AWM
ASSOCIATION FOR WOMEN IN MATHEMATICS

Newsletter

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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.

IN THIS ISSUE

PRESIDENT'S REPORT

Greetings from the train en route from Basel to the Zürich airport on a gray, wintery day.

December is fundraising month. The exciting news this year is that *an anonymous donor has pledged to match up to $5000 of end-of-year donations to AWM. Contributions received (by mail or website) by January 31, 2014 are eligible for the match.* While AWM has many dedicated volunteers, we cannot maintain our programs without monetary support. We need your help! If you care about the next generation of women entering the field, or have benefited from AWM programs in the past, please consider a generous gift this holiday season.

The past two years have seen three generous donations in the form of new research prizes. The first two of these prizes will be awarded at the upcoming Joint Mathematics Meetings (JMM) in January (see below). The third prize, the Joan and Joseph Birman Prize in Topology and Geometry, is currently accepting nominations through February 15. The Birman Prize will be awarded next year at the 2015 JMM. For more details, see https://sites.google.com/site/awmmath/programs/birman-research-prize.

In my last President's Report, I introduced the new AWM Advisory Board. Made up of a distinguished group of mathematicians and scientists from academia and industry, the Board is designed to offer a broad, external view of the Association and to help build connections with industry. Through these connections, we hope to expand the reach of our programs and open new possibilities for fund-raising. The first Board meeting took place in early November. The meeting opened with AWM personnel presenting an overview of the organization today. There was a consensus among the board that AWM had something of value to offer mathematicians working outside academia and companies requiring employees with strong computational and scientific skills. A productive discussion ensued about how AWM could reach out to such companies. Plans are in progress to follow up on several suggestions made at the Board meeting.

The big event on the horizon this month is the 2014 JMM to be held in Baltimore, January 15–18. As always, AWM has a full schedule of events planned for the JMM. Two highlights of the meeting are the AWM reception on Wednesday evening and the AWM Noether Lecture on Thursday morning. The reception, which begins at 9:30 p.m. following the Gibbs Lecture, will feature the presentation of several AWM prizes. In particular, I will have the honor of presenting the inaugural Microsoft Prize in Algebra and Number Theory and the inaugural Sadosky Prize

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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*

in Analysis, two new research prizes for early career women. *Please join us at the reception to honor the prize winners, Sophie Morel of Princeton University and Svitlana Mayboroda of the University of Minnesota.*

This year's Emmy Noether Lecture will be given by distinguished mathematician and former AWM President, Georgia Benkart. Her talk is intriguingly titled "Walking on graphs the representation theory way." Be sure to put it on your schedule! A joint AWM-AMS Special Session on Geometric Applications of Algebraic Combinatorics is planned in connection with the Noether Lecture.

Other AWM activities at the JMM include a panel discussion Wednesday afternoon on "Building a Research Career in Mathematics," a poster session/reception Friday evening, and a full-day workshop on Saturday for early career women. Following the model initiated last year, the workshop will focus on a particular research area and feature talks by both new PhDs and more senior women in the field. This year's workshop centers on image analysis, computational geometry, and computer vision. All in all, it promises to be a busy four days. To catch your breath, please stop by the AWM exhibit booth and say hello! For a complete listing of AWM events at the JMM see http://jointmathematicsmeetings.org/meetings/national/jmm2014/2160_otherorg.

I would like to close this report with some musings on a problem that many of you will face or have faced at some point in your career: the problem of traveling with young children. The difficulty of arranging childcare can be a serious impediment to attending conferences and special programs at a time in one's career when it is crucial to be making connections with research colleagues across the country and the world. The challenges involved in addressing this issue are formidable. Conferences encounter insurance problems in providing on-site childcare, government funding sources have not been open to funding childcare, and mothers are often uncomfortable leaving a child with an unfamiliar babysitter. Under the circumstances, I believe that the most feasible and effective solutions are the most flexible ones. For example, providing supplementary funding that would allow for options—bringing a regular babysitter along to a conference, arranging supplementary babysitting at home to accommodate a spouse's work schedule, or hiring an on-site babysitter at the conference location—would be ideal. Spearheaded by Lillian Pierce, our Mathematics + Motherhood columnist, and Christine Taylor of Princeton University, AWM is currently discussing the feasibility of initiating a childcare grant program. We welcome your input and ideas.

As I write this report (now at 35,000 feet, somewhere over the Atlantic), the AWM election is well underway. Newly elected officers will take office on February 1. AWM volunteers are the heart and soul of the organization. Their time and effort are crucial to the operation of our programs. It is with sincere gratitude that I acknowledge the work of outgoing Executive Committee members Trachette Jackson, Irina Mitrea, Ami Radunskaya, and Marie Vitulli. Also on February 1, the Past President will be replaced on the Executive Committee by the new President Elect. I would especially like to thank Jill Pipher, whose advice and guidance as Past President have been invaluable to me during my first year as AWM President. Jill has contributed greatly to the advancement of women in mathematics over the past four years through her leadership of AWM. She will continue to be

a model for women in the field both through her research and her leadership as Director of the Institute for Computational and Experimental Research in Mathematics (ICERM).

Ruth Charney
Waltham, MA
November 22, 2013

Ruth Charney

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, greenwaldsj@appstate.edu *and Alice Silverberg, University of California, Irvine,* asilverb@math.uci.edu.

Seven Math Girls

Jean E. Taylor, Rutgers University (Professor Emerita) and Courant Institute

On September 26th, Günter M. Ziegler, a German mathematician, talked for an hour with a roomful of girls (and assorted family members) at the National Museum of Mathematics (http://momath.org). This museum, which opened on 12/12/12, is in midtown Manhattan and is well worth a visit by anyone, though its target audience is 4th to 8th graders. Ziegler's intriguing title, "Seven Math Girls," turned out to hinge on a set of seven pictures.

The first was a set of photos of a piece of bone, with parallel slashes cut on the bone in several rows. The bone is 23,000 years old, was found near the Oshango River in the Congo, and is now in a museum in Germany. What does this have to do with a "math girl"? Well, one row has 11 slashes, another 13, another 17. It certainly appears to be representing numbers, which would make it the earliest known artifact with numbers. (No, not all the rows have a prime number of slashes!) People have speculated that the person doing the carving was a girl and that she was counting things. Why a girl? The reasoning seems to be that only a girl would have time for such an activity, a line of reasoning that seems to me more reflective of our culture than that of 23,000 years ago.

The second picture was one published on the cover of a book about Emmy Noether. It had been found in a folder of Noether-related material in Oberwohlfach,

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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 $116 for a basic four-line ad. Additional lines are $14 each. See the AWM website for *Newsletter* display ad rates.

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

Addresses
Send all queries and all *Newsletter* material except ads and queries/material for columns to Anne Leggett, leggett@member.ams.org. Send all book review queries/material to Marge Bayer, bayer@math.ku.edu. Send all education column queries/material to Jackie Dewar, jdewar@lmu.edu. Send all media column queries/material to Sarah Greenwald, greenwaldsj@appstate.edu and Alice Silverberg, asilverb@math.uci.edu. Send everything else, including ads and address changes, to AWM, fax: 703-359-7562, e-mail: awm@awm-math.org.

but it is not in fact of her! This gave Ziegler a chance to talk about Noether and her personality and to show a photo of her which Noether herself liked.

The third was a photo of a World War II American patent, about using frequency hopping for secret communication; the controller for it was a player piano. It was granted to George Antheil and Hedy Kiesler Markey. Ziegler made the patent a guessing game; the answer was that the Hedy of the patent was the movie star Hedy Lamarr. Zeigler talked a bit about Lamarr's math and its current use.

The fourth was a 1998 photo of a little girl working with a calculator that Ziegler said appears often in German newspaper articles about math and girls. He traced down the photo and found out that the girl, Sarah Sherry, is now a university student of engineering and materials science and had been playing with the calculator after finishing her math homework early. She still likes math.

On the other hand, the fifth photo was of a postcard said to be popular with German high school students, with a picture of a girl and the caption "Mathe ist ein Arschloch." (Ziegler politely translated it as "Math is a nuisance," but a couple of German girls in the audience said "That's not right! It means asshole!") This girl turns out to be unhappy about being on that postcard and is still struggling with her math in school.

The sixth photo was of a steel sculpture in Munich, in the shape of a one-sheeted hyperboloid with a vertical axis of rotation, extended smoothly at the base by a truncated cone. The sculptor, a woman, was initially going to call it "Power" but changed the name to "Mae West."

The seventh picture was a photo of an East German Math Olympiad group. The key here is that a girl seated in the middle is holding her hands in the shape of a rhombus (more or less). The girl was Angela Merkel, now the German Chancellor, and is known for that rhombus hand-pose as well as for her background as a physical chemist.

So the title "Seven Math Girls" was quite a stretch. Each picture does show some connection to math and to a female, kinda sorta maybe. And the audience was attentive, though the main people asking and answering questions were the German girls. Perhaps the focus on things with some relationship to Germany (even Hedy Lamarr was born in Vienna) engaged them more than the rest of the audience? In particular, on the last photo, Ziegler said "you all know who that girl is," yet even I had trouble recognizing the pronunciation of "Angela Merkel," so my guess is that he really lost most of his audience on that one.

You can see some of these pictures in his book *Mathematik—Das ist doch keine Kunst!* and read about the math and the "girls" in various wikipedia articles. You just might learn some interesting facts and have a good time, like the audience did.

