Biographies), Cham, 2016 and **Einstein's Wife: The Real Story of Mileva Einstein-Marić**, by Allen Esterson and David Cassidy (with essay by Ruth Lewin Sime), The MIT Press, Cambridge, 2019.

*Reviewed by Barbara Lee Keyfitz*

These two books tell the stories of two interesting women, born almost a century apart (Somerville in 1780 and Marić in 1875), whose destinies unfolded in very different ways. Neither book is a full-fledged biography (those exist, from the pens of other biographers). In learning about the life of Mary Somerville, Elisabetta Strickland, an Italian algebraic geometer who is a member of our community, was struck by the evolution of a Scottish country girl with no formal education into a successful scientist who was able to support herself and her family with her professional work, and who spent the final third of her long life (she died in 1872 at the age of 91) in Italy, where she was a friend not only of scientists but of the great men of the Italian political revolution of her day, the Unification of Italy. Her book celebrates both the mathematical and the social success of a remarkable woman who wrote self-deprecatingly, "I never made a discovery myself ... I have perseverance and intelligence, but no genius..." Strickland shows that one can contribute to mathematics even if one does not get any theorems named after one, and, as a rather charming side-note, she plays up the role that Italy, with its beauty and its climate and culture, played in the success of Mary Somerville's professional career and personal story.

Indeed, Mary Somerville's trajectory had an unpromising beginning. She spent her childhood in a small seaport, Burntisland, on the east coast of Scotland, where her father, a naval officer who was often away on voyages, had settled his family. Despite the lack of educational opportunities, she managed somehow to discover that mathematics existed (notably, by finding some algebra puzzles in a fashion magazine). But it looked for a long time as though her life would take the standard path in her generation for an attractive woman of good breeding. Her parents married her off to a cousin when she was 24; she had two children; the cousin/husband (who seems not to have been very sympathetic to

her) died; at the age of 32 she was married off to another cousin, William Somerville, a physician, and had four more children. By the time she was in her late forties, she had traveled in Europe, had dealt with the deaths of three of her children, had met many famous people, and had discovered the works of Poisson, Lagrange, Euler and Laplace (learning French so that she could read those that had not been translated). She had published one short article, "On the Magnetizing Power of the More Refrangible Solar Ray," in a scientific journal.

Then something amazing happened. Henry Brougham (who did so many things in his life, including designing the carriage that goes by that name, that this review will have to refer you to Wikipedia) had founded the Society for the Diffusion of Useful Knowledge, whose mission was to make good books available to the general public. He had the idea of asking Mary Somerville to write a translation and interpretation of Laplace's *Mécanique Céleste*, which he was convinced that she understood at a time when very few people could penetrate it. The result was her first book, *On the Mechanism of the Heavens*. It took her three years to write it, and it was an immense success. It was published in 1831 and was immediately followed by an introductory volume, *A Preliminary Dissertation on....* Together, these works made her famous and brought rewards ranging from the very useful (a government pension of £300 a year) to the fanciful (a request from a shipbuilder to name a new merchant ship after her).

All this is told by Elisabetta Strickland with great verve, and the story continues in style. The Somervilles and their two younger children moved to Italy in 1840, the year Mary turned 60, for the sake of William's health, and the rest of the story unfolds in a whirl of tourism, social contacts, and, of course, continuing publications in the spirit of her first two. Despite some health problems, she was active and alert almost until the end of her long life; she enjoyed a warm relationship with her children; and her marriage to William Somerville appears to have been very happy. He died ten years before she did, and she grieved for him, but she continued to thrive in the company of her friends and her children. The story of her life overturns some myths about the position of women in her time, as she managed to be more or less financially independent and to control where she lived, whom she spent time with, and how she spent her time. Perhaps she benefited from having lived at a time when science was still the province of amateurs, so that even without a university degree, and even in a world where

*continued on page 10*

upper-middle-class women were not expected to be breadwinners, she was able to pursue a satisfying career. Of course, one cannot help but wonder what she might have accomplished had she had the opportunities available to women of our generation. Did she really regret her career as an expositor and interpreter of science rather than as an inventor? Was it a shortage of talent (“genius” as she wrote) that prevented her from making discoveries in physics or mathematics, or was it a lack of teachers who could have inspired her when she was young, as our teachers do now, by pointing out how much remains to be discovered, rather than simply putting into her eager hands the science that was already known? I recommend this short book (which as far as I know is available online only, and can be downloaded by anyone whose university has a contract with Springer) to anyone who would like to know something about Mary Somerville. It would have benefited from some judicious copyediting; but then, the author is a mathematician, not a biographer, and she is not writing in her native language.

Marić’s story, on the other hand, is a sad one, at times almost painful to read. In the 95 years between Mary Somerville’s childhood and hers, much had changed, and much had not. Mileva Marić was born in what is now Serbia, into a middle-class family, and received a good elementary education in schools where it seems to have been recognized that she had unusual talent. Her parents encouraged her desire to enroll in a *gymnasium* (that is, an academic secondary school), which was permitted in some parts of central Europe at that time, but not all, and she finally became a university student at what is now the ETH in Zürich, where women were allowed to study (but very few were enrolled). It was there that she met Albert Einstein, who was four years younger than she, but had entered ETH in the same class.

*Einstein’s Wife*, as its title suggests, is not only a book about Mileva Marić, though. It is a book with a mission, practically a polemic, and that mission is to disprove a “Mileva Story,” popularized in the 1990s and beyond, that she is really the uncredited genius behind much of Einstein’s work. There appears to be no doubt that she was rather badly treated by Einstein, who seems to have fallen in love with her; either did or did not want to marry her when she became pregnant, but in any case was unable to overcome the opposition of his parents; eventually did marry her, but only after she had borne a child out of wedlock who either died or was

taken away for adoption; behaved contemptibly to her when he became involved with another woman; and finally divorced her, leaving her to raise the other two of their children, one of whom suffered from serious mental illness. A brief biography, compiled by one of the authors, David Cassidy, who is a historian of science, takes up the first third of the book. Cassidy does not say how she spent her time during the remaining 29 years of her life after the divorce—she died in 1948, aged 72—other than that she remained in Zürich, looked after her schizophrenic son, and was often ill. Whether she offered her own opinion of the fairness (or otherwise) of the way she was treated, or whether she claimed unacknowledged credit for any of Einstein’s famous work, is not recorded here. It is not clear, from this telling, whether her failure to achieve even modest success was due most to unfair treatment at the hands of one man, to prejudice against women in scientific society in general, or to her own ill-health and the burdens of single-parenthood. A perspective on the difficulties that can contribute to women’s failure to achieve their potential—then and now—is given in a brief essay by Ruth Lewin Sime, a scientist and historian of science, that forms the second section of the book. I found it well-written and dispassionate, and somewhat out of place in this argumentative book.

The specific issue of whether Marić actually had some of the ideas, did some of the work, and even wrote parts of the papers that were ultimately credited to Albert Einstein alone, is what occupies two-thirds of *Einstein’s Wife*. The germ of this theory appeared in Serbia in the 1920s, based on interviews with Marić’s family (apparently not with Mileva Marić herself, though she was very much alive at the time), and later from a Serbian biography, which has not been translated into English. It was taken up by a number of scientists and journalists and was even the subject of a television documentary in the 1990s. The author of the third part of *Einstein’s Wife*, Allen Esterson, a British physicist, has been attempting to set the record straight since then, and this book is the product of that effort. The evidence for the “Mileva Story” appears far from compelling, and it is not clear whether it was ever taken seriously, or was read as some people read the *National Enquirer*: an entertaining story and almost certainly fiction. In any case, Esterson deals with such evidence as has been presented as if the story were widely credited. The other side’s rebuttal is not presented here (and I have not examined it). I found this part of the book somewhat tendentious. A shorter version, with less duplication, might have sufficed to make the author’s point. And,

without necessarily disagreeing with the conclusions, I found some of the arguments unconvincing. For example, Cassidy and Esterson examine both Marić and Einstein's examination grades from ETH in detail. While neither of them performed brilliantly, he passed and she failed, twice. Her second failure meant that she was not eligible to receive a diploma, even if she completed a dissertation. Most of the readers of this review have evaluated students on the basis of examinations, and we know that they are not infallible guides to a student's potential. One can assume that the examiner knew the identities of all the students, and one cannot assume that the examiner was favorably disposed to women students. Nonetheless, the book gives copious evidence that Albert Einstein hashed out the ideas that became the theory of special relativity and the photoelectric effect (for which he won the Nobel Prize) and no evidence that Mileva Marić thought about them at all, let alone invented either of these theories.

It is ironic that the professionalization of science that took place during the nineteenth century might have played a part in the marginalization of women scientists. In our own time, we have seen fields that were accommodating to women before they were recognized as important, like computer science, say, become much

less accessible to women as their prestige increased. Reading about these two scientifically talented women whose lives turned out so differently, I wanted to contrast the times they lived in. But Mary Somerville and Mileva Marić differed in so many other ways as well. Somerville was pretty, sociable, and a good dancer; Marić was regarded as unattractive and in addition had a physical deformity which made her the butt of teasing. Perhaps it is even more ironic that Mary Somerville, who was married off willy-nilly by her family, ended up with a helpmeet who supported her ambitions, and Mileva Marić's marriage, made for love and against the advice of her family, may have ended up derailing her career.

