

Newsletter

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Contents

From the Editor 2

The Netflix Prize 3

Classroom Connections:
Differential Equations 5

The Blackwell-Tapia
Conference 7

College Board of Mathematical
Sciences (CBMS) Report 8

The Fourth Annual Field of
Dreams Conference 8

Angela Grant Scholarship Fund 9

NAM at the 2011 Joint
Mathematics Meetings 10

NAM Calendar 10

Job Openings 11

NAM Board of Directors 18

NAM Membership Form 19

Black, Brown, and Beige Together



Blackwell-Tapia Conference 2010

The Blackwell-Tapia Conference was hosted by the Mathematical Biosciences Institute (MBI) at The Ohio State University in Columbus, Ohio on November 5-6, 2010. In the words of an esteemed speaker, this conference brought black, brown, and beige together in the spirit of mathematics.

Top Row: Trachette Jackson (University of Michigan, Blackwell-Tapia Prize Winner), Juan Meza (Lawrence Berkeley National Laboratory), William Massey (Princeton University), Rodrigo Bañuelos (Purdue University), Marty Golubitsky (Ohio State University, Director of MBI)

Bottom Row: Johnny Brown (Purdue University), Cassandra Washington (student), Ryan Hynd (University of California, Berkeley), Richard Tapia (Rice University), Emery Brown (Massachusetts Institute of Technology)

The National Association of Mathematicians (NAM)

publishes the NAM Newsletter four times per year.

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This website has a list of open job and summer positions. It also features past editions of the *Newsletter* and editions from 41.1 to present are in color.

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NAM's Official Webpage <http://www.nam-math.org>

NAM's History and Goals: The National Association of Mathematicians, Inc., known as NAM was founded in 1969. NAM, a nonprofit professional organization, has always had as its main objectives, the promotion of excellence in the mathematical sciences and the promotion and mathematical development of under-represented minority mathematicians and mathematics students. It also aims to address the issue of the serious shortage of minorities in the workforce of mathematical scientists.

From the Editor

As I walk to my office, I pass by the *Women of Mathematics* MAA poster and my eyes find Etta Z. Falconer. Next to a photo of her teaching, it reads

If being a woman mathematician was difficult in the mid twentieth century, being a black woman was exponentially harder.

I glance back at the picture of her teaching and I drift back to my college days when she taught me Abstract Algebra. She presented groups eloquently but I always had a stronger interest about her own hardships and what made her succeed. It was out of recognition of hardships in mathematics for underrepresented groups that NAM was born. A resonating question that NAM's founders pondered was "If not we as spokespersons, then who?" Fortunately, NAM continues to be a positive, enthusiastic force in the mathematical community.

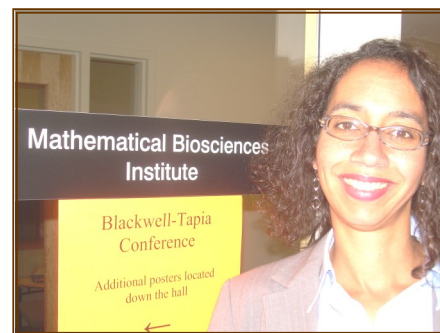
This enthusiasm for math helped Robert Bell and Chris Volinsky develop the best recommendation software which resulted in winning the famed Netflix Prize. Excitement for math permeated every talk at the Blackwell-Tapia conference as we shared our mathematical and personal accomplishments. As educators, we share our passion by helping students make connections about what they learn.

At the Field of Dreams Conference, mentors shared their expertise to cultivate and develop the next generation of scholars. All the while, PBS has shown us that we can keep life interesting by finding enjoyment through a "secret life" outside of academia.

The continuation of NAM's energy and enthusiasm is a function of what its members bring. I encourage you to be active and engaged in NAM by joining our activities and celebrations at the Joint Mathematics Meetings 2011 in New Orleans. Every time we join together, I am encouraged from the support that abounds.

I look forward to seeing each and every one of you at the Joint Mathematical Meeting where we will bring in a new fiscal year. Together, we can create pathways of success for our organization that will amplify our efforts so that hardships will be "exponentially" decreased.

See you soon!