WIMM Watch: *American Horror Story: Coven*

Sarah J. Greenwald

In this season's installment of FX's horror anthology, actress Gabourey Sidibe plays Queenie, the sassy "tough girl" at a girls' finishing school. In the episode "Boy Parts," which originally aired on October 16, 2013, we see her backstory. I found it particularly interesting that the show countered so many stereotypes in one scene—

ASSOCIATION FOR WOMEN IN MATHEMATICS

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Website: http://www.awm-math.org

AWM DEADLINES

AWM Essay Contest:
January 31, 2014

AWM Travel Grants:
February 1, 2014 and May 1, 2014

AWM Mentoring Travel Grants:
February 1, 2014

AWM-Birman Research Prize:
February 15, 2014

AWM Louise Hay Award:
April 30, 2014

AWM Humphreys Award:
April 30, 2014

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Queenie is a large black woman working at a fast food joint. A customer is belligerent when he feels that he has been shorted on the number of pieces of fried chicken. He accuses Queenie of having poor math skills and asks to see the manager. But Queenie is the manager and she is good at math: "Actually sir, I got an A in math, all of them—calculus, trigonometry, advanced algebra." This season is all about girl power, literally, so upon reflection, it made complete sense to have strong math ability represented in this context. However, I didn't have much time to revel in Queenie's math skills, because, as is typical on the show, horrific violence ensues.

BOOK REVIEW

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

Seduced by Logic: Emilie Du Châtelet, Mary Somerville and the Newtonian Revolution, Robyn Arianrhod. New York: Oxford University Press, 2012. 257 pp. ISBN-13: 978-0199931613.

Reviewer: Judith P. Zinsser, Miami University of Ohio, zinssejp@miamioh.edu

When another admirer of Emilie Du Châtelet (1706–49) read my biography of the marquise,[1] he commented that it lacked a description of what happened to the Newtonian scientific ideas and propositions that she wrote about. It is possible that readers had a similar wish after reading the standard biography of the nineteenth-century mathematician and scientist, Mary Somerville (1780–1872).[2] Robyn Arianrhod has given us such a description. In wonderfully clear language and with careful use of analogy, supplemented by seventeen pages of equally lucid appendices, she explains the corrections to, adaptions of and augmentations to Newton's physics as it evolved from the eighteenth to the twentieth century (3). Here, readers will find universal attraction, the conservation of energy, and the nature and behavior of light, to name only the topics of particular concern to Du Châtelet.

[1] *Emilie Du Châtelet: Daring Genius of the Enlightenment* (New York: Viking Penguin, 2007).

[2] Elizabeth Chambers Patterson, *Mary Somerville and the Cultivation of Science*, 1815–1840 (The Hague: Marinus Nijhoff Publishers, 1983).

Arianrhod goes beyond this elucidation of the premises and observations and their reformulation by successive generations to explain new discoveries such as electromagnetism, quantum theory, relativity and chaos theory. Chapter fifteen takes the narrative to the current resolution of quandaries about these topics and highlights how different our understanding of mathematics and science are from that of Du Châtelet and Somerville. Twentieth-century scientists, Arianrhod concludes, acknowledge that "probability," not "certainty," best describes their conclusions about the workings of the universe, and that calculations of long term phenomena and the "more subtle kinds of physical 'reality' " are at best predictions, like the mathematical models embraced by economists and statisticians (211–213, 243).

Thus, *Seduced by Logic* is not a comparative biography as its title suggests, but rather a thoughtful history of women's contributions to the traditional historical narrative of Western mathematics and science from the late seventeenth century to the present. For example, in addition to the sections on Du Châtelet and Somerville, Arianrhod offers often extensive digressions into the lives and work of other women from these centuries, including Maria Agnesi, Laura Bassi, and Sophie Germain. She also weaves in other changes in science and scientific thinking relating them back to her heroines, such as Herschel's experiments and their relationship to Du Châtelet's idea of heat (178), the invention of the metric system and Somerville's visit to Paris during the French Revolution (185).

In the Epilogue, Arianrhod explains with great eloquence the origin of her title and how she came to the study of mathematics. She, like Du Châtelet and Somerville, was suddenly struck by the awesome majesty of a universe ruled by natural laws which could be approximated in mathematical formulas and experimental models. "I realized anew," she writes, "like the passionate Emilie, just how calming it can be for the emotional person to abandon herself to the logic and certainty of mathematics and to be seduced by its noetic beauty (254–255)." Du Châtelet's translation of and commentary on Newton's *Principia* (from Latin into French) and Somerville's two-volume exposition of Laplace's *Méchanique céleste* (from French into English) made Newton's hypotheses about universal attraction and Laplace's final proofs of its validity available to a wider audience and demonstrated both women's mastery not only of languages, but also of the mathematics and physics essential to understanding these very difficult texts.

Arianrhod identifies the major negative and positive

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cultural attitudes and institutional realities affecting European women with intellectual ambitions: lack of access to education, to learned discourse, facilities and collaboration; the significance of a male mentor; and the ongoing problem of having writings accepted despite being written by a female. An appendix gives UNESCO statistics on women in science today, and North American studies on women in mathematics. Both demonstrate the persistence of those attitudes and realities, both negative and positive. However, Arianrhod offers no references in her notes or bibliography to the major feminist narratives and analyses of women in science. These would have offered even more authority and depth to her analyses of these women's choices and accomplishments. Also, to a women's historian, some other aspects of the writing jar. Arianrhod refers to her heroines as "Emilie" and "Mary."[3] Unfortunately, this style tends to diminish the woman even if unintended. It is hard to imagine a study of "Isaac" and "Albert"; they remain Newton and Einstein for Arianrhod as they do for other authors. As for sources, she has read her subjects' scientific writings, the principal biographies, texts in mathematics and physics specifically related to Newton and Einstein, and a few articles on women in science. However, the readings seem more eclectic than systematic. For example, Arianrhod includes a popular French biography of Du Châtelet complete with imagined conversations. She relies extensively on Somerville's *Recollections* even though Somerville did not write or dictate them until she was in her eighties.

Finally, I wish Arianrhod had been able to read more widely in the current histories of European science that place it in a broader cultural context, for example by: William Clark, Lorraine Daston, Jan Golinski, David Gooding, Sarah Knott, Thomas Kuhn, Margaret Osler, Trevor Pinch, Simon Schaffer, Stephen Shapin, Barbara Taylor, Betty Jo Teeter-Dobbs.[4] These authors consider the ways in which women (and most men) were gradually excluded from its study, their work dismissed not only because it did not fit existing paradigms or originate in the appropriate institutional setting, but also because it questioned our narrow definition of "science," how it must be conducted, and what constitutes contribution and accomplishment. The authors of such studies have shown the continuing significance of the intersections between science and philosophy, the intertwining of disciplines, the significance of rejected hypotheses, and the elusive quality of what is defined as "true." Both Du Châtelet and Somerville concerned themselves with these topics, and so a comparative study of their lives and works would have been enhanced by use of those texts.

For example, a desire to find "true" or "certain" knowledge brought both women to their appreciation of mathematics and desire for its mastery. Mathematics and the study of physical phenomena led both to descriptions of nature that defied scripture. Each of them, outside of her century's educational establishment, could read and speculate widely, across what were coming to be designated as separate disciplines. Somerville's *On the Connexion of the Physical Sciences* (1834) shows this ability in a nineteenth-century context, as Du Châtelet's *Institutions de physique* (1740 and 1742) does in the eighteenth-century's. Both conducted their "science" within the household, and yet maintained their extended family; both had an active social and intellectual network. Perhaps even more significant, the cultural milieu for women and men in science in their eras and in the present day explains why gaining appropriate recognition for both of them remains difficult. Too often their writings are labeled "unoriginal," and therefore of no real intellectual and scientific value. They are interesting prodigies, notable because they are women who managed to rise above the usual expectations for their sex.

Both women suffer from what the feminist intellectual historian Berenice A. Carroll calls "the class system of the intellect" and its accompanying definitions of what is defined as "new" and "original."[5] Overwhelmingly in human history, men's inventions fulfill those criteria, such as the stone ax and the steam engine, but not women's, for example, bread and cloth. "Originality," Carroll argues, is itself a misnomer as nothing has evolved without antecedents. Words describing women's contributions, as in the orthodox,

[3] Also, the spelling of Du Châtelet's name is not correct throughout the book. Although it is "Du Châtelet" with a capital "D" in the title and often in the text, there are occasions, including in the index, when it is "du." "Du" in this instance does not denote a place of origin but is an integral part of the name, and therefore is always capitalized.

[4] Among their works, see, for example: David Gooding, Trevor Pinch, and Simon Schaffer eds. *The Uses of Experiment: Studies in the Natural Sciences* (New York: Cambridge University Press, 1989); William Clark, Jan Golinski, and Simon Schaffer eds. *The Sciences in Enlightenment Europe* (Chicago: University of Chicago Press, 1998). For a general view of women in the Enlightenment era see Barbara Taylor and Sarah Knott, eds. *Women, Gender and Enlightenment* (New York: Palgrave Macmillan, 2007).

[5] Berenice A. Carroll, "The Politics of 'Originality': Women and the Class System of the Intellect," *Journal of Women's History* 2 (2) (1990): 136–64.

traditional history of science, denigrate rather than applaud their accomplishments. They become "popularizers," creators of syntheses, collaborators or assistants. All indicate a ranking of efforts and assert the claim that ideas can be the exclusive property of some and not others. Thus, women have too often been designated as of lesser intellect or placed outside the patriarchal system altogether, the institutionalized system that controls not only the definitions of "procedures," "evidence," and "valid work," but also the recognition and rewards within a field and a discipline. Du Châtelet is finally beginning to escape this denigration, Somerville still teeters on the edge (226). It is to be hoped that Arianrhod with her extensive understanding of the era, the mathematics and the science, will write a full-scale biography and persevere in her efforts to bring reevaluation and appreciation to the life and work of this other remarkable nineteenth-century mathematician and scientist.