## Deadline Extended for Falconer Lecturer

Due to some recent changes in deadlines for AWM programs and awards, nominations for the AWM-MAA Falconer Lecturer will be accepted until October 1, 2019. See <https://awm-math.org/awards/falconer-lectures/> for the nomination procedure.

## CALL FOR NOMINATIONS

### The 2021 Noether Lecture

AWM established the Emmy Noether Lectures in 1980 to honor women who have made fundamental and sustained contributions to the mathematical sciences. In April 2013 the lecture was renamed the AWM-AMS Noether Lecture and since 2015 has been jointly sponsored by AWM and AMS. This one-hour expository lecture is presented at the Joint Mathematics Meetings each January. Emmy Noether was one of the great mathematicians of her time, someone who worked and struggled for what she loved and believed in. Her life and work remain a tremendous inspiration.

The mathematicians who have given the Noether lectures in the past are: Jessie MacWilliams, Olga Taussky Todd, Julia Robinson, Cathleen Morawetz, Mary Ellen Rudin, Jane Cronin Scanlon, Yvonne Choquet-Bruhat, Joan Birman, Karen Uhlenbeck, Mary Wheeler, Bhama Srinivasan, Alexandra Bellow, Nancy Kopell, Linda Keen, Lesley Sibner, Ol'ga Ladyzhenskaya, Judith Sally, Olga Oleinik, Linda Rothschild, Dusa McDuff, Krystyna Kuperberg, Margaret Wright, Sun-Yung Alice Chang, Lenore Blum, Jean Taylor, Svetlana Katok, Lai-Sang Young, Ingrid Daubechies, Karen Vogtmann, Audrey Terras, Fan Chung Graham, Carolyn Gordon, Susan Montgomery, Barbara Keyfitz, Raman Parimala, Georgia Benkart, Wen-Ching Winnie Li, Karen E. Smith, Lisa Jeffrey, Jill Pipher, and Bryna Kra.

People of any gender can be a nominator, whether or not they are AWM members. Self-nominations are allowed, in which case an additional letter of support must be provided. The letter of nomination should include a one-page outline of the nominee's contribution to mathematics, giving four of her most important papers and other relevant information. Nominations are to be submitted as ONE PDF file via MathPrograms.Org. The submission link will be available 45 days prior to the deadline. Nominations must be submitted by **October 1, 2019** and will be held active for three years. If you have questions, phone 401-455-4042, email [awm@awm-math.org](mailto:awm@awm-math.org), or visit <https://awm-math.org/awards/noether-lectures>.

## EDUCATION COLUMN

Education Column Editor: Jackie Dewar, Loyola Marymount University, [jdewar@lmu.edu](mailto:jdewar@lmu.edu)

### Right and Wrong

Pat Kenschaft, Professor Emerita, Montclair State University

When I was young some psychologist(s) claimed that people go into mathematics because they want to be right at least some of the time. (Can anyone tell me the name(s) of the psychologist(s)?) I immediately and quietly pleaded guilty. I like to be right!

I already knew from my parents' extended political involvement that it is impossible to expect everyone to agree that on political issues you are right most of the time. My adventures with marriage emphasized that impossibility in the marriage context. Just friendship gives plenty of reinforcement for the importance of accepting the fact that we all make mistakes—and that even when we don't think we have, others may.

The fact that mathematicians agree on what is right essentially all of the time is nice and has many interesting consequences. I remember long ago during Soviet times when a mathematician won a grant to go to Moscow. Many told him he would be very lonely there because the Russians would be afraid to talk with visitors from the US. He went anyway, and informed the Russian math community ahead where he would be staying. When he arrived at his hotel room, there were numerous messages from Russian mathematicians inviting him to visit their homes.

In the following years most of what I knew about Russia I learned from the *Notices of the AMS*. The aforementioned mathematician set the pattern for other leading US mathematicians, and I found reading their reports fascinating.

Another political response to the unity among mathematicians was apparent after the sudden availability of communication between residents of the US and China after years of being cut off from each other. The mathematicians on both sides reached out immediately. "What have you discovered while we were not communicating?" It was another exciting time in the math community.

Alas, one consequence of being undeniably right some of the time is that everyone is downright wrong some of the time.

Somehow, mistakes in mathematics class have risen to a high level of emotion. I suspect this is a major reason

why mathematics has such a poor reputation among the general public. We need a discussion about how we can foster the idea that mistakes are inevitable and everyone makes them. "We all make mistakes" is a common statement of mine in everyday life.

I'm not sure how well I emphasized this when I was teaching. I do know I encouraged students to point out my mistakes, and I well remember every class's astounded response the first time a student would say correctly I had made one. I felt a genuine sense of happiness when a student found a mistake of mine. They were paying close attention and they knew the subject matter well enough to be confident enough to raise their hand.

"Great!" I would respond. "That is indeed a mistake. I'm so glad you found it!" This was indeed true. I don't want mistakes in math class to pass as truth, and both the student's knowledge and courage pleased me. Most of the students would gasp at my smile and obvious pleasure in being corrected. I guess they found their own mistakes so troublesome that they couldn't believe I would rejoice in one of mine being detected.

What else can we do to promote the acceptance of mistakes as an inevitable consequence of doing mathematics?

My 2014 article in this column<sup>1</sup> told of a variety of reasons that I oppose standardized testing, but one is that it puts such a high value on right answers and punishes students and teachers too much for wrong answers. Mathematics is the study of patterns and the use of patterns to solve problems—not the learning of how to get right answers.

Perhaps we can comfort students by saying, "We all make mistakes" repeatedly after we find them having made one.

I wonder if emphasizing more the possibility of having many right answers would help. After a student had correctly answered a problem I had posed in public, I would ask, "Does anyone have a different solution?" Often we would see there was more than one way to solve a problem. Once the students produced four different correct ways of solving a problem, and I think we all felt a special delight. Different does not necessarily mean wrong.

When I was a student at Swarthmore College, Professor Heinrich Brinkmann was well known for finding something right in every student's utterance. "I see you are thinking of ..." he would begin, and then continue, "but really it is..." He was a very popular professor and his students did well after having him.

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<sup>1</sup> Kenschaft, P. (2014, Sep/Oct). Why I Oppose Standardized Testing. *AWM Newsletter*, 44(5), 14–16.

It amuses me that in my retirement when nobody cares but me whether I solved a puzzle correctly, how unhappy I can be when a Sudoku puzzle comes out wrong. Laughing at myself relieves some distress, but it is still there. How much worse are wrong answers when the stakes are high! I hope there can be more discussion about how to help students cope with the unpleasantness of getting wrong answers. We all do it sometimes.

**NOTE:** Pat Kenschaft's new email is [kenschaftp@montclair.edu](mailto:kenschaftp@montclair.edu).

## Revisiting: The New Majority College Student

*Jackie Dewar, Professor Emerita of Mathematics, Loyola Marymount University*

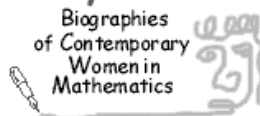
About a year ago, I wrote about supporting first-generation, low-income college students, or “New Majority college students” (Dewar, 2018). Recently, I found that a prominent national association of student affairs administrators in higher education has produced a report on essentially the same topic that may be of interest to readers: *First-generation Student Success: A Landscape Analysis of Programs and Services at Four-year Institutions* (Whitley, Benson, & Wesaw, 2018). The report, based on mixed methods research, examines the importance and impact of many factors—the existence of an institutional definition of first-generation, data collection, assessment of needs, the

location of support programs within the university. It notes the complex nature of first-generation identity, including intersectionality between first-generation and low income or other factors. The report encourages institutions and stakeholders to shift to an asset-based lens, focused on the unique strengths these students bring to campus, rather than a deficit view. It makes recommendations for advancing change and found that successful first-generation efforts are based on creating an engaged community of “faculty, staff, students, university leaders, families, first-generation alumni, community members, and stakeholders” (Whitley, Benson, & Wesaw, 2018, Executive Summary, p. 5). Not surprisingly, faculty were identified as playing multiple roles. See <https://firstgen.naspa.org/2018-landscape-analysis> for an executive summary, the full report, and more.

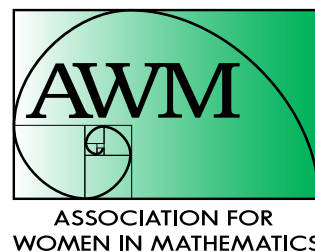
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### Essay Contest



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 2020 contest is sponsored by Math for America, [www.mathforamerica.org](http://www.mathforamerica.org).



The 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 his or her entry published in the *AWM Newsletter*. For more information, visit <https://awm-math.org/awards/student-essay-contest/>. The deadline for electronic receipt of entries is **February 1, 2020**. To volunteer to be interviewed, please visit the website <https://awm-math.org/awards/student-essay-contest/> and sign up using the link at the bottom of the page.