Talitha Washington



The Netflix Prize

Robert Bell and Chris Volinsky

In October 2006, the DVD-rental company Netflix released a massive data set of 100 million customer movie ratings as part of the Netflix Prize, a contest to improve upon its current recommendations. Netflix uses prior ratings by its customers to recommend additional movies (actually DVD's of all sorts) that the customers are likely to enjoy. Because Netflix believes that its recommendations service is critically important to customer satisfaction, and therefore to customer retention, it offered a \$1,000,000 prize for achieving a 10% improvement on its existing algorithm, measured by root mean squared prediction error on a set of test data.

While massive, the data release was conceptually quite simple. Each of the 100 million training records included four fields:

- a movie ID (there were 17,770 distinct movies),
- a user ID (about 480,000 users),
- the rating date (covering six years, 2000-2005), and
- the rating (an integer from 1 to 5).

The name and release year was provided for each movie ID, but no additional information was provided about users. The job of contest participants was to predict ratings for a set of almost three million test cases that contained the same first three fields—but no ratings. Contestants were allowed to submit predicted ratings for the test cases once per day and received feedback in the form of the root mean squared prediction error (RMSE) for a random half of the test cases (the public part). The RMSE for the other (secret) half of the test cases was always withheld, for use by Netflix to determine prize winners. A leaderboard (www.netflixprize.com/leaderboard) showed an up-to-date ranking of teams in terms of their public RMSE's.

The unprecedented prize and data release created quite a stir in the statistics and machine learning communities, with thousands of entrants from around the world. The two of us, both statisticians, joined with a computer scientist colleague, Yehuda Koren (now at Yahoo! Research), to form the entry named BellKor (a pun on two of our names and BellCore, the original research consortium for the Baby Bells after the break-up of AT&T).

Using state-of-the-art methods, the top teams reached halfway to the 10% goal within six weeks and 60 percent of the way within ten weeks. But after those initial large advances, further progress generally came in much smaller steps—fine tuning of other people's models, combinations of existing methods, and the occasional truly new idea. The journey to the 10% target took almost three years.

Recommender Systems Methods

Recommender systems, which provide personalized recommendations of items designed to suit a user's indi-

vidual tastes, roughly fall into two camps based on whether they

use content information. Content-based systems typically score each item on many features, and then try to characterize each user's interest in those features by some combination of direct solicitation and behavioral input such as purchases or ratings. Movie features might include genre, actors and directors, and measures of the amount and style of action and dialogue. A prime example of a content-based recommender system is internet based Pandora Radio, which has scored hundreds of thousands of songs on about 400 musical attributes. Users can provide information about their tastes by providing seed song(s) or artist(s) and by giving thumbs up/down to selections recommended by Pandora.

Collaborative filtering is an alternative set of methods that avoids the need to score items, or even to define features, by using patterns of ratings or other feedback to infer characteristics of items and users. Before the competition began, the most commonly used collaborative filtering tool was nearest neighbors, where the rating for a target user-movie pair is based on either ratings by the target user of other movies deemed similar to the target movie, or on ratings of the target movie by other users deemed similar to the target user. It appears that Netflix's recommendations at the time were neighborhood based.

An important revelation from the Netflix Prize was the superiority of latent factor models, most notably matrix factorization, which were responsible for the swift improvement compared with Netflix's results. Consider an n -by- m matrix R with a row for each user and a column for each item, where r_{ui} contains the rating of item i by user u . Matrix factorization tries to find a low rank approximation for R , specifically $R = PQ'$, where P and Q are n -by- k and m -by- k , respectively, for k much smaller than either n or m . One way of thinking of this is that each item or each user receives a k -dimensional vector, q_i or p_u , summarizing its characteristics or tastes, respectively. The prediction for rating r_{ui} is given by the dot product of p_u and q_i . The main distinction from content-based recommendations is that the feature set is learned from data rather than being pre-specified.