Interesting Web Pages

http://healthland.time.com/2013/11/27/goldieblox-sparks-a-pink-toys-debate-this-holiday/ is titled "The War on Pink: GoldieBlox Toys Ignite Debate over What's Good for Girls." (The debate we saw seemed to be mostly about their use of a parody of a Beastie Boys song as their original soundtrack.) The video that went viral showcases a Rube Goldberg machine built by girls using some of the GoldieBlox engineering toys, to counter the pink princess images associated with many girls' technical toys.

We all know how much airbrushing can easily be done these days via software, but http://www.upworthy.com/seewhy-we-have-an-absolutely-ridiculous-standard-of-beauty-in-just-37-seconds?c=reccon1 showcases a short video that makes it easy to show someone (a 12-year-old obsessing about her body, perhaps?) just what can be done.

CALL FOR NOMINATIONS

2015 M. Gweneth Humphreys Award

The Executive Committee of the Association for Women in Mathematics has established a prize in memory of M. Gweneth Humphreys to recognize outstanding mentorship activities. This prize will be awarded annually to a mathematics teacher (female or male) who has encouraged female undergraduate students to pursue mathematical careers and/or the study of mathematics at the graduate level. The recipient will receive a cash prize and honorary plaque and will be featured in an article in the *AWM Newsletter*. The award is open to all regardless of nationality and citizenship. Nominees must be living at the time of their nomination.

The award is named for M. Gweneth Humphreys (1911–2006). Professor Humphreys graduated with honors in mathematics from the University of British Columbia in 1932, earning the prestigious Governor General's Gold Medal at graduation. After receiving her master's degree from Smith College in 1933, Humphreys earned her PhD at age 23 from the University of Chicago in 1935. She taught mathematics to women for her entire career, first at Mount St. Scholastica College, then for several years at Sophie Newcomb College, and finally for over thirty years at Randolph-Macon Woman's College. This award, funded by contributions from her former students and colleagues at Randolph-Macon Woman's College, recognizes her commitment to and her profound influence on undergraduate students of mathematics.

The nomination documents should include: a nomination cover sheet (available at www.awm-math.org/humphreysaward.html); a letter of nomination explaining why the nominee qualifies for the award; the nominee's vita; a list of female students mentored by the nominee during their undergraduate years, with a brief account of their post-baccalaureate mathematical careers and/or graduate study in the mathematical sciences; and supporting letters from colleagues and/or students. At least one letter from a current or former student of the candidate must be included.

Nomination materials for the Humphreys Award shall be submitted online. See the AWM website at www.awm-math.org for nomination instructions. Nominations must be received by **April 30, 2014** and will be kept active for three years at the request of the nominator. For more information, phone (703) 934-0163, email awm@awm-math.org or visit www.awm-math.org/humphreysaward.html.

EDUCATION COLUMN

Education Column Editor: Jackie Dewar, Loyola Marymount University, jdewar@lmu.edu. *This issue, there are two articles in the column.*

Contingent Faculty: What is the Problem?

Patricia Hale, Department of Mathematics and Statistics, California State Polytechnic University, Pomona

Recently, this column explored the issue of contingent faculty in the academy (Morley, 2013). Given the importance of this issue, I will continue that exploration. Much of the existing work about this group of educators focuses on how they are often mistreated. As I was once an adjunct myself, and my partner currently holds such a position, I know from personal experience how holding such a position can at times feel degrading. These lived experiences have given me first hand knowledge of the unacceptable compensation and working environment contingent faculty face. Even knowing the current sad reality of the academy, I still believe that the soul of higher education should have a strong social conscience. Moral objections aside, educators should know that institutional success based on the abuse of workers is never sustainable. However, what I will examine in this article is the possible impact of this trend on education in general, on mathematics students, and on women in mathematics.

First, what is meant by contingent faculty? This term is commonly used to refer to those teaching at a post-secondary institution who are referred to as lecturers or adjunct faculty; the position may be full or part time (Ochoa, 2011). Another term used is non-ladder faculty, since they are not on the tenure line (ladder). Some data on contingent faculty include post docs, graduate student assistants, and others who may be employed solely in a research capacity. The term is generally used to identify individuals doing the same work done by ladder faculty, but to whom the institution has made no long-term commitment.

One common argument against contingent faculty is that they are not as "good" at teaching as ladder faculty. I tend to agree with Evans (2009) that there are contingent faculty who are great teachers, and some who are awful—which is exactly the case with ladder faculty. However, testing this hypothesis is evidently difficult as there is little research comparing student success (or student learning outcomes) based on the status of the instructor. Bolge (1995) did not find a difference in student success in remedial math courses when comparing the impact of instructors who were either full time or part time instructors at a community college. Part time instructors are clearly contingent faculty, but full time faculty involved in this study could be ladder or contingent faculty. Thus, the research does not tell us if contingent faculty are better or worse than ladder faculty at teaching the material in a given course. In a similar study (Carrell & West, 2010), faculty are differentiated on the basis of experience, more vs. less, which again is not helpful for this examination.

Another argument is that contingent faculty are not as rigorous and therefore do not prepare students for future courses. Carrell and West (2010) found that students who had more experienced instructors did better in subsequent calculus courses. This study clearly says that teaching experience matters—no surprise there—but does not say much about the status of the instructor relative to being on tenure line or not. Bettinger and Long (2004) found no difference in student performance in subsequent courses based on the status of the instructor (contingent vs. ladder faculty). Bettinger and Long even found that in technical fields such as computer science, adjuncts had a positive impact on student performance in subsequent courses. We may conjecture as to why in some fields this would be the case. For example, in computer science or architecture, the adjunct may be a professional with years of experience and enthusiasm for her field. However, the discrepancy in results from these two studies indicates more research is necessary to truly understand this phenomenon.

Several studies agree that nonetheless taking courses from contingent faculty negatively impacts students. Students taught by contingent faculty have less interaction with those faculty outside of class and are less persistent at remaining in school (Umbach, 2007, Harrington & Schibik, 2001). Bettinger and Long (2004) also found a type of persistence—in this case defined as students who took a subsequent course in the same field—was more likely when students took a course from ladder faculty. Similarly, Egan and Jaeger (2008) found that students who took "gatekeeper" courses from ladder faculty were more likely to persist into the second year. Moreover, several studies have indicated that colleges and universities with a higher percentage of part time faculty have lower graduation rates (Ehrenberg & Zhang, 2004; Jacoby, 2006). Thus, research consistently indicates that contingent faculty are not able to develop the relationships with students outside of class that promote retention.

So far the research indicates exactly what we would expect. Contingent faculty are paid to teach and it appears that, even with fewer resources than ladder faculty, they are

Percentage of Contingent Faculty 2005–2006		
Type of institution	Doctoral	Master's & Bachelor's
AAUP Data (all departments)	26%	25%
AMS Data (math departments)	36%	43%

doing a reasonable job of teaching students in their courses and preparing students for subsequent courses. I could not find any research to contradict this. However, they do not interact with students as much as ladder faculty—something they are not paid to do and often do not have the resources to do. For example, at many institutions contingent faculty must share an office with many other instructors, if they even have an office.

Given the increased use of contingent faculty and the problems just discussed, the question arises: How do the percentages of contingent faculty teaching in mathematics departments compare to overall percentages at colleges? Although it is often believed that the contingent faculty issue is more of a problem at community colleges, I will focus on the situation at four-year institutions using 2006 data from AAUP and AMS. Problems with comparing these data sets include that the AMS data does not appear to include graduate students who are teaching or doing research as part time faculty, while the AAUP data does.

The data indicates that the use/abuse of contingent faculty is even more prevalent in mathematics than it is in academe in general. The situation could be worse than the data indicates since using graduate students to teach courses is prevalent in most math departments and thus the percentages given in the table above underestimate reality. Most of us have observed in our own institutions that our departments employ adjuncts at a higher rate than many other departments. This substantial use of contingent faculty in mathematics does justify why those concerned about mathematics

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CALL FOR NOMINATIONS

The 2015 AWM – Joan & Joseph Birman Research Prize in Topology and Geometry

The Executive Committee of the Association for Women in Mathematics has established the AWM – Joan & Joseph Birman Research Prize in Topology and Geometry. This prize will be awarded every other year, beginning in 2015. 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 having not yet received tenure, at the nomination deadline.

The AWM – Joan & Joseph Birman Research Prize in Topology and Geometry serves to highlight to the community outstanding contributions by women in the field and to advance the careers of the prize recipients. The award is made possible by a generous contribution from Joan Birman who works in low dimensional topology and her husband Joseph Birman who is a theoretical physicist.

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. 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 15, 2014**. If you have any questions, phone 703-934-0613 or email awm@awm-math.org.

Percentage of Ladder and Contingent Faculty who are Women by Type of University and Faculty Degree Status

	University – Doctoral			University – Master's			College – Bachelor's		
	Ladder	Contingent		Ladder	Contingent		Ladder	Contingent	
		Full Time	Part Time		Full Time	Part Time		Full Time	Part Time
PhD	14%	29%	29%	27%	38%	29%	28%	25%	36%
Non-PhD	29%	59%	45%	45%	57%	46%	54%	45%	49%
Total	14%	38%	40%	28%	52%	43%	30%	40%	47%

as a profession are troubled by the current trends in the hiring of non-ladder faculty.

Those interested in advancing women in mathematics careers may want to consider the likelihood that a woman pursuing a career in academia will work for a period of time, and possibly her whole career, in the contingent faculty category. From 2000 to 2009 the percentage of PhD's awarded to women hovered around 30% and the percentage of Master's degrees awarded to women from 2004 to 2009 was about 41% (Hale, 2012). The percentage of women with doctorates who are ladder faculty at Master's and Bachelor's granting institutions has almost caught up with the percentage of women who are new PhD's, while the percentage of female ladder faculty at doctoral institutions still lags. In the table above we compare percentages of female ladder faculty with the percentage of women who are contingent faculty at various types of institutions broken down by the women's terminal degree (Blair, 2013).