## 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.*

### **Journeys of Women in Mathematics, a Film**

*Nalini Joshi, University of Sydney*

**Disclaimer:** The International Mathematical Union (IMU) owns the copyright for this film, which was created by its Committee for Women in Mathematics (CWM). I am a current Vice-President of the IMU, elected for the term 2019–2022, but did not at any stage participate in the production or design of this film. This review is entirely personal and in no way reflects any position taken by the IMU or CWM.

#### **Review**

It is a fact of my life that being simultaneously a woman and a mathematician has surprised most people I have met. My interior and exterior experience of this duality shapes what I offer below as a very personal view of the film *Journeys of Women in Mathematics*.

Life as a female mathematician is full of subtleties, which appear sometimes to be visible only to those who are female mathematicians. I found myself caught up in one such underlying subtle thread when I was watching this film. I bring it up here because the visual medium has a powerful effect on interior imaginative landscapes and its unintended messages could dissuade some people in the film's audience from thinking about mathematics as a future pathway. Whether future films about female mathematicians can refrain from amplifying such unintended messages remains open in my mind.

The film is structured in two parts. The first part features three female mathematicians from around the world and follows them in their daily activities. It was immensely refreshing to me personally to see that these mathematicians come from outside the dominant paradigm usually visible in mathematics: they are from India, Cameroon and Brazil.

The second part is a compilation of short interviews with many women who attended (WM)<sup>2</sup>, the World Meeting for Women in Mathematics, which was held just before the International Congress of Mathematics at Rio in 2018.

The stories of the women in the first part shaped a vibrant, colorful and human message, which is what I loved most about this film: that life as a female mathematician is a full human life. Each of the three mathematicians featured is a mother, plays family roles as carers and/or partners, and is a shaper of communities. The strongest message the film conveys is that mathematics is as human as you and I, that it is global in its reach and that it is as inclusive at its heart as we know it to be.

The first mathematician featured in the film is Neela Nataraj (Mumbai, India). Her story suggested a difficult life journey, involving a time of deep-seated grieving for her father and being a carer for her mother. The second mathematician, Aminatou Pecha Njiahouo (Maroua, Cameroon), is energetic and passionate, but also misses her children deeply because she has to leave them behind with her husband in order to work as the only female mathematician at her university some distance away from her home. The third featured mathematician, Carolina Araujo (IMPA, Rio de Janeiro, Brazil), did her PhD at an elite US institution which she found very competitive, returned to Brazil and completed the solution of a major problem. She finds it most rewarding to help other female mathematicians.

This first half of the film focused on the emotional journeys of these women. In some ways, these views and insights into other lives are what we have been missing and I found myself lapping up the stories like a lost traveller in the Australian outback at a rare water hole.

But the film lacked something else that might engage a mathematical audience, which is a view of the women's mathematical ideas. Possibly because of this, these interviews had a decidedly melancholic air. It elicited a conversational thread that seemed to say that hardship was inevitable if one is a woman in mathematics.

It may be the case that the filmmakers' unfamiliarity with mathematical thinking led them to focus on the more accessible, emotional life experiences of these mathematicians. But most of us go around with nuggets of mathematical ideas we are thinking about in our minds. These personal treasure hunts for new ideas to tackle longstanding puzzles are often the drivers of our motivation, passion and persistence. I found it difficult not to be able to see beyond a few mathematical words usually displayed on a page for each woman, in their stories.

The second half of the film (which begins at a timestamp about 13:35 minutes) segues into shorter interviews with six additional female mathematicians, five from South America and one from Mexico: Natalia Garca Coln, Infotec, Mexico; Alicia Dickenstein, Universidad de Buenos Aires, Argentina; Jaqueline Mesquita, Universidade de Braslia, Brazil; Maria Eullia Vares, Universidade Federal do Rio de Janeiro, Brazil; Salom Martinez, Universidad de Chile, Chile; and Carolina Neira Jimnez, Universidad Nacional de Colombia, Colombia. It was accompanied by more lively dynamic music and seemed more uplifting.

In this half, more women spoke up about their passion for mathematics. Natalia Coln spoke about the exciting feelings and freedom of thought that arose from mathematical thinking. Carolina Jimnez says, "Once you get an answer you get such a satisfaction." These small snippets pushed against the subtle thread of suffering created by the first half of the film in my mind.

Personally, I love chasing the thrill of discovery in mathematics. To me, mathematics is creative play at a deep level, involving collaboration with friends, the invention of new ways of seeing and contribution to understanding the world. I wanted the film to touch on these aspects so that members

of the audience might see something about our wonderful interior worlds.

Instead of this, I saw a dangerous subtle thread, which skirted close to implying that we are defined by our service and our sacrifice.

I want the younger people who might be watching the film to get a sense of the real interior world of a female mathematician. We are simultaneously emotional and analytical, caring and ambitious, cautious and far-sighted. We are explorers, artists and inventors. We are solvers of puzzles and treasure hunters.

Let's hope this is the first of many films about women in mathematics, and that future iterations will converge towards the world I see.

### Notes

*Journeys of Women in Mathematics* Full Length Version [21.24 min]. <https://protect-au.mimecast.com/s/DlhPCANZvPiqP4ZLIGzVcf?domain=youtu.be>

Created by the IMU Committee for Women in Mathematics  
Filmed and edited by Micro-Documentaries.

Supported by a grant from the Simons Foundation.

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## CALL FOR NOMINATIONS

### Alice T. Schafer Mathematics Prize

The Executive Committee of the Association for Women in Mathematics calls for nominations for the Alice T. Schafer Mathematics Prize to be awarded to an undergraduate woman for excellence in mathematics. All members of the mathematical community are invited to submit nominations for the Prize. The nominee may be at any level in her undergraduate career, but must be an undergraduate as of October 1, 2019. She must either be a US citizen or have a school address in the US. The Prize will be awarded at the AWM Reception and Awards Presentation at the January 2020 Joint Mathematics Meetings in Denver, CO.

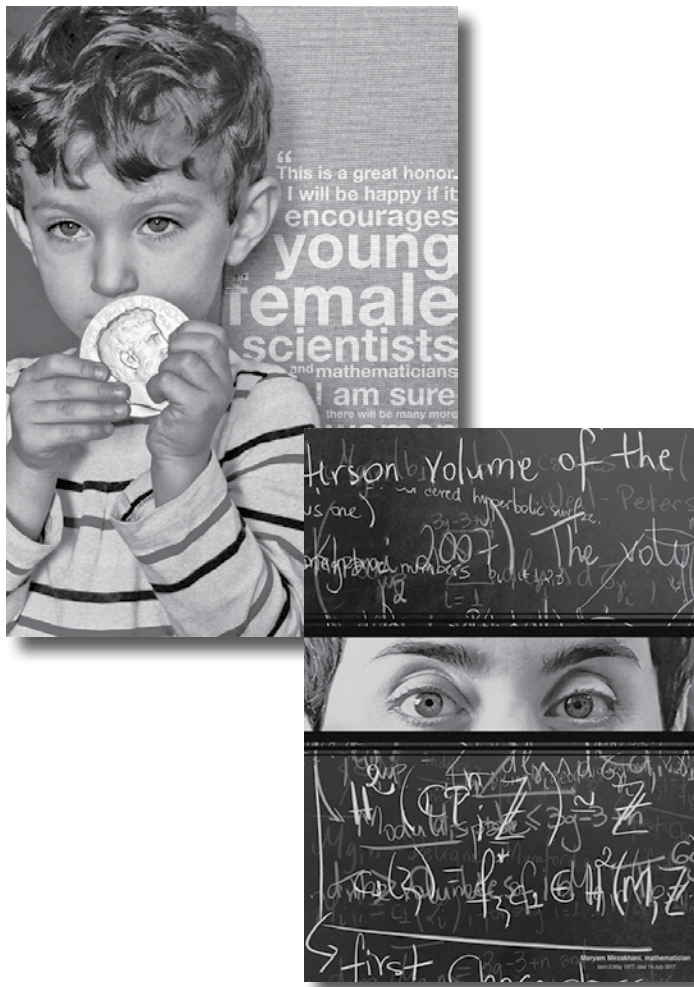
The letter of nomination should include, but is not limited to, an evaluation of the nominee on the following criteria: quality of performance in advanced mathematics courses and special programs, demonstration of real interest in mathematics, ability for independent work in mathematics, and performance in mathematical competitions at the local or national level, if any.

Anyone can be a nominator. People of any gender can be a nominator, self-nominations are allowed, and you do not need to be an AWM member to nominate someone for this award. If this is a self-nomination, then you must have one additional letter of support. With the letter of nomination, please include a copy of transcripts and indicate undergraduate level. Any additional supporting materials (e.g., reports from summer work using math, copies of talks, recommendation letters from professors, colleagues, etc.) should be enclosed with the nomination. All nomination material is to be submitted as ONE PDF file via MathPrograms.Org with a copy of transcripts included at the end of the file. The submission link will be available 45 days prior to the deadline. Nominations must be received by **October 1, 2019**. If you have questions, phone 401-455-4042, email [awm@awm-math.org](mailto:awm@awm-math.org), or visit <https://awm-math.org/schafer-prize-for-undergraduates/>.

# Remembering Maryam Mirzakhani at the 2019 AWM Research Symposium

Omayra Ortega, Sonoma State University, [www.omayraortega.com](http://www.omayraortega.com), [omayra.ortega@gmail.com](mailto:omayra.ortega@gmail.com)

The Remembering Maryam Mirzakhani Exhibit was displayed during the 2019 AWM Research Symposium in Duncan Hall of Rice University. This exhibit included photos of, and art work based on, the life of Dr. Maryam Mirzakhani, the first woman to be awarded the Fields Medal. Many of these photos had not been displayed prior to the creation of this exhibit. The Remembering Maryam Mirzakhani Exhibit delved into images of both the personal and professional life of this beloved mathematician who left us too soon. The addition of this exhibit to the AWM Research Symposium was very appropriate considering the audience of scholars in attendance who have to artfully balance their personal and professional lives each day.



The Remembering Maryam Mirzakhani Exhibit was first shown at the 2018 World Meeting for Women in Mathematics in Rio and during the International Congress of Mathematicians (ICM2018) which immediately followed. The exhibition was created by the International Mathematical Union's Committee for Women in Mathematics (CWM) with Curator Thais Jordao and Designer Rafael Meireles Barroso. This exhibit was shown at Rice with the permission of the CWM.

To quote H el ene Barcelo and Stephen Kennedy in their article on Mirzakhani in the November 2018 *Notices of the AMS*, "when Mirzakhani was awarded the Fields Medal in 2014 she had already been diagnosed with the cancer that would eventually claim her life. Always a private and humble person, she did not welcome the attention and acclaim that accompanied the prize. Together with her husband, Jan Vondr ak, she wanted to raise their daughter, live her life, and pursue mathematics."



This printing of The Remembering Maryam Mirzakhani Exhibit is looking for a **permanent home**. If your institution, department, or organization is interested in keeping this exhibit, please contact the author at [omayra.ortega@gmail.com](mailto:omayra.ortega@gmail.com). The requirements of keeping this printing of the exhibit permanently include:

- Identifying an individual "in charge" of the exhibit, who will act as the guardian
- Requesting permission from the CWM to permanently display this exhibit
- Displaying the exhibit in its entirety (18 images)
- Displaying the exhibit in the order specified by the artist and curator team, Thais Jordao and Rafael Meireles Barroso
- Covering the cost of shipping to your organization



# AWM Workshop at the 2020 SIAM Annual Meeting

Application deadline for graduate students: **October 1, 2019**

For many years, the Association for Women in Mathematics has held a series of workshops for women graduate students and recent PhDs in conjunction with major mathematics meetings. Since 2016, these workshop talks are supported by the AWM ADVANCE grant. The AWM Workshops serve as follow-up workshops to Research Collaboration Conferences for Women, featuring both junior and senior women speakers from one of the Research Networks supported by the ADVANCE grant. An AWM Workshop is scheduled to be held in conjunction with the 2020 SIAM Annual Meeting in Toronto, Ontario, Canada, July 6–10, 2020.

**FORMAT:** The workshop will consist of two research minisymposia focused on the Mathematics of Materials organized by Hala AH Shehadeh and Malena Español, a Poster Session and an informational minisymposium directed at starting a career. Selected junior and senior women from the Research Collaboration Conference for Women (RCCW) WIMM will be invited to give 20-minute talks in the two research minisymposia. The speakers will be supported by the National Science Foundation AWM ADVANCE grant: *Career Advancement for Women Through Research Focused Networks*. The Poster Session will be open to all areas of research; graduate students working in areas related to mathematics of materials are especially encouraged to apply. The graduate students will be selected through an application process to present posters at the Workshop Poster Session run in conjunction with the SIAM Poster Session. AWM will offer partial support for travel and hotel accommodations for the selected graduate students. The workshop will include a luncheon and mentoring session where workshop participants will have the opportunity to meet with other women mathematicians at all stages of their careers, and a career panel which will be open to the public. In particular graduate students working in areas related to the mathematics of materials will have the opportunity to connect with the Women in Mathematics of Materials (WIMM) Research Network.

All mathematicians (female and male) are invited to attend the talks, career panel and poster presentations. Departments are urged to help graduate students and junior faculty who are not selected for the workshop to obtain institutional support to attend the presentations.

**MENTORS:** We also seek volunteers to act as mentors for workshop participants, in particular the graduate students. If you are interested in volunteering, please contact the AWM office at [awm@awm-math.org](mailto:awm@awm-math.org) by **February 1, 2020**.

**ELIGIBILITY:** To be eligible for selection and funding, a graduate student must have made substantial progress towards her thesis. Women with grants or other sources of support are welcome to apply. All non-US citizens must have a current US address.

All applications should include:

- a title of the proposed poster
- an abstract (75 words or less) of the proposed poster
- a curriculum vitae
- a letter of recommendation from her thesis advisor.

Applications must be completed electronically by **October 1, 2019**. See <https://awm-math.org/meetings/awm-siam/>.

# How a May 12th Initiative Became a Monthly Event in Panama

*Jeanette Shakalli, the International Mathematical Union (IMU)'s Committee for Women in Mathematics (CWM) ambassador for Panama*

May 12th was the birthdate of Maryam Mirzakhani, who in 2014 became the first woman to be honored with the Fields Medal, the most prestigious award in mathematics. The initiative of choosing May 12th as the Celebration of Women in Mathematics was proposed by the Women's Committee of the Iranian Mathematical Society. On July 31, 2018, the proposal was approved by the majority of attendees at the World Meeting for Women in Mathematics in Rio de Janeiro, Brazil. There were more than 100 events, announced on <https://may12.womeninmaths.org/>, taking place on May 12, 2019, in the following countries: Argentina, Australia, Belgium, Benin, Brazil, Canada, Chile, Congo, Denmark, Egypt, Ethiopia, France, Germany, India, Indonesia, Iran, Israel, Italy, Mexico, Nepal, Panama, Peru, Philippines, Portugal, Russia, Senegal, Slovakia, South Africa, Spain, Sweden, Thailand, Tunisia, Turkey, the UK, Ukraine, and the United States.

In the Republic of Panama, I organized a Math Carnival in honor of the Celebration of Women in Mathematics at the Biomuseum from 9:00 a.m. until 2:00 p.m. My main idea was to inspire Panamanian youth, in particular girls, to study mathematics by showing them real-life examples of women who have accomplished a successful career in mathematics in their own country. Therefore,



on Sunday, May 12, 2019, three Panamanian female mathematicians, Manuela Foster Vega, Fany Gonzalez and I, shared our story about how we joined the world of mathematics, what obstacles we faced along the way, and what lessons we learned through our personal and professional experiences. There were also fun activities: Manuela



encouraged the kids and adults of all ages who attended the Carnival to solve Hanayama puzzles, Fany showed them how to create geometric figures using Itsphun pieces, and I taught them how to fold a cube origami design made of six Sonobe modules. Around 400 people attended this math outreach event, including families, students and teachers. The Math Carnival was such a success that the Biomuseum asked us to organize this event monthly, and we are proud to say that we, of course, said yes!



# AWM and MAA Join National Efforts to Address Discrimination

*Catherine Paolucci, Karoline Pershell, and Michelle Snider*

In late 2017, a research team based at the University of Michigan launched the STEM Inclusion Study, reaching through professional societies to survey their members so as to better understand the experiences of groups that have been underrepresented in STEM (e.g., women, underrepresented racial and ethnic minorities, the LGBTQ+ community, and persons with different abilities). The result is the largest dataset on this topic, with almost 27,000 employed STEM professionals represented.

The survey looked across workplace sectors and across career stages. Preliminary reports provided to each participating organization included recommendations with the goal of guiding change and providing resources to the membership. As a result, the AWM held a panel titled “Promoting Inclusion in STEM (PI-STEM)” organized by AWM Executive Committee member Talia Fernós at the January JMM; the MAA included the article “STEM Inclusion Study” by

Michael Pearson and Jacqueline Jensen-Vallin in the *MAA Focus* April/May 2018 (pp. 10–11); and the *AMS Inclusion/Exclusion Blog* November 2018 entry was “The STEM Inclusion Study: What we’ve learned so far” by Helen G. Grundman, AMS Director of Education and Diversity.

On June 7, 2019, participating professional societies were invited by the research team to learn more about the findings and create cross-association communication to support and share initiatives. In attendance was AWM Executive Director Karoline Pershell and DC-based AWM members Michelle Snider and Catherine Paolucci, as well as another AWM member, Michael Pearson, attending in his role of MAA Executive Director. Michelle Snider is research staff at the IDA/Center for Computing Sciences in Maryland, just outside of DC, and serves as Chair of the AWM Government Advocacy Committee. Catherine Paolucci is an Assistant Professor of Mathematics Education at the University of Florida and represents AWM on the Leadership Council for the Societies Consortium on Sexual Harassment.

**Karoline Pershell (KPP):** Michelle and Catherine, thank you for giving your time to attend this session. What surprised you about the findings?