The table indicates that women who have a PhD are generally represented in the contingent ranks at a greater rate than tenure line women. One exception to this is the 25% of full time women at Bachelor's institutions. The situation at doctoral institutions may be of particular concern because, in 2010, only about 14% of the ladder faculty are women, but 29% of the contingent faculty who have a PhD are women. However, the percentage of non-doctoral women in contingent faculty positions is not only greater than the percentage of women who receive a Master's degree, but is also significantly greater than the percentage of women who have a PhD and are either ladder or contingent faculty. The pipeline for women in mathematics from terminal degree to a contingent faculty position does not seem to "leak," but instead women magically appear, particularly at the Master's level.

So what does this mean for a female student in mathematics? We know that when she arrives at a college or university, it is highly likely that her math courses will be taught by contingent faculty or possibly graduate teaching associates since less than 24% of instruction is provided by ladder faculty (Morley, 2013). The good news is that this means it will be more likely that she will have a female instructor, since women are a larger percentage of the adjunct faculty than they are of tenure-line faculty. But will that instructor have the time and resources to be a positive role model for this student? Will the student want the career that she sees women in mathematics have? I don't know anyone who aspires to be contingent faculty. Since her instructor is likely to be contingent faculty, she is less likely to have as much interaction with that person as a student twenty years ago would have had; this in turn makes it more likely that she will decide not to take additional math courses or possibly even to quit school completely. We have been fighting for increasing the number of women in mathematics, and retaining women in STEM fields, for a long time. It is discouraging that the current trends in higher education are working against those efforts.

What can we do about this "crisis"? Forces outside of our departments primarily dictate the trend of using more contingent faculty. However, for the sake of our students, and our colleagues who are contingent faculty, we must try to take action, but how? Kezar and Maxey (2013) suggest we turn to our professional societies; they suggest that it must be an organized effort if change is to occur. As a first step our societies could become part of a collective group, such as the Coalition on the Academic Workforce (see http://www.academicworkforce.org/). Kezar and Maxey also suggest our societies work to eliminate barriers for contingent faculty, perhaps by making efforts to include this group in the specific society and all aspects of the profession. Societies could use conferences and publications to increase awareness of the issues and develop a policy statement for members

and member institutions of the society. We can look to our unions, or look to forming a union on our campus. A recent study indicates salaries for contingent faculty are higher when they have union representation (Coalition on the Academic Workforce, 2012). If our campus has a union, we could ask that they become part of a collective effort as well. Organizing, in one form or another, seems to offer the best hope for getting our universities to do the right thing for contingent faculty and students.

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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.

Mathematics Education Mentoring Grants. Women mathematicians who wish to collaborate with an educational researcher or to learn about educational research may use the mentoring grants to travel to collaborate with or be mentored by a mathematics education researcher. In order to be considered for one of the travel grants, a mathematics applicant must hold a doctorate in mathematics. A mentor should hold a doctorate in mathematics education or in a related field such as psychology or curriculum and instruction. The applicant's research must be in a field which is supported by the Division of Mathematical Sciences of the National Science Foundation.

Selection Procedure. AWM expects to award up to seven grants, in amounts up to $5,000 each. Awardees may request to use any unexpended funds for further travel to work with the same individual during the following year. In such cases, a formal request must be submitted by the following February 1 to the selection committee or funds will be released for re-allocation. (Applicants for mentoring travel grants may in exceptional cases receive up to two such grants throughout their careers, possibly in successive years; each such grant would require a new proposal and would go through the usual competition.) For foreign travel, U.S. air carriers must be used (exceptions only per federal grant regulations; prior AWM approval required).

Eligibility and Applications. Applicants must be women holding a doctorate (or equivalent) and with a work address in the USA (or home address, in the case of unemployed applicants). Please see the website (http://www.awm-math.org/travelgrants.html) for further details and do not hesitate to contact Jennifer Lewis at 703-934-0163, ext. 213 for guidance.

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

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Linking "Women in Mathematics" and Middle School Girls through Mentoring

*Emek Kose (*ekose@smcm.edu*) and Angela Johnson (*acjohnson@smcm.edu*), St. Mary's College of Maryland*

As readers of this newsletter well know, women continue to be underrepresented in STEM fields. This underrepresentation of women in math-based STEM fields can be viewed as a matter of social justice. Furthermore, women have the potential to contribute not only to the size but the diversity of the STEM workforce. Diversity leads to innovation, and women's presence is essential for generating creativity.

Motivated by these concerns, we designed an intervention with a nested structure—a college course "Women in Mathematics" (WIM) with an outreach component. College students in the WIM course studied the lives and mathematical contributions of women mathematicians throughout history, and current gender equity issues in education and mathematical careers. They also mentored 20 middle school girls throughout the semester culminating with the younger students acting as "leaders" of math activities at a math-oriented event for middle school girls. This "nested strategy" resulted in a significant change of attitude in college students and positive changes in middle school girls towards STEM fields. This article describes our program and the outcomes we obtained. It also seeks to initiate conversations with others teaching or interested in teaching women-in-mathematics courses.

The Course and Program

We developed a college course with the goals of improving attitudes toward mathematics and addressing the underrepresentation of women in mathematics. The course, "Women in Mathematics" (WIM), was one section of Survey of Mathematics, a class non-math majors take to satisfy the college's core curriculum requirement. The WIM students learned about the lives and mathematics of nine historical women and current gender issues in mathematics; in addition, they mentored 20 middle school girls throughout the semester.

The class was designed to inform college students (both women and men) about the role of women in mathematics and the issues women in STEM face, while increasing their confidence in math. To increase their confidence, the

instructor (Emek) wanted to try something completely new: mentoring and playing math games with middle school girls, who, as the course material would reveal, are a critical group to target in STEM recruitment. As college students got involved in working with girls from our local middle school, we hoped the issue of girls drifting away from math, and women's underrepresentation in math-focused STEM fields, would become personal for them in a way unlikely to be achieved just by having them attend lectures and read papers. This proved to be the case. When the college students interviewed the middle school girls, they saw the issues from class come to life before their eyes, and it led them to ponder the whys and hows of retaining women in STEM. We directed the class to both female and male college students because it is not only women who are going to be the agents of change. It is equally important for men to improve their confidence in math and its usefulness and to advocate for greater diversity in the math-based STEM workforce. Specifically, the objectives of the course included:

- Identify more than ten current and historical female mathematicians by name and field of work;
- Investigate the current gender issues and participation of women in mathematics from elementary through graduate school and mathematics-related careers;
- Make and investigate mathematical conjectures;
- Through the mentoring component, be a part of creating a positive change for the future and feel empowered.

As previously noted, the class had a nested mentoring structure. The college students were mentored by the professor and affiliated faculty; in turn they mentored middle school girls as part of the afterschool activity we created. The students in the WIM class came up with their own goals for the afterschool mentoring program, which included:

- Inspire the girls to pursue careers in the STEM fields;
- Help increase the confidence and participation of the girls in higher level math and science classes;
- Be positive role models;
- Offer strong mathematics guidance and close mentor-student relationship with the aims of reducing stereotype threat and changing attitudes to get the girls to adopt the belief that intelligence and ability are expandable;
- Help them become persistent by encouraging them to keep trying when they get a problem wrong or when they are stuck.

In addition to the mentoring component, the in-class activities spanned a wide range, including but not limited to: student-led discussions on the lives and times of the women mathematicians and supplementary articles, understanding and practicing mathematics in the form of group work, and having women mathematicians from academia and the industry visit the class to talk about how they use mathematics and their mathematical lives.

The college students worked in groups of three or four, and each group was assigned two to four middle school girls as mentees. The groups planned the math games they were going to play with their mentees and set their goals for each visit ahead of time. We wanted the college students to be on the same level as the middle schoolers as opposed to taking a position of authority. We also wanted a fun and relaxed environment for middle school girls to enjoy math. These reasons led us to opt for math games rather than tutoring. We used math games mainly from *Math Wise: Over 100 Hands-On Activities that Promote Real Math Understanding, Grades K–8* (Overholt & Kincheloe, 2010). The WIM students and their mentees also organized a "math games session" for the annual Math Girls Day event hosted every semester on our college campus for 40–50 middle school girls. The middle school students, supported by their mentors, presented the math board games and a math scavenger hunt to other middle school girls from three different schools in our local school district. Participants reported the math games sessions to be the highlight of the day due to the variety of games completely designed by the teams and presented by the mentored middle school girls.

The Results

Both the afterschool activity run by the WIM class and the class itself were successful. To measure the college students' attitudes towards math we used four scales from the Fennema-Sherman Mathematics Attitudes Scale: the Confidence in Learning Mathematics scale, the Mathematics Usefulness scale, the Teacher scale and the Mathematics as a Male Domain scale. Scales were administered in the first and last week of class. WIM student attitudes improved significantly in three of the four, indicating that their confidence, their perception of the utility of mathematics, and their perception of their teacher's attitudes towards math all improved. (We conjecture that their sense of math as a male domain remained unchanged as a result of learning about the struggles and underrepresentation of women

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in mathematics.) The letters they wrote at the end of the semester provided additional evidence of changed attitudes. The following excerpt comes from a letter to an imagined future student in the class: "before this class I hated math and really knew nothing, and never thought of women's contribution to math. Math to me always seemed like a guy thing. This class taught me so much. It makes me wonder when and why did I begin disliking math. Math is so important and useful in everyday things." In a letter to her middle school mentee, another college student wrote, "you may not think it will ever be helpful to you, but just being math literate opens a lot of doors. You never know what your interests or passions will be ten years from now."