**Michelle Snider (MBS):** The rates of observed differential treatment based on the demographic data  
*continued on page 20*

## CALL FOR NOMINATIONS

### The 2021 AWM – Joan & Joseph Birman Research Prize in Topology and Geometry

The AWM has established the AWM – Joan & Joseph Birman Research Prize in Topology and Geometry. First presented in 2015, the prize will be awarded every other year. The purpose of the award is to highlight exceptional research in topology/geometry by a woman early in her career. The field will be broadly interpreted to include topology, geometry, geometric group theory and related areas. Candidates should be women, based at US institutions who are within 10 years of receiving their PhD, or have not yet received tenure, at nomination deadline. The award has been made possible by a generous contribution from Joan Birman who works in low dimensional topology and her late husband Joseph Birman who was a theoretical physicist.

People of any gender can be a nominator, whether or not they are AWM members. Self-nominations are allowed. The nomination should include: 1) a one to three page letter of nomination highlighting the exceptional contributions of the candidate; 2) a curriculum vitae of the candidate not to exceed three pages; and 3) three letters supporting the nomination (submitted independently). Nomination materials should be submitted online at [MathPrograms.org](https://mathprograms.org). The submission link will be available 45 days prior to the nomination deadline. Review of candidates will begin in mid-February. For full consideration, nominations should be submitted by **February 1, 2020**. If you have any questions, phone 401-455-4042, email [awm@awm-math.org](mailto:awm@awm-math.org), or visit <https://awm-math.org/awards/awm-birman-research-prize/> for more information.

(race, gender identity, etc.) were fairly consistent across the organizations surveyed. For example, I had expected the rates to be much higher for “observed differential treatment based on gender” for members of the AWM versus other STEM organizations, but the difference was minor. This speaks to the fact that these behaviors are systemic and counteracts the narrative that there are just “a few bad apples,” either in terms of individuals or specific workplaces.

**Catherine Paolucci (CP):** As Michelle noted, the results show that this is clearly an issue that is shared across disciplines, and while our instinct may be to focus inward on the experiences within our own community, we are not on our own in working to promote more welcoming environments that embrace diverse talent and perspectives. As the lines continue to blur across STEM fields in research and workforce development, we can also reach outside of our own community to find allies, resources, and collaborators in our efforts to change the culture of our departments, offices, labs, field sites, etc. Strategies, progress, and challenges should be shared across disciplines in our efforts to recognize and lift up the unique talents of those who have historically been underrepresented in our STEM communities.

**KPP:** What motivated you about the findings that were presented at this meeting?

**CP:** The results primarily focused on reporting of observed behaviors. The rates of observed incidents alone were motivating, in terms of the need for continued work on improving workplace cultures and conduct. However, for me, the results also highlighted a persistent need for societies both to continue to educate their members on recognizing bias and discrimination in the workplace and to ensure there are clear channels or resources for reporting and addressing incidents without fear of retaliation, especially for those early in their careers.

**MBS:** STEM fields are often viewed as “pure,” uncontaminated by opinions and feelings. Results of this study confirm that combining science and engineering work with social issues like diversity and inequality is often viewed as undermining the objectivity and credibility of scientists and engineers. In reality, decisions about what we study and what we fund are unavoidably cultural and political, but this “depolitized” view of STEM delegitimizes these topics. I really appreciated gaining both the vocabulary and the data to help me talk about something that I had felt was going on, but didn’t have the words for. Too often, they are seen as isolated “women’s issues” or “minority issues,” but in order to address something so entrenched, we need to see the interconnectedness and to

get support from the whole community, and hopefully this framework can facilitate starting those discussions in a more complete context and without judgement.

**KPP:** What are next steps, both as organizations and as a math community?

**MBS:** The study authors talked about how meritocratic ideologies frame inequalities as the fault of underrepresented groups rather than as systemic. People who give meritocratic explanations for their cultures (e.g., “women tend not to have the skills required in the high-stakes world of venture capital”) tend not to see discrimination in their spaces. The results of this study definitively demonstrate persistent social biases against women, people of color, LGBTQ+ persons, and persons with different abilities in the US. Sharing this data with people across our organizations and communities can help us show that there is a systemic inequality problem, and this can be a first step towards creating a culture in which harassment and differential treatments are no longer tolerated.

**CP:** A critical piece of making progress on these issues is the education of and support for leaders within the workplace. Whether it’s a department chair, a dean, a private sector executive, or leadership within a government agency, their commitment is critical to changing what is acceptable and normalized within their work environment. It is essential that the work of changing a culture does not fall on the shoulders of those who are just beginning to build their careers, but that the tone and example be set by the mentors, the leaders, and particularly by those who set the requirements for and make decisions about career progression (including tenure and promotion). Societies need to continue to work to provide these stakeholders with the resources they need to drive substantial and lasting change in behaviors and norms that, in some cases, have long been entrenched in the culture, systems, and conduct of their workplace.

**KPP:** As each of you are leading various initiatives on behalf of AWM, how do you want to tell the membership that they can get involved?

**MBS:** I chair the Government Advocacy Committee that organizes Hill Visits in Washington, DC. We invite everyone to participate in these visits (yes, you!), but without funding to help bring people to DC, we understand that participation is limited to people who are already in the region. You can volunteer to aid in organizing Hill Visits from anywhere by helping to track and review legislation, or even by calling Congressional offices to set up meetings. The 2021 JMM (which coincides with AWM’s 50th Anniversary!) will be in Washington, DC. We will plan a Hill Visit adjacent to the JMM, so start planning now to come to DC a

few days early. For more info, email [HillVisit@awm-math.org](mailto:HillVisit@awm-math.org).

**CP:** AWM and MAA are inaugural members (as is AMS) of the newly formed Societies Consortium for Sexual Harassment in STEMM (with over 100 professional societies across Science, Technology, Engineering, Mathematics and Medicine). As the AWM rep for this committee, Karoline and I also petitioned for AWM to have a seat on the Leadership Council. We are currently the only women-focused organization and the only math organization represented on the Leadership Council. We are also the smallest organization, which speaks to the amazing impact of AWM's active member engagement. The Societies Consortium aims to work through professional societies to drive change in conduct, climate, and culture in ways that support excellence in STEMM fields. As this kicks off in the coming months, I will share information with members through *Newsletter* articles, eCommunication notices, and eventually through a set of website resources. In the meantime, if you have questions or comments, please feel free to email me directly at [cpaolucci@coe.ufl.edu](mailto:cpaolucci@coe.ufl.edu).

**KPP:** Excellent! I will also add that people who are interested in working with their department to create welcoming environments where all mathematicians can thrive should apply for the AWM Moving Towards Action Workshop at JMM2020 (see the box following this article). For those who can't attend, I would recommend

reviewing the National Academy of Sciences report, *Sexual Harassment of Women: Climate, Culture, and Consequences in Academic Sciences, Engineering, and Medicine* (2018), which carefully builds the case for healthy work environments and ends with recommendations for implementing policies and practices that will drive behavioral changes in the profession.

**CP:** Yes, that report is a great resource.

**MBS:** It is a 300-page "page-turner," surprisingly. It makes for great summertime beach reading. Yes, Google that.

## AWM Moving Towards Action Workshop

We are looking for participants from institutions that run the gamut, from schools interested in making change but don't know where to start, to those schools further down the path of actively creating welcoming environments. The actual training will take place on Tuesday, January 14, 2020 at the JMM in Denver, CO, with pre- and post-workshop requirements. See <https://awm-math.org/meetings/jmm-2020-workshop/> for further information and to apply; the application deadline is **October 1, 2019**. Decisions will be made by October 30.

## CALL FOR NOMINATIONS

### The Association for Women in Mathematics Dissertation Prize

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 Prizes will be given for those dissertations deemed most outstanding by the award committee. The award is intended to be based entirely on the dissertation itself, not on other work of the individual. To be eligible for the award a graduate student must have defended her dissertation within the last two years (October 1, 2017 to September 30, 2019). She must either be a US citizen or have a school address in the US. The Prizes will be presented at the AWM Reception and Awards Presentation at the Joint Mathematics Meetings in Baltimore, MD, January 2020.

Anyone can be a nominator. People of any gender can be a nominator, self-nominations are allowed, and you do not need to be an AWM member to nominate someone for this award. The nomination should include: 1) a one to three page letter of nomination highlighting the exceptional mathematical research presented in the dissertation, 2) a curriculum vitae of the candidate not to exceed three pages, 3) a copy of the dissertation and 4) two letters supporting the nomination. Nomination materials should be submitted online at [MathPrograms.org](http://MathPrograms.org). The submission link will be available 45 days prior to the nomination deadline. Nominations must be received by **October 1, 2019**. If you have questions, phone 401-455-4042, email [awm@awm-math.org](mailto:awm@awm-math.org), or visit [awm-math.org/awards/awm-dissertation-prize/](http://awm-math.org/awards/awm-dissertation-prize/) for more information.

## 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 a long-term working and mentoring relationship with a senior mathematician. This relationship should help the junior mathematician to establish her research program 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 and 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 Steven Ferrucci at 401-455-4042 for guidance.