We saw similar growth in the middle school girls' attitudes. Qualitative data from pre- and post-activity interviews and the field notes of the college students indicated that 100% of the girls enjoyed our afterschool activity, and 30% changed their attitudes towards math and said they would take mathematics in high school. Anonymous post-program evaluation comments by the middle school girls included the following: "This is my favorite after-school activity. When are you coming back again?" "You make math fun!" Of 20 girls, 10% stated that they would consider a STEM career. The feedback we received from the afterschool program coordinator was equally encouraging, both in terms of girls' enjoyment of the program, and how they talked to their friends about the mathematical activities they had been doing. Overall, we think that the nested structure of the program was key to the success of the program and the significant changes in attitudes of both target groups.

While designing the WIM course, we benefited immensely from conversations with women colleagues all over the country who have taught a similar course before. Our experience with the course made us curious about other "women and mathematics" courses and similar programs targeting elementary, middle and high school girls. *To that end, we see this brief report as initiating a dialogue and kindly ask the readers to contact us at the email addresses above to exchange ideas or develop new ones together.*

Acknowledgements

We would like to thank the MAA Tensor Grant for Women in Mathematics for making it possible to design and teach the course and Jacqueline Dewar, Angela Gallegos, Susan Goldstine and Lindsay Jamieson for invaluable conversations that helped us shape the program.

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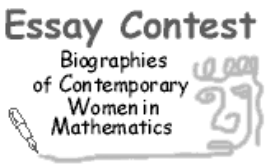
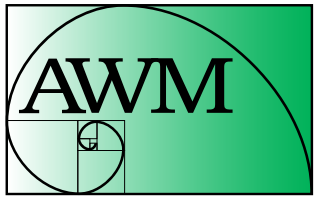


To increase awareness of women's ongoing contributions to the mathematical sciences, the Association for Women in Mathematics holds an essay contest for biographies of contemporary women mathematicians and statisticians in academic, industrial, and government careers. AWM is pleased to announce that the 2014 contest is sponsored by Math for America, 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, contact Dr. Heather Lewis (the contest organizer) at hlewis5@naz.edu or see the contest web page: www.awm-math.org/biographies/contest.html. The deadline for electronic receipt of entries is **January 31, 2014**. (To volunteer as an interview subject, contact Heather Lewis at the email address given.)



STUDENT CHAPTER COLUMN

AWM History Panel at UIC

Jessica Dyer

The UIC AWM Student Chapter held a panel on November 15, 2013, entitled "Women in mathematics: Reflections and history from female mathematicians." The panelists were Alexandra Bellow (Northwestern), Jeanne LaDuke (DePaul), Anne Leggett McDonald (Loyola), Bhama Srinivasan (UIC), and Amie Wilkinson (University of Chicago); Steve Hurder (UIC) was the moderator.

Each panelist took a turn to tell us about her thoughts on women in math: her personal history, and/or her research into women in math in general. Bhama Srinivasan, a past president of the AWM, told us about the founding of the AWM and presented statistics on the proportion of female PhD recipients and tenured faculty in American universities. Jeanne LaDuke spoke about her book *Pioneering Women in American Mathematics: The Pre-1940 PhD's* and told us about those PhD recipients and their careers and the challenges they faced. Anne Leggett is the long-time editor of the *AWM Newsletter*; she spoke about her experiences editing the newsletter and the changes over the decades. Alexandra Bellow spoke about her personal experiences as a woman in math during her time in grad school and during her professorship at Northwestern. Amie Wilkinson, one of the first four female tenured professors of mathematics at the University of Chicago, spoke about her career and her thoughts on the current state of the field.

Panelists Bhama Srinivasan, Jeanne LaDuke, Anne Leggett, Alexandra Bellow, and Amie Wilkinson

We promoted the event widely and encouraged visitors from other universities and departments to attend. The event was very well attended, with a diverse audience of about 75 people, consisting of professors, grad students, undergrads, and visitors from other schools. We had to bring in extra rows of chairs and we still had people standing in the back on both sides of the room! We had interesting questions and comments from the audience during the discussion at the end of the panel. The event was followed by our departmental tea, where the panelists and audience were able to mingle and continue the discussion.

This event was planned by graduate student members of our chapter, including Yen Duong, Ellie Dannenberg, Janet Page, Cara Mullen, Jessica Dyer, and Caroline Terry, as well as by Bhama Srinivasan and with invaluable help from our faculty mentor, Brooke Shipley.

MATHEMATICS, LIVE!

A Conversation with Karen Saxe

Interviewer: Katharine Ott, University of Kentucky

Karen Saxe is Professor of Mathematics at Macalester College. She is currently serving as the 2013–2014 AMS Congressional Fellow. I spoke with Karen on the phone about her fellowship and her career in mathematics.

KO: Good morning, Karen. Where are you today?

KS: I am in Washington, DC in the office of Senator Al Franken (D. MN).

KO: What are you doing there?

KS: I am the AMS/AAAS [American Association for the Advancement of Science] Science and Technology Policy Fellow, which is a lot of words! The AAAS sponsors about 30 Congressional Fellows each year. Each fellow is sponsored by a professional society. I am sponsored by the AMS and I am the only mathematician in the cohort. I work in Senator Franken's office. Education is my main policy area but I am also going to be helping with Indian Affairs and Marriage Equality. I am on the legislative team, developing legislation and helping that legislation get worked through Congress and into actual law.

KO: Why is it important for mathematicians to have a presence in Washington, DC?

KS: In general, it is good for all of us scientists to be here [in Washington, DC] because there are not many politicians, nor really many people on the legislative teams, with science backgrounds. There are some, for example Representative Holt (D. NJ) has a PhD in physics, but it is good to spread people who have PhDs in sciences out around the House and Senate. The AAAS has altogether over 200 fellows right now in the government, 34 are Congressional Fellows and all of the rest are in the Executive Branch. There is another mathematician in that group and also several computer scientists. The Executive branch fellows are placed in many agencies, including the NSF and the NIH [National Institutes for Health], and we talk with them regularly, so we form a bridge between the Legislative and Executive branches through the sciences. The Congressional Fellows provide information to our offices on energy issues, climate, food safety, health policy, and education policy. We are able to interpret information we listen to at Congressional hearings from experts and help form questions for these experts.

Also, to have someone here who has a lot of experience working in higher education is useful. There is currently a lot of focus on STEM education and also on what is referred to as CTE (Career and Technology Education). It is really useful to have scientists as a part of this conversation—people who have themselves been successful in science and in school and who enjoyed school—as we try to change the conversation as to how to get elementary and secondary schools doing [STEM education and CTE] better or more successfully.

KO: You teach a course on mathematics and politics and have some previous political involvement. Can you share with us why you are interested in politics?

KS: You asked why it's important for "us" to be on the Hill, but the answer to that is different from the answer to the question of why I wanted to do it. As I have had more experience in higher ed administration, I really wanted to see how the government and higher education interact, for one thing. I also wanted to learn more about K–12 education policy, something that I have been involved with in a personal way for years in Minnesota.

I have done redistricting in the state of Minnesota and served on the Citizens Minnesota Redistricting Commission. When I did that it became clear to me that to do policy and to work with policy makers was something that I felt more comfortable with than I imagined I would, and I became more interested in it. I teach about that stuff. I don't do anything about redistricting or voting here except to have fun conversations with people about it. People ask me questions like, "What do you think of instant runoff voting?" because Minneapolis, for example, uses it in their city election.

KO: You have been very active in professional organizations throughout your career. Why do you think professional organizations are important?

KS: I think that they bring us together. We do great stuff at our own institutions—research, curriculum development and outreach. But you get stuck in your little world, and even if you are doing great things there are a lot of other people doing great things. I think that the professional organizations bring us together with people who we might not have more naturally come together with to talk about issues related to teaching, research and outreach. They also provide huge amounts of support, especially to young mathematicians. Actually, to everybody! I am currently benefiting from AMS support.

KO: You mention that the professional organizations support young mathematicians. How can junior faculty or graduate students start to get involved in these groups?

KS: I know that in the case of the MAA it really is as simple as volunteering. Every year there is a nomination process online and you can just nominate yourself. The MAA needs people to volunteer. I am not right this second doing anything

for the AWM, but I have served on committees and I think the AWM is more or less the same. I encourage people just to write to somebody if they are interested.

KO: Let's talk a little about your background. Can you give us an overview of your education and your career path?

KS: I went to college at Bard College in New York. I knew that I wanted to do science; at first I thought that I might want to do chemistry or physics. I started out in calculus, physics and chemistry. I liked calculus pretty well, and I did really well in it and the teacher thought that I should take linear algebra the next year. I took linear algebra and that sealed the deal. I majored in math and physics, and at the end of junior year I knew I was going to get a PhD, but I wasn't sure whether I should apply to math or theoretical physics departments. I don't remember how I made the decision but sometime over the summer I decided to go to math graduate school. I applied, and happily chose to go to the University of Oregon, which turned out to be a great match for me. I thought I wanted to do group theory, and I originally went there because both Charlie Curtis and Gary Seitz were there. My analysis background was a lot weaker so I had to start in the first analysis course and it turned out to be wonderful. I loved it and went down the road of doing functional analysis. I like it because it brings algebra and analysis together. My PhD was on rings of operators, so many of the techniques were very algebraic—dealing with ideals and so on.

I was pretty sure I wanted to end up teaching at a good liberal arts school, but I thought that I should apply for research postdocs. Things were a little different than they are now. It was not the case that you really needed to do a postdoc to get a job at a good liberal arts school, which is more standard now. But in any case, I ended up taking a FIPSE [Fund for the Improvement of Postsecondary Education] postdoctoral fellowship at St. Olaf College in Minnesota. That was terrific because I taught one class each semester and had a huge travel and book budget. I had a great mentor at St. Olaf College, Paul Humke, who brought us every week to the University of Minnesota, and we would talk with people there. It was a two-year postdoc, so then I applied to liberal arts schools. I was figuring out that I liked Minnesota a lot, and I got a job at Macalester. That is where I have been ever since.

KO: Can you describe what your department is like?

KS: Our department is a joint math, computer science and statistics department. We have about 15 people, three are computer scientists, two have statistics PhDs, there are three with PhDs with all different areas—one is applied math, one is electrical engineering and another one is biomedical physics—and the rest of us are straight up mathematicians. We are the biggest department on campus. We offer three majors; two of them are Math and Computer Science, and we have an Applied Math and Stats program, which just started

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CALL FOR NOMINATIONS

2015 Louise Hay Award

The Executive Committee of the Association for Women in Mathematics has established the Louise Hay Award for Contributions to Mathematics Education, to be awarded annually to a woman at the Joint Prize Session at the Joint Mathematics Meetings in January. The purpose of this award is to recognize outstanding achievements in any area of mathematics education, to be interpreted in the broadest possible sense. The annual presentation of this award is intended to highlight the importance of mathematics education and to evoke the memory of all that Hay exemplified as a teacher, scholar, administrator, and human being.

The nomination documents should include: a one to three page letter of nomination highlighting the exceptional contributions of the candidate to be recognized, a curriculum vitae of the candidate not to exceed three pages, and three letters supporting the nomination. It is strongly recommended that the letters represent a range of constituents affected by the nominee's work. Nomination materials for the Hay Award shall be submitted online. See the AWM website at www.awm-math.org for nomination instructions. Nominations must be received by **April 30, 2014** and will be kept active for three years. For more information, phone (703) 934-0163, email awm@awm-math.org or visit www.awm-math.org.

since I was chair. I was chair there for the six years preceding this.

KO: As a faculty member, what is your balance of research, teaching and service?

KS: We teach five courses a year, so that is a 2–3 teaching load. Because we are such a big department, those teaching math can almost always count on only two preps in a semester. We really do require an active scholarly portfolio, so you do have to publish. It's different throughout your career, but to get tenure you have to publish, and you have to continue to be active throughout to continue to get promotions.

KO: What are some of the best things about working at a liberal arts college?

KS: For one, the students are terrific, and so is the faculty. I guess I'll just give a couple of examples of that. My department is terrific at developing curriculum. Together with several colleagues we have developed a really great introduction to calculus and statistics, a one-year course for students. Another example of how we collaborate is the following. There is a center for scholarship and teaching on campus, and every week a faculty member gives a talk about what their current research is. One week you go in and you hear from a painter, and the next week you are hearing from a physicist. It's very casual, but you can ask all kinds of questions about these things. And you really get to see what everybody is doing and sharing. From what I have seen, you don't typically get that at a university.

KO: What kinds of jobs do your students pursue after graduation and how do you try to prepare them?

KS: We are not a department that really pushes a ton of students towards theoretical math PhDs. We do have some great students who go on and do that, but that is not the focus of our program. We try to foster the notion that there are a lot of things you can do with math. Right now,

NSF-AWM Travel Grants for Women

Mathematics Travel Grants. Enabling women mathematicians to attend conferences in their fields 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.

Mathematics Education Travel Grants. There are a variety of reasons to encourage interaction between mathematicians and educational researchers. National reports recommend encouraging collaboration between mathematicians and researchers in education and related fields in order to improve the education of teachers and students. Communication between mathematicians and educational researchers is often poor and second-hand accounts of research in education can be misleading. Particularly relevant to the AWM is the fact that high-profile panels of mathematicians and educational researchers rarely include women mathematicians. The Mathematics Education Research Travel Grants provide full or partial support for travel and subsistence for

- mathematicians attending a research conference in mathematics education or related field.
- researchers in mathematics education or related field attending a mathematics conference.

Selection Procedure. All awards will be determined on a competitive basis by a selection panel consisting of distinguished mathematicians and mathematics education researchers appointed by the AWM. A maximum of $1500 for domestic travel and of $2000 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. These travel funds are provided by the Division of Mathematical Sciences (DMS) of the National Science Foundation. The conference or the applicant's research must be in an area supported by DMS. Applicants must be women holding a doctorate (or equivalent) and with a work address in the USA (or home address, in the case of unemployed applicants). Please see the website (http://www.awm-math.org/travelgrants.html) for further details and do not hesitate to contact Jennifer Lewis at 703-934-0163, ext. 213 for guidance.

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

doing statistics is really popular, students might go into marketing or into non-profit work doing data analysis. We try to tie the math to different disciplines. I think we do a really good job not just connecting math to the sciences, but also to the social sciences.

KO: What stage of your career has been the most challenging for you?

KS: Probably the middle of grad school, that was one super challenging time. The math was hard, and I saw a bunch of people dropping out. And I had three children pre-tenure. I probably won't say more about why that was difficult, but I am sure anyone who reads this can imagine. Those were some interesting and very challenging times. My husband is also a mathematician, so the whole thing of getting two careers going with young children was challenging.

KO: What professional accomplishments are you most proud of?

KS: I think chairing my department. I don't know if I can take responsibility, but good things happened. We started the Applied Math and Stats major and it has been really successful. Also to be doing this [Congressional Fellowship] and serving on the editorial board of some of the MAA journals has been very satisfying.

KO: Have mentors played an important role in your career?

KS: Yes. Yes! If anyone played a huge role in my career, it was Ken Ross from the University of Oregon. I'll name one more—Joan Hutchinson. She is a colleague at Macalester and has been super supportive of me.

KO: Is there anything else that you would like to share with the AWM community?

KS: When I was going to grad school, the role that the AWM played was really clear. When I talk to my female students now, a lot of times they don't quite get why things are hard. Sometimes they have never had any problems or faced any adversity because of being a woman. But, talking to women who have done PhDs, they still do. In this Congressional group of fellows I am the only mathematician, so most people are bench scientists, and the stories that you hear, the issues, are the same as ever. I think that the support of the AWM is still really important and needed.

KO: Thank you very much for your time.

KS: Thanks, Katy.

MATHEMATICS + MOTHERHOOD

Interview with Ruth Charney

Lillian Pierce, Hausdorff Center for Mathematics and Duke University

Ruth Charney is a Professor of Mathematics at Brandeis University and President of AWM.

LP: Tell me a bit about your mathematical work.

RC: I work in an area called geometric group theory. I started out in K-theory, which was a hot topic when I was in graduate school, and I've gradually changed fields over the years. I've always been interested in the interaction between algebra and topology, either looking at groups from a geometric point of view or looking at topological spaces from an algebraic point of view. In the early 1990s, geometric group theory, as we now know it, came into existence and it was new and exciting. I jumped on the bandwagon and I have been enjoying it ever since.

LP: How has your work with AWM grown and changed over the years?

RC: I have been a member of AWM for nearly 40 years. I was on the AWM Executive Committee back in the early '90s, and for a number of years after that, I helped to organize the AWM workshops for early career women at the Joint Mathematics Meetings. After that, I became more active in the American Mathematical Society and less involved in AWM, although I continued to be involved in many activities aimed at supporting women in math. About a year and a half ago, I got a call out of the blue asking if I would consider running for the presidency of AWM. Actually, I had been asked once before, years earlier, but at that time, with children still at home and a sabbatical on the horizon, it just wasn't a good time. This time, I felt I was at the stage of my career where I should be "giving back," so I agreed.

LP: Tell me about your children, and when in your career you had them.

RC: I have two children, both boys, who are now grown up. The first is 26 and the second is 23. I had children fairly late. My first child was born shortly after I got tenure. But I should emphasize that that was not part of a plan, I was not "waiting" till I got tenure, it just happened that way. When I was young, my life was very full with my career, my friends, and

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other passions. (I spent many happy hours studying modern dance, for example.) I wasn't really interested in children at the time. It was not until I was in my early thirties when I started to think "well, maybe I do want children and I'd better think about this now!" At the time, my (future) husband and I had jobs in different cities, so we made the commitment to find jobs together. All that took time. It just happened that I got tenure in the meantime.

LP: Did the experience of having a new baby and being a tenured professor match your expectations?

RC: Anyone who has had children can tell you that having a baby (especially the first) is full of surprises! But I think my expectations were not too far off in terms of the effect on my work. The advantage I had, which many women who have children at a younger age do not have, is that my husband (an economist) and I both had secure academic jobs. We were both making decent salaries, we both had flexibility in our schedules, and we could afford to hire someone to help with childcare.

LP: What kind of childcare did you arrange?

RC: When our children were small, we hired a student at Ohio State University to look after them part-time. We adored her and the kids adored her! She worked for us for 10 years! After the kids were grown up and didn't need childcare, she used to come by to take them out for excursions because she missed them.

LP: That sounds like a wonderful childcare arrangement.

RC: Having a babysitter we totally trusted made a huge difference. When the kids were little and the babysitter was there, I would go to my office to work. Some people try to work at home when their children are young. But I had two mental compartments. When I was at home I thought only about my kids and it was very hard for me to think about work; when I was at my office I thought only about my work and I kept the kids in the back of my mind. I could change modes very quickly if I changed physical locations. It worked well for me.

LP: But unlike a postdoc, a full faculty member would have significant teaching. Did you make any special teaching arrangements when your children were born?