**Deadline.** There is one award period per year. Applications are due **February 1**.

### CALL FOR NOMINATIONS

## The 2020 Kovalevsky Lecture

AWM and SIAM established the annual Sonia Kovalevsky Lecture to highlight significant contributions of women to applied or computational mathematics. This lecture is given annually at the SIAM Annual Meeting. Sonia Kovalevsky, whose too-brief life spanned the second half of the nineteenth century, did path-breaking work in the then-emerging field of partial differential equations. She struggled against barriers to higher education for women, both in Russia and in Western Europe. In her lifetime, she won the Prix Bordin for her solution of a problem in mechanics, and her name is memorialized in the Cauchy-Kovalevsky theorem, which establishes existence in the analytic category for general nonlinear partial differential equations and develops the fundamental concept of characteristic surfaces.

The mathematicians who have given the prize lecture in the past are: Linda R. Petzold, Joyce R. McLaughlin, Ingrid Daubechies, Irene Fonseca, Lai-Sang Young, Dianne P. O'Leary, Andrea Bertozzi, Suzanne Lenhart, Susanne Brenner, Barbara Keyfitz, Margaret Cheney, Irene M. Gamba, Linda J.S. Allen, Liliana Borcea, Éva Tardos, and Catherine Sulem.

The lectureship may be awarded to anyone in the scientific or engineering community whose work highlights the achievements of women in applied or computational mathematics. Anyone can be a nominator. People of any gender can be a nominator, self-nominations are allowed, and you do not need to be an AWM member to nominate someone for this award. If this is a self-nomination, then you must have one additional letter of support. The nomination must be accompanied by a written justification and a citation of about 100 words that may be read when introducing the speaker. Nominations are to be submitted as ONE PDF file via MathPrograms.Org. The submission link will be available 45 days prior to the deadline. Nominations must be received by **October 1, 2019** and will be kept active for two years.

The awardee will be chosen by a selection committee consisting of two members of AWM and two members of SIAM. Please consult the award web pages <https://www.siam.org/Prizes-Recognition/Major-Prizes/Lectures/Detail/the-awm-siam-sonia-kovalevsky-lecture/> and <https://awm-math.org/awards/kovalevsky-lectures/> for more details.

# AWM Thank-Yous

AWM is grateful to those whose donations support its mission of encouraging women and girls to study mathematics and have careers in the mathematical sciences. We extend a special thank you to AWM Contributing Members and donors. We also thank those who prefer to remain anonymous. (This list reflects activity from July 1, 2018–June 30, 2019).

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McGill University, Mathematics & Statistics  
Mercy College  
Meredith College, Mathematics and Computer Science  
Merrimack College  
Miami University  
Michigan State University, Statistics and Probability  
Michigan Technological University  
Millersville University  
Mills College  
Minnesota State University, Mankato  
Missouri University of Science & Technology  
Missouri State University  
Mount Holyoke College  
Murray State University  
National Institute of Standards & Technology, Sciences Division  
National Security Agency  
New Mexico State University, Mathematical Sciences  
North Dakota State University  
Northern Illinois University, Mathematical Sciences  
Northwest Missouri State University  
Northwestern University  
Oakland University  
Oberlin College  
Occidental College  
Ohio Northern University, Mathematics and Computer Science  
Ohio University  
Ohio Wesleyan University  
Oklahoma State University  
Old Dominion University  
Oregon State University  
Pomona College  
Portland State University, Mathematics and Statistics  
Princeton University  
Purdue University  
Rice University  
Rose-Hulman Institute of Technology

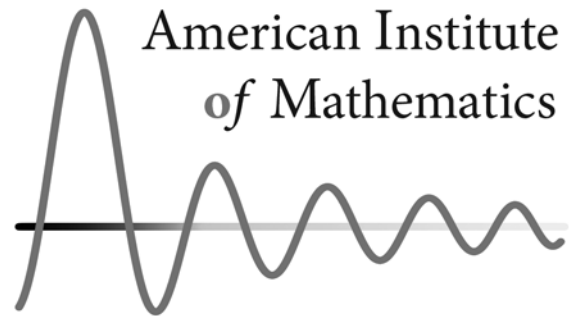
Ryerson University  
Saint Louis University, Mathematics & Statistics  
Salisbury University  
Seattle University  
Simon Fraser University  
Skidmore College, Mathematics and Statistics  
Slippery Rock University, Mathematics and Statistics  
Smith College, Mathematics and Statistics  
Sonoma State University  
Southeast Missouri State University  
St. Cloud State University  
St. Olaf College  
Stanford University  
Stony Brook University  
SUNY at Albany  
SUNY, College at Potsdam  
Swarthmore College, Mathematics and Statistics  
Syracuse University  
Temple University  
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University of Calgary  
University of California, Berkeley  
University of California, Davis  
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University of California, Merced  
University of California, Riverside  
University of California, Santa Barbara  
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 Urbana Champaign  
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 University of Kentucky  
 University of Louisiana  
 at Lafayette  
 University of Manitoba  
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 University of Memphis  
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 and Statistics  
 University of Michigan,  
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 University of Pittsburgh  
 University of Portland  
 University of Puget Sound,  
 Mathematics and  
 Computer Science  
 University of Richmond  
 University of Rochester  
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 University of Washington,  
 Applied Mathematics  
 University of Waterloo,  
 Applied Mathematics  
 University of Waterloo,  
 Combinatorics and  
 Optimization  
 University of Waterloo,  
 Statistics and Actuarial  
 Science  
 University of Wisconsin–  
 Madison  
 University of Wyoming  
 Vanderbilt University  
 Vassar College, Mathematics  
 and Statistics  
 Villanova University,  
 Mathematical Sciences  
 Virginia Commonwealth  
 University  
 Virginia Tech  
 Wake Forest University,  
 Mathematics and Statistics  
 Washington State University  
 Wayne State University  
 Wellesley College  
 Wesleyan University  
 Western Washington  
 University  
 Williams College  
 Wittenberg University  
 York University  
 Youngstown State University

## ADVERTISEMENTS



*AIM, the American Institute of Mathematics, sponsors week-long activities in all areas of the mathematical sciences with an emphasis on focused collaborative research.*

## Call for Proposals

### Workshop Program

AIM invites proposals for its focused workshop program. AIM's workshops are distinguished by their specific mathematical goals. This may involve making progress on a significant unsolved problem or examining the convergence of two distinct areas of mathematics. Workshops are small in size, up to 28 people, to allow for close collaboration among the participants.

### SQuaREs Program

AIM also invites proposals for the SQuaREs program: Structured Quartet Research Ensembles. More long-term in nature, this program brings together groups of four to six researchers for a week of focused work on a specific research problem in consecutive years.

More details are available at:

<http://www.aimath.org/research/>  
 deadline: November 1



*AIM seeks to promote diversity in the research mathematics community. We encourage proposals which include significant participation of women, underrepresented minorities, junior scientists, and researchers from primarily undergraduate institutions.*

# TITLES OF INTEREST

from the AMS



## Women Who Count

Honoring African American Women Mathematicians

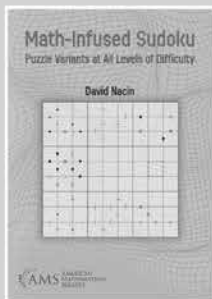
Shelly M. Jones, *Central Connecticut State University, New Britain*

*The work Dr. Jones is doing is essential to promoting awareness and inclusion in the mathematical sciences.*

—Dr. Christina Eubanks-Turner

*Women Who Count: Honoring African American Women Mathematicians* is a children's activity book highlighting the lives and work of 29 African American women mathematicians, including Dr. Christine Darden, Mary Jackson, Katherine Johnson, and Dorothy Vaughan from the award-winning book and movie *Hidden Figures*.

2019; 138 pages; Softcover; ISBN: 978-1-4704-4889-9; List US\$15; AMS members US\$12; MAA members US\$13.50; Order code MBK/124



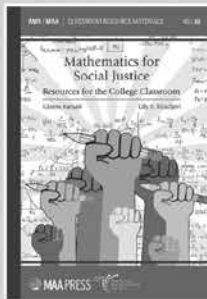
## Math-Infused Sudoku

Puzzle Variants at All Levels of Difficulty

David Nacin, *William Paterson University, Wayne, NJ*

Building upon the rules of Sudoku, the puzzles in this volume introduce new challenges by adding clues involving sums, differences, means, divisibility, and more.

2019; 116 pages; Softcover; ISBN: 978-1-4704-5090-8; List US\$25; AMS members US\$20; MAA members US\$22.50; Order code MBK/123



AMS / MAA Press

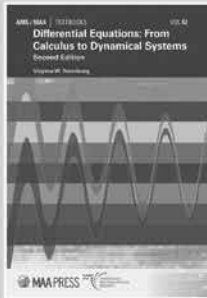
## Mathematics for Social Justice

Resources for the College Classroom

Gizem Karaali, *Pomona College, Claremont, CA*, and Lily S. Khadjavi, *Loyola Marymount University, Los Angeles, CA*, Editors

This collection of resources for mathematics faculty interested in incorporating questions of social justice into their classrooms includes both a series of essays from instructors experienced in integrating social justice themes into their pedagogy and 14 classroom-tested modules featuring ready-to-use activities and investigations for the college mathematics classroom.