RC: With my first child, the year I was pregnant I was on leave at the Institute for Advanced Study. The baby was born in April so I had from April until September without teaching. I didn't have to make any special arrangements for that. With my second, I didn't have that leisure. He was due at the end of August and was born a few weeks late in September and I was supposed to teach that year. I thought to myself, "I'd rather do my teaching in the fall quarter, since I know I won't be able to think about research anyway, and I'll clear out a later quarter to concentrate on my research." So I was teaching two courses two weeks after my son was born. A week into the term, I realized I was completely nuts! That's the one thing I would do differently if I had it to do over!

LP: It sounds like we should be grateful that teaching reductions following the birth of a child are relatively common now!

RC: At that time nobody was talking about accommodations for childbirth. It never occurred to me to ask for a reduced teaching load or other special arrangements. The only thing I asked for were some reasonably easy courses to teach.

LP: Did you have any role models or mentors on how to move forward during those years of new motherhood?

RC: There were a couple of women in the department who were quite a bit older, but I never discussed it with either of them. I didn't worry much about these things. I did what felt right to me and assumed I could work things out. I'm convinced that's how those of us who started our careers in the '70s survived. We just didn't notice the obstacles. We did what we did and went plowing ahead. It took a certain kind of personality.

LP: How do you think things have changed since then?

RC: Most of the women I know now in mathematics are having kids, or have had kids. I don't think it's unusual at this point. I have had a number of young women who are thinking about having children ask me whether they should request accommodations, and express concern about not being taken seriously, or not being able to keep up their level of research. So women are definitely concerned about this. But now there are lots of models out there of successful ways to raise a family and build a career at the same time, and universities are willing to make accommodations. I hope that your column on Mathematics + Motherhood will help young women to realize that. You can have children as a graduate student, as a professor, or anywhere in between. The challenges are different at each stage, but you just have to do what's right for your life. I don't think there's a *best* answer, but I do think there's always a *solution* to the problems.

LP: What accommodations do you think are most important?

RC: Providing time is the most important thing. So teaching reductions and release from administrative duties are of primary importance in the first year or two. Beyond that, we need to facilitate travel to attend conferences and to work with collaborators, so grants to help women with childcare issues to enable them to travel would be enormously helpful. Mentoring can also be valuable. There's one-on-one mentoring or group mentoring. The groups can involve women at various levels from across the sciences. I like groups because one gets more variety of perspectives and experiences, and effective one-on-one mentoring relationships often grow naturally out of these. By talking about the issues, one learns about arrangements that others have made that worked well, or the need to advocate at the university level for more accommodations.

LP: Group discussions can be really helpful—it's reassuring just to see other mathematicians and scientists who are going through, or have already advanced through, the stage where both children and career seem to need infinite time.

RC: True, but it's not just children. I had a serious hobby for a long time. I can look back and say, if I hadn't done this, this, and this, no doubt I could have written more papers. My kids, my hobbies, my outreach activities—all took time that I could have focused on doing more mathematics. If I could go back, would I do it the same way again? Absolutely! If you want to spend 100% of your time doing mathematics, then yes, children will get in the way of that. But if I hadn't had children, no doubt I would have let some of my other passions distract me.

ICWM 2014

The Local Organizing Committee of ICWM 2014, icwm2014.
seoul@gmail.com

The International Congress of Women Mathematicians 2014 (ICWM 2014) is a satellite conference of the International Congress of Mathematicians 2014 (ICM 2014) which will be held August 13–21, 2014 in Seoul, Korea. The purpose of the ICWM 2014 satellite conference is to bring together women mathematicians and supporters of women in mathematical sciences from around the world to showcase the mathematical contributions of women, to exchange ideas about supporting and encouraging active careers for women in the mathematical sciences, and to provide the opportunity for young women mathematicians from especially developing countries to meet and talk with women in the mathematical sciences from around the world. This meeting in Seoul will be the second full meeting of its kind associated with the ICM. The first such meeting was held in association with ICM 2010 in Hyderabad, India.

The ICWM 2014 meeting will consist of one and a half days of activities spread over several days. A full day of activities is planned for August 12th, the day before ICM 2014 begins. The venue will be Ewha Womans University in Seoul, about one hour by car or subway from COEX Convention Center, the site of ICM 2014. Five colloquium style talks will be given by leading women mathematicians from around the world, invited at the recommendation of the 16 international members of the ICWM 2014 Program Committee organized by the International Mathematical Union (IMU). In the afternoon, there will a one-hour panel discussion session with representatives of women mathematicians' organizations around the world. The second half day of activities will be held August 14, 2014 from 3–7 p.m. at COEX Convention Center to provide easier access to more participants. Two more colloquium style talks are planned for the half day session followed by a two-hour open social hour, ICWM-Night, with light snacks and drinks for everyone. Following at 7 p.m., the ICM 2014 Emmy Noether Lecture will be delivered. Throughout the one and a half day conference, there will be an international poster session.

ICWM 2014 is sponsored and organized by Korean Women in Mathematical Sciences (KWMS) with assistance and guidance from IMU, European Women in Mathematics (EWM), and AWM. KWMS is actively raising funds to provide 100 travel grants and other financial support for women participants, especially from developing countries. The travel grant application process is coordinated with ICM 2014. For more information see http://www.icm2014.org and http://www.kwms.or.kr/icwm2014.

It is hoped that through international meetings such as ICWM 2014, a network of supporting organizations for women mathematicians in all countries can work together to support and encourage active careers for women in mathematical sciences everywhere. Please join us in Seoul this year. Your participation, women or men, in support of women in the mathematical sciences will help to make ICWM 2014 a great success.

Announcements

ICM 2014 Satellite Conferences

A number of satellite conferences will be held throughout Korea before and after ICM 2014. See http://www.icm2014.org/sc.

Ki-Won Kim (kwkim@silla.ac.kr) and Bettye Anne Case (case@math.fsu.edu) would like to hear from women who may attend the satellite conference at Dongguk University (http://22.icfidcaa.org); they are planning a discussion session.

EWM Summer School

The 6th European Women in Mathematics Summer School will focus on Apollonian Circle Packings, at the Institut Mittag-Leffler, Sweden, June 23–27, 2014. It will be funded by the EWM, EMS and the Number Theory Foundation and is being organized by Alina Bucur (UCSD), Pirita Paajanen (Wellcome Trust Sanger Institute) and Lillian Pierce (Duke/Hausdorff Center for Mathematics). This Summer School will feature lecture series by Elena Fuchs (Berkeley) and Hee Oh (Yale) on Apollonian Circle Packings and related topics.

The aim of European Women in Mathematics summer schools is to provide a stimulating intellectual environment for female and male PhD students from different countries and different mathematical disciplines to learn new mathematics (outside the scope of their own research) and to meet new colleagues. The historic Institut Mittag-Leffler will provide accommodation, breakfast, and lunch to all participants; very limited funding for travel may be available in exceptional circumstances. Applications are due on **January 15, 2014** at the IML website: http://www.mittag-leffler.se/?q=2014 school. More information may be found at http://math.uscd.edu/~abucur/ewm/index.html.

Accelerating Change for Women Faculty of Color in STEM

IWPR, November 2013, http://www.iwpr.org/

As the U.S. continues to prioritize building a stronger STEM (science, technology, engineering, math) workforce, a new Institute for Women's Policy Research (IWPR) report shows that women faculty of color remain significantly underrepresented. In 2010, underrepresented minority (URM) women (blacks, Hispanics, Native Americans and those who identify as more than one race) were just 2.1 percent of STEM faculty at U.S. 4-year colleges and universities, while comprising 13 percent of the U.S. working age population. In contrast, white men held 58 percent of these positions, while making up 35 percent of the working age population. The highest level of representation for URM women faculty is in the life sciences and the lowest is in computer science and mathematics.

The IWPR report shares recommendations from a high-level convening of experts who explored improvements needed to speed progress. While women's earnings in most STEM fields are higher than in most female-dominated occupations, women faculty of color face challenges, such as hostile workplace climates, work-life balance issues, and the failure of many academic departments to embrace diversity.

"Ensuring that women faculty of color have the supports to pursue and advance in STEM academic careers is increasingly important, especially given the projected growth of these fields in the coming years," said Cynthia Hess, IWPR Study Director and report co-author. "To increase the number of highly-skilled STEM workers and strengthen the economic security of U.S. families, we must engage the entire STEM talent pool."

The report also presents data on the "STEM representation gap"—the increase needed to achieve full STEM representation in relation to representation in the total population. The gap is highest among black women who experience a representation gap at the doctorate level of 71 percent.

The convening of academic administrators, professors, and government representatives recommended developing a scorecard system for monitoring and publicizing individual institutions' progress on diversity in STEM, making targeted funding available to women faculty of color, and shifting university hiring and promotion practices.

The report, *Accelerating Change for Women Faculty of Color in STEM: Policy, Action, and Collaboration*, is available for free download at the IWPR website.

ASSOCIATION FOR WOMEN IN MATHEMATICS

AWM Conflict of Interest Policy

A conflict of interest may exist when the interest (financial or other) or concerns of any member of AWM, or the member's immediate family, or any group or organization to which the member has an allegiance or duty, may be seen as competing or conflicting with the interests or concerns of AWM.

When any such potential conflict of interest is relevant to a matter requiring participation by the member in any action by AWM or any of its committees to which the member belongs, the interested party shall call it to the attention of AWM or the committee and such person shall not vote on the matter. Moreover, the person having a conflict shall retire from the room in which the organization or its committee is meeting (or from a conference call) and shall not participate in the final deliberation or decision regarding the matter under consideration.

The foregoing requirements shall not be construed as preventing the member from briefly stating her position in the matter, nor from answering pertinent questions of other members, as her knowledge may be of great assistance.

The minutes of the meeting of the organization or committee shall reflect when the conflict of interest was disclosed and when the interested person did not vote. When there is a doubt as to whether a conflict of interest exists, and/or whether a member should refrain from voting, the matter shall be resolved by a vote of the organization (or its committee), excluding the person concerning whose situation the doubt has arisen.

A copy of this conflict of interest statement passed by the AWM Executive Committee, Vancouver, 8/16/1993, shall be published once a year in the *AWM Newsletter*, and any member serving as an officer or on a committee shall be advised of the policy upon undertaking her duties.

AWM Members, Sponsors and Contributors: Thank-yous

AWM is very 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 our annual special thank-yous to the sponsors, contributing members, contributors, and institutional members who made donations between July 1, 2011 and June 30, 2012 by listing them here. We also thank those who prefer to remain anonymous.

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BOWDOIN COLLEGE — Tenure-track Assistant Professor position starting Fall 2014. Preference given to applications from applied mathematicians whose research interests touch on both the pure and applied aspects of their specialization. Areas that would particularly complement current faculty expertise include, but are not limited to, stochastic processes, dynamical systems, and spatial models. Teaching two courses per semester, generally one calculus or introductory level course and one intermediate or advanced course. Ph.D. preferred, advanced ABDs considered. Visit http://www.MathJobs.org to apply. Review begins **12/9/13** and will continue until position is filled. Bowdoin College is committed to equality and is an equal opportunity employer. For a full description of the position and further information about the College, see www.bowdoin.edu.

GOING TO GRADUATE SCHOOL? THINK EDGE (ENHANCING DIVERSITY IN GRADUATE EDUCATION) — The goal of the EDGE program is to strengthen the ability of women students to successfully complete PhD programs in the mathematical sciences, with particular inclusion of women from underrepresented groups. Pending funding, the 2014 EDGE Summer Program will be held June 2 – June 27 at Harvey Mudd College, Claremont, CA. The summer session provides two core workshops in analysis and algebra/linear algebra, as well as a shorter workshop in a vital area of mathematical research. EDGE also promotes networking and community through collaborative problem solving and by including facilitators from institutions across the country, speakers from academia and industry, and peer mentors. A follow-up mentoring program and support network is established with each participants' graduate program. Applicants to the program should be women who are either graduating seniors who have applied to PhD programs in the mathematical sciences or recent recipients of undergraduate degrees who are now entering Ph.D. programs. All applicants should have completed standard undergraduate courses in analysis and abstract algebra; final acceptance into the program is contingent upon acceptance to a PhD program in the mathematical sciences. Participants are provided travel, room and board, and a stipend. For application materials and additional details, visit http://www.edgeforwomen.org/ The deadline for applications is **March 3, 2014**.

INSTITUTE FOR DEFENSE ANALYSES — The Institute for Defense Analyses Center for Communications ResearchóPrinceton (IDA/CCR-P) is looking for individuals in mathematics, computer science, electrical engineering, and related fields to join in exciting research that enhances our nationís security along with our sponsor, the National Security Agency. Individuals that thrive here enjoy solving difficult problems with a wide range of tools, from mathematics, statistics, computational science, and engineering. Rather than recruiting specific specialties, we are looking for smart PhDs who are willing to learn whatever it takes to solve our ever evolving research problems. Some problems require very deep and sophisticated mathematics, others the latest computational and other technologies, and many problems require both. Ours is a superior professional working environment emphasizing cooperative effort. We are located in Princeton, NJ and benefit from the exciting intellectual environment of our immediate area, as well as the benefits of being close to both New York and Philadelphia. U.S. citizenship and a Department of Defense TS//SI clearance (with polygraph) are required. IDA/CCR-P will sponsor this clearance for those selected. The Institute for Defense Analyses is proud to be an equal opportunity employer, committed to diversity in the workplace. Individuals with disabilities, including ìdisabled veteransî or veterans with service-connected disabilities, are encouraged to apply. Interested individuals should contact Dr. David J. Saltman (Director) at saltman@idaccr.org with a C.V. and a list of references.

UNIVERSITY OF CALIFORNIA, RIVERSIDE — Department of Mathematics — F. Burton Jones Chair in Pure Mathematics — Applications and nominations are invited for the F. Burton Jones Chair in Pure Mathematics. The chair was established by a generous endowment from the late Emeritus Professor F. Burton Jones. The holder of the Jones Chair is expected to be a mathematician of great distinction, with national and international recognition for scholarly achievement. The holder is also expected to play a leadership role in the department and to further grow the departmentís strength in pure mathematics. It is hoped to have the position filled by July 1, 2014. It is expected that the appointment will be with tenure at the rank of full professor and that the appointee will perform all the duties thereof. Established criteria of the University of California determine rank and salary. Initial review of applications will begin on Monday, **December 2, 2013** and will continue until position is filled. Please send nominations, applications (curriculum vitae, publication list and names of at least five references) and other supporting materials to:Professor David Rush, Chair, Selection Committee, F. Burton Jones Chair, Department of Mathematics, University of California, Riverside, Riverside, CA 92521-0135. The University of California, Riverside is an Affirmative Action/Equal Opportunity Employer

UNIVERSITY OF CALIFORNIA, RIVERSIDE — FACULTY POSITION IN PURE MATHEMATICS — Applications and nominations are invited for a tenure track faculty position beginning July 1, 2014. Applications are welcome from those working in all areas of Pure Mathematics. The position will be at the assistant professor level. A PhD in Mathematics is required. Tenure track assistant professor applicants are expected to have demonstrated excellent research and teaching, normally including major contributions beyond the doctoral dissertation. Responsibilities of this position include teaching undergraduate and graduate level courses and seminars, conducting scholarly research and participation in departmental and university service activities. Established criteria of the University of California will determine the salary and the level of appointment. Applicants should log on to mathjobs.org to submit their curriculum vitae, including a list of publications and a minimum of 3 letters of recommendation. Evaluation of applications will begin on Monday, **December 2, 2013** and will continue until the position is filled. University regulations and laws concerning confidentiality govern all letters of recommendation (see Academic Personnel Manual 160 http://www.ucop.edu/academic-personnel/_files/apm/apm-160.pdf). The University of California, Riverside is an Affirmative Action/Equal Opportunity Employer. UCR has family-friendly policies and is committed to accommodating the needs of dual career couples. Under Federal Law, the University of California may employ only individuals who are legally authorized to work in the United States as established by providing documents specified in the Immigration Reform and Control Act of 1986.

UNIVERSITY OF CALIFORNIA, RIVERSIDE — TWO FACULTY POSITIONS IN APPLIED MATHEMATICS OR CLOSELY RELATED AREAS — Applications and nominations are invited for two tenure track faculty positions beginning July 1, 2014. Applications are welcome from those working in Applied Mathematics or areas with strong ties to the applications of mathematics. Both positions will be at the assistant professor level. A PhD in Mathematics is required. Tenure track assistant professor applicants are expected to have demonstrated excellent research and teaching, normally including major contributions beyond the doctoral dissertation. Responsibilities of these positions include teaching undergraduate and graduate level courses and seminars, conducting scholarly research and participation in departmental and university service activities. Established criteria of the University of California will determine the salary and the level of appointment.

Applicants should log on to mathjobs.org to submit their curriculum vitae, including a list of publications and a minimum of 3 letters of recommendation. Evaluation of applications will begin on Monday, **December 2, 2013** and will continue until the position is filled. University regulations and laws concerning confidentiality govern all letters of recommendation (see Academic Personnel Manual 160 http://www.ucop.edu/academic-personnel/_files/apm/apm-160.pdf). The University of California, Riverside is an Affirmative Action/Equal Opportunity Employer. UCR has family-friendly policies and is committed to accommodating the needs of dual career couples. Under Federal Law, the University of California may employ only individuals who are legally authorized to work in the United States as established by providing documents specified in the Immigration Reform and Control Act of 1986.

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UNIVERSITY OF CHICAGO — Position Title: Assistant Professor **Req #** 01857 — The Department of Statistics at the University of Chicago invites applications from exceptionally qualified candidates for faculty positions at the rank of Assistant Professor. We seek individuals doing advanced research in statistical methodology or theory or in related fields. As part of a University of Chicago initiative, applicants could be working in scientifically focused computation or applied mathematics, but hiring is not limited to that initiative. It is expected that all successful applicants will engage in the direction of doctoral dissertations, as well as teaching at the undergraduate and graduate levels. Interdisciplinary collaboration will be particularly valued. While applicants do not need to be specifically trained in statistics, they must have doctorates in statistics or some field of mathematics or science where statistical concepts play an important role. Doctorate must be in hand at the time of appointment. Appointments may be made jointly with another department in the University. A demonstrated research excellence appropriate to the rank is essential. Applicants must apply online at the University of Chicago Academic Jobs website at http://tinyurl.com/mct7w4e, and must upload a cover letter and CV. You may also upload research and teaching statements as well as up to three relevant research publications, but they are not required. In addition, three letters of reference will be required. Referral letter submission information will be provided during the application process. Application screening will begin November 1, 2013; submission by **December 1, 2013**, will ensure consideration during this academic year, but the search will continue until all positions are filled or the search is closed. Inquiries should be sent to the Search Committee at search@galton.uchicago.edu or to Search Committee, Department of Statistics, Eck 108, University of Chicago, 5734 S. University Avenue, Chicago, IL 60637. The University of Chicago is an Affirmative Action /Equal Opportunity Employer. http://tinyurl.com/mct7w4e

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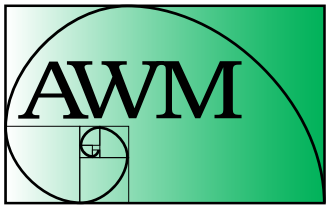

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