**Classroom Resource Materials**, Volume 60; 2019; 277 pages; Softcover; ISBN: 978-1-4704-4926-1; List US\$55; AMS members US\$41.25; MAA members US\$41.25; Order code CLRM/60



AMS / MAA Press

## Differential Equations: From Calculus to Dynamical Systems

Second Edition

Virginia W. Noonburg, *University of Hartford, West Hartford, CT*

This second edition of Virginia Noonburg's best-selling textbook includes two new chapters on partial differential equations, making the book usable for a two-semester sequence in differential equations.

**AMS/MAA Textbooks**, Volume 43; 2019; 402 pages; Hardcover; ISBN: 978-1-4704-4400-6; List US\$75; AMS members US\$56.25; MAA members US\$56.25; Order code TEXT/43



## The Math Behind the Magic

Fascinating Card and Number Tricks and How They Work

Ehrhard Behrends, *Freie Universität, Berlin, Germany*

Translated by David Kramer

In this rich, colorfully illustrated volume, Ehrhard Behrends presents around 30 card tricks and number games that are easy to learn and have an interesting mathematical foundation, with no prior knowledge required.

2019; 208 pages; Softcover; ISBN: 978-1-4704-4866-0; List US\$30; AMS members US\$24; MAA members US\$27; Order code MBK/122

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◆ = Textbook



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## ADVERTISEMENTS

# MSRI

## Call for Applications

### 2020-21 Research Programs

The Mathematical Sciences Research Institute in Berkeley, California invites applications for membership in its 2020-21 research programs.

#### FALL 2020

- **Random and Arithmetic Structures in Topology**
- **Decidability, Definability and Computability in Number Theory**

#### SPRING 2021

- **Mathematical Problems in Fluid Dynamics**

[msri.org/programs](http://msri.org/programs)

**Apply online beginning August 1, 2019**

Research Professorships (Deadline: 10/1/19)

Research Memberships (Deadline: 12/1/19)

Postdoctoral Fellowships (Deadline: 12/1/19)

**MSRI**  
Mathematical Sciences  
Research Institute

The Institute is committed to the principles of Equal Opportunity and Affirmative Action. Students, recent Ph.D.s, women, and minorities are particularly encouraged to apply.



MSRI has been supported from its origins by the National Science Foundation, now joined by the National Security Agency, over 100 Academic Sponsor Institutions, by a range of private foundations, and by generous and farsighted individuals.



2019-2020 MEMBERSHIP

## THE SCHOOL OF MATHEMATICS

THE IAS SCHOOL OF MATHEMATICS welcomes applications from mathematicians and theoretical computer scientists at all career levels, and strongly encourages applications from women, minorities, and mid-career scientists (5-15 years from Ph.D.). Competitive salaries, on-campus housing, and other resources are available for periods of 4-11 months for researchers in all mathematical subject areas. The School supports approximately 40 post-docs per year.

In 2020-2021, there will be a special-year program, GEOMETRIC AND MODULAR REPRESENTATION THEORY, led by Geordie Williamson of the University of Sydney; however, Membership will not be limited to mathematicians in this field.

#### PROGRAMS

EMERGING TOPICS  
[math.ias.edu/emergingtopics](http://math.ias.edu/emergingtopics)

WOMEN & MATHEMATICS  
[math.ias.edu/wam/2020](http://math.ias.edu/wam/2020)

SUMMER COLLABORATORS  
[math.ias.edu/summercollaborators](http://math.ias.edu/summercollaborators)

#### MID-CAREER

Are you 5-15 years from your Ph.D.?  
Ask us about funding!

To apply, submit your application at [mathjobs.org](http://mathjobs.org)  
For more info, please visit: [math.ias.edu](http://math.ias.edu)

DEADLINE: DECEMBER 1, 2019 • [MATHJOBS.ORG](http://MATHJOBS.ORG)

## ADVERTISEMENTS

# MSRI

## Call for Applications

### SUMMER RESEARCH FOR WOMEN IN MATHEMATICS

The Mathematical Sciences Research Institute in Berkeley, California invites applications for its **Summer Research for Women in Mathematics (SWiM)** program.

The purpose of this program is to provide space and funds to groups of women mathematicians to work on a research project at MSRI. Research projects can arise from work initiated at a Women's Conference, or can be freestanding activities.

#### PROGRAM ELIGIBILITY & FUNDING

- Groups of 2 to 6 women with partial results on an established project may submit an application to the program.
- Each member of the group must have a Ph.D. in mathematics or advanced graduate standing. At least one member must be U.S. based.
- Each group may apply to be in residence at MSRI for a minimum of two weeks, and all group members must be in residence for the duration of the visit.
- **The visits must take place between June 15, 2020 and August 7, 2020.**
- Lodging on UC Berkeley campus, meals, and reimbursement of travel expenses will be provided.
- **For group members with children,** MSRI will provide funding that makes it possible for the member to fully take part in the program. For full details, visit:

[msri.org/swim](http://msri.org/swim)

**Application deadline: November 1, 2019**



The Institute is committed to the principles of Equal Opportunity and Affirmative Action. Students, recent Ph.D.s, women, and minorities are particularly encouraged to apply.



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**Research**



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# ICERM



The Institute for Computational and Experimental  
Research in Mathematics

### SUMMER WORKSHOP FOR WOMEN

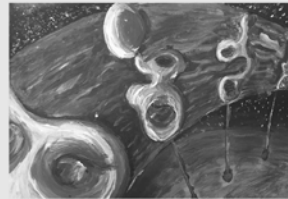
#### Women in Algebraic Geometry

July 27 – 31, 2020

#### Organizing Committee

**Melody Chan**, Brown University  
**Antonella Grassi**, University of Pennsylvania  
**Rohini Ramadas**, Brown University  
**Julie Rana**, Lawrence University  
**Isabel Vogt**, Stanford University

#### Program Description:



The Women in Algebraic Geometry Collaborative Research Workshop will bring together researchers in algebraic geometry to work in groups of 4-6, each led by one or two senior

mathematicians. The goals of this workshop are: to advance the frontiers of modern algebraic geometry, including through explicit computations and experimentation, and to strengthen the community of women and non-binary mathematicians working in algebraic geometry. This workshop capitalizes on momentum from a series of recent events for women in algebraic geometry, starting in 2015 with the IAS Program for Women in Mathematics on algebraic geometry.

Successful applicants will be assigned to a group based on their research interests. The groups will work on open-ended projects in diverse areas of current interest, including moduli spaces and combinatorics, degenerations, and birational geometry. Several of the proposed projects extensively involve experimentation and computation, which will increase the likelihood that concrete progress is made over the course of five days and provide useful training in computational mathematics.

#### Full details can be found at:

[icerm.brown.edu/topical\\_workshops/tw19-5-wisdm/](http://icerm.brown.edu/topical_workshops/tw19-5-wisdm/)  
121 S. Main Street • Providence, RI 02903  
401-863-5030 • [info@icerm.brown.edu](mailto:info@icerm.brown.edu)

## ADVERTISEMENTS

UNIVERSITY OF  
**Nebraska**  
Lincoln

22nd Annual  
**JANUARY 31-FEBRUARY 2, 2020**

# Nebraska Conference for Undergraduate Women in Mathematics

*A national showcase for the research of  
undergraduate women in the mathematical sciences*

## PLENARY SPEAKERS

Dr. Margaret Cozzens  
Rutgers University

Dr. Trachette L. Jackson  
University of Michigan

## APPLICATION INFORMATION

**go.unl.edu/ncuwm**

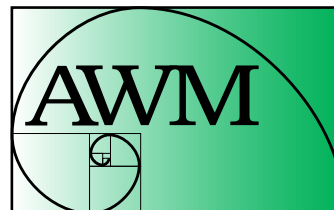
Find application guidelines and information  
about conference selection and registration  
on the website.

For undergraduate participants, most local expenses are covered  
and some travel support is available.

UNL Department of Mathematics  
203 Avery Hall  
University of Nebraska-Lincoln  
Lincoln, NE 68588-0130



UNL does not discriminate based upon any protected status. Please see [go.unl.edu/nondiscrimination](http://go.unl.edu/nondiscrimination).



ASSOCIATION FOR  
WOMEN IN MATHEMATICS

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1/2 page (vertical)	3 9/16" x 8 1/2"	\$385
1/4 page (vertical)	3 7/16" x 4 1/8"	\$258.50
1/4 page (horizontal)	7 1/8" x 1 7/8"	\$258.50

For further information, see [awm-math.org](http://awm-math.org).

**THE MATHEMATICS DEPARTMENT AT BROWN UNIVERSITY** invites applications for the position of Associate Professor with Tenure, to begin July 1, 2020. Exceptionally qualified senior candidates may be considered for appointment at the level of Full Professor. Preference will be given to applicants who will interact mathematically with current members of the Department. For more information see: <https://www.brown.edu/academics/math/faculty>. Qualified individuals are requested to submit a letter of application, and a curriculum vitae online to: <http://www.mathjobs.org>. Applicants should include the names of precisely 5 references that would be contacted at the appropriate time by the search committee. Candidates should have an outstanding record of scholarship establishing them as international leaders in their fields; a demonstrated willingness to contribute to the vitality of the department by mentoring students and interacting with colleagues; a commitment to diversity and inclusion; and evidence of effective and responsible classroom teaching. Applications received by **October 15, 2019** will receive full consideration, but the search will remain open until the position is closed or filled. For further information or inquiries, write to: [sresearch@math.brown.edu](mailto:sresearch@math.brown.edu). Brown University is committed to fostering a diverse and inclusive academic global community; as an EEO/AA employer, Brown considers applicants for employment without regard to, and does not discriminate on the basis of gender, race, protected veteran status, disability, or any other legally protected status.

*continued on page 30*

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## ADVERTISEMENTS

**THE MATHEMATICS DEPARTMENT AT BROWN UNIVERSITY** invites applications for a position at the level of Tenure-Track Assistant Professor, to begin July 1, 2020. Preference will be given to applicants who will interact mathematically with current members of the Department. For more information see: <https://www.brown.edu/academics/math/faculty>. Qualified individuals are requested to submit a letter of application, a curriculum vitae and five reference letters to be uploaded by referees online to: <http://www.mathjobs.org>. At least one letter should address the candidate's teaching credentials. Candidates should have an excellent track record of research and teaching, a commitment to diversity and inclusion, and show clear potential to contribute in the future as tenured faculty members. Applications received by **October 15, 2019** will receive full consideration, but the search will remain open until the position is closed or filled. For further information or inquiries, write to: [sresearch@math.brown.edu](mailto:sresearch@math.brown.edu). Brown University is committed to fostering a diverse and inclusive academic global community; as an EEO/AA employer, Brown considers applicants for employment without regard to, and does not discriminate on the basis of gender, race, protected veteran status, disability, or any other legally protected status.

**THE CARLETON COLLEGE DEPARTMENT OF MATHEMATICS AND STATISTICS** anticipates hiring for two tenure-track positions in Mathematics, both at the Assistant Professor level, and both to begin September 1, 2020. Ph.D. in hand or imminent completion by that date is expected. Appointment at a higher level may be considered in exceptional cases. Please apply through Math Jobs. To ensure full consideration all application materials should be received by **November 15, 2019**. Carleton College does not discriminate on the basis of race, color, creed, ethnicity, religion, sex, national origin, marital status, veteran status, actual or perceived sexual orientation, gender identity or expression, status with regard to public assistance, disability, or age in providing employment or access to its educational facilities and activities. We are committed to developing our faculty to better reflect the diversity of our student body and American society. Women and members of minority groups are strongly encouraged to apply.

**THE DEPARTMENT OF MATHEMATICS AT CORNELL UNIVERSITY** invites applications for one tenure-track Assistant Professor position, starting July 1, 2020. While we particularly invite candidates in dynamical systems and geometric analysis, candidates from all areas will be considered. Diversity and Inclusion are a part of Cornell University's heritage. The College of Arts and Sciences at Cornell embraces diversity and seeks candidates who will create a climate that attracts students and faculty of all races, nationalities, and genders. We strongly encourage women and underrepresented minorities to apply. Cornell University is a recognized EEO/AA employer and educator, valuing AA/EEO, Protected Veterans, and Individuals with Disabilities. Applicants must apply electronically at <http://www.mathjobs.org>. Deadline **October 15, 2019**. Early applications will be regarded favorably.

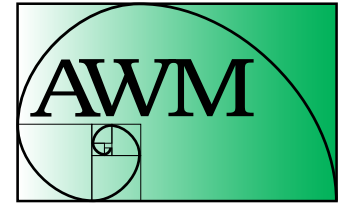
**THE DEPARTMENT OF MATHEMATICS AT CORNELL UNIVERSITY** invites applications for an H.C. Wang Assistant Professor, non-tenure track, non-renewable, 3-year position beginning July 1, 2020. Successful candidates are expected to pursue independent research at Cornell and teach three courses per year. A Ph.D. in mathematics is required. The Department actively encourages applications from women and minority candidates. Diversity and Inclusion are a part of Cornell University's heritage. We are an employer and educator recognized for valuing AA/EEO, Protected Veterans, and Individuals with Disabilities. Applicants must apply electronically at <http://www.mathjobs.org>. Deadline: **December 1, 2019**. Early applications will be regarded favorably.

**POMONA COLLEGE** invites applications for a tenure track position in the Department of Mathematics, at the rank of Assistant Professor, beginning July 1, 2020. We are looking for candidates who are committed to excellence in teaching and research, and who will be excited about mentoring students and supervising student research. The department has directed much effort towards creating a supporting community for all students, and is particularly interested in candidates who have experience working with students from diverse backgrounds and a demonstrated commitment to improving access to and success in higher education for underrepresented students. The department invites applicants in the areas of Analysis, Topology, Geometry, or Probability broadly construed. Those who display fluidity in crossing barriers between pure and applied mathematics and/or are comfortable working with realworld data are particularly encouraged to apply. Duties of the position include teaching four semester courses per year, and the direction of student senior projects on a wide range of topics. Pomona College is a highly selective residential liberal arts college attracting an economically and geographically diverse student body, located 35 miles east of downtown Los Angeles. It is the founding member of the Claremont Colleges, a consortium of seven institutions with over forty active mathematicians. Pomona College is an equal opportunity employer and especially invites applications from women and members of underrepresented groups. Applications are to be submitted at [Mathjobs.org](http://mathjobs.org). A complete application will include a curriculum vitae, graduate transcripts, at least three letters of recommendation (at least one of which evaluates teaching), a description, for the non-specialist, of research accomplishments and plans, a statement of teaching philosophy, and a diversity statement. Applications completed by **December 1, 2019**, will receive full consideration.

**THE DEPARTMENT OF MATHEMATICS AT THE UNIVERSITY OF NEBRASKA-LINCOLN.** Applications are invited for one tenure-track position in algebra or geometry, starting August 2020. The successful candidate will have a Ph.D. in mathematics and a demonstrated potential for excellence in mathematics research and teaching. Preference will be given to applicants who (i) have a documented research background in an area of algebra or geometry, particularly in commutative algebra, algebraic geometry, geometric group theory or closely related field, and (ii) have the potential to interact with and strengthen existing research groups within the Department of Mathematics. Applicants should submit a letter of application, a CV, separate statements addressing research and teaching, and at least three letters of reference, at least one of which should address teaching. Applicants are encouraged to use the AMS application cover sheet and to submit their applications via [mathjobs.org](http://mathjobs.org). If using [mathjobs.org](http://mathjobs.org) is not possible, hard copies may be sent to: Tenure-Track Search Committee Chair, Department of Mathematics, 203 Avery Hall, University of Nebraska-Lincoln, Lincoln, NE 68588-0130. In addition, to be considered for the position, applicants must also complete the Faculty/Administrative application at <http://employment.unl.edu>, requisition # F\_190101. Review of applications will begin **October 18, 2019** and continue until the position is filled. For more information see the department's web site at [www.math.unl.edu](http://www.math.unl.edu). As an EO/AA employer, qualified applicants are considered for employment without regard to race, color, ethnicity, national origin, sex, pregnancy, sexual orientation, gender identity, religion, disability, age, genetic information, veteran status, marital status, and/or political affiliation. See <http://www.unl.edu/equity/notice-nondiscrimination>

# 2019–2020 Individual Membership Form

JOIN ONLINE at [www.awm-math.org](http://www.awm-math.org)!



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[awm@awm-math.org](mailto:awm@awm-math.org)

LAST NAME \_\_\_\_\_ FIRST NAME \_\_\_\_\_ M.I. \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ STATE/PROVINCE \_\_\_\_\_

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AWM Membership, PO Box 40876, Providence, RI 02940

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(401) 455-4042, or visit our website at: [www.awm-math.org](http://www.awm-math.org)

I do not want my AWM membership information to be released for the Combined Membership List.

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## PROFESSIONAL INFORMATION:

Position: \_\_\_\_\_

Institution/Company: \_\_\_\_\_

City: \_\_\_\_\_ State/Province: \_\_\_\_\_ Zip/Postal Code: \_\_\_\_\_ Country: \_\_\_\_\_

If student, check one:

Graduate  Undergraduate

If not employed, leave position and institution blank.

## DEGREES EARNED:

Degree(s)	Institution(s)	Year(s)
Doctorate: _____	_____	_____
Master's: _____	_____	_____
Bachelor's: _____	_____	_____

## Individual Dues Schedule

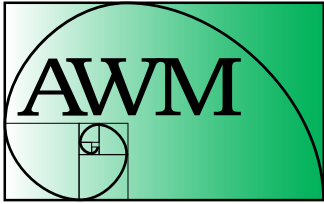
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## ASSOCIATION FOR WOMEN IN MATHEMATICS

Volume 49, Number 5, September–October 2019

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- 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)*

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

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

Position \_\_\_\_\_ Institution/Org. \_\_\_\_\_

Telephone: Home \_\_\_\_\_ Work \_\_\_\_\_

***MAIL TO:***

AWM  
PO Box 40876  
Providence, RI 02940

***or E-MAIL:***

awm@awm-math.org