An obvious complication is that R is not fully observed; indeed, for the Netflix Prize, almost 99 percent of the entries are missing. We start to get around that detail by minimizing an objective function that depends on only those user-item pairs for which a rating is observed, specifically, $\sum_{(u,i) \text{ observed}} (r_{ui} - p'_u q_i)^2$. However, even 100 million observations are not a lot when trying to estimate a vector of parameters for each of nearly half a million users




and items. Estimating say 50 taste parameters for users who average only 200 ratings (and often rate far fewer) is guaranteed to over fit the data. Consequently, we use a “regularized” objective function,

$$\sum_{(u,i) \text{ observed}} (r_{ui} - p'_u q_i)^2 + \lambda(\|P\|^2 + \|Q\|^2).$$

See Koren, Bell and Volinsky, “Matrix Factorization Techniques for Recommender Systems,” *IEEE Computer*, August 2009, pp. 30-37 for more details.

Participants

The competition was notable for the wide participation, and success, of people with little or no background working on recommender systems or on data mining research, in general. As such, the Netflix Prize is a textbook example of crowdsourcing, outsourcing of a problem through an open call to anyone interested in working on the solution. While some participants brought research backgrounds in recommender systems, or like us, in related fields such as data mining, most just brought ingenuity and a willingness to try lots of ideas. Emblematic of this spirit was British psychologist Gavin Potter, whose entry was named “Just a guy in a garage.” Potter believed that knowledge of human behavior would trump computer models and his efforts were good enough to reach well into the top ten in Year 2. More surprising among the leaders was a team of three Princeton undergraduates that rose into the top three for most of the second half of Year 1 (and briefly into first place). Ironically, one member of that team, Lester Mackey, an African American computer scientist currently in the Ph.D. program at Berkeley, won an AT&T Labs graduate fellowship and worked as an intern during the summer of Year 1 under the supervision of our teammate Yehuda Koren.

Despite the large prize at stake, there was a remarkable spirit of collaboration among competitors throughout. An active forum allowed competitors to ask questions, to propose ideas, and to discuss ideas of others. Most notable was Simon Funk (in third place at week ten of Year 1), who posted a blog (*Try This at Home*) filled with code, documentation, and detailed discussion of matrix factorization methods. This post inspired hundreds of future competitors and set the tone for future sharing of ideas. In addition, we and some other competitors published research papers in journals or conference proceedings, all of which contributed to the success of “the crowd.”

The Competition

Because Netflix recognized that the ten percent target might take years to reach, if ever, it arranged for an annual \$50,000 progress prize to be awarded to the team leading at each anniversary of the competition. Our team approached the lead about midway through Year 1 and held the lead most of the last four months of the year. A key part of our success was developing improvements and variations on lots of methods and working out a way to efficiently combine those results. Our predictions combined

results from about 100 models.

As Year 1 drew to a close, we had built what seemed like a fairly comfortable lead—an 8.26% improvement versus 8.03% and 8.00% for our two closest competitors, a team of computer scientists from Hungary and the Princeton students. Of course, winning was not guaranteed; some other team could have been concealing a better score until the final moments. Indeed, we were doing just that ourselves, and we submitted a score of 8.38% a little more than 24 hours before the Year 1 deadline. But almost simultaneously with our improved score hitting the leaderboard, a merger between our two main rivals posted a submission exactly matching our score on the public half of the test set.

If neither team could improve on the last day, it would come down to who had the lower secret RMSE.

However, according to the rules, those RMSEs were to be rounded to the nearest 0.0001 (or 0.01%), with the tie breaker being submission time. That was bad news because the other team had submitted 76 second before us! Fortunately, necessity really is the mother of invention. On the final day, we were able to rework our blending method enough to reach an 8.43% improvement on the public leaderboard, enough to win the Year 1 progress prize.

With the dramatic slowing of progress in the latter part of Year 1, there was much speculation about whether the 10% target was even possible to attain. Perhaps, all the good ideas had already been tried. However, we were able to continue to improve our models in Year 2. Most notable were extensions of matrix factorization that allowed user tastes to vary with time, even from one day to the next (a single “user” might consist of multiple members of a household). Our largest model included an astounding 30 billion parameters, about 300 for each observation.

Still, it became clear that winning would require successfully combining results from a very large number of



Team BellKor members Chris Volinsky, Yehuda Koren and Robert Bell (left to right) pose with a “Hollywood Star” signifying their winning of the first Netflix Progress Prize.



methods, and a merger of top teams was the most likely way to get there. In Year 2, we merged with BigChaos, two computer science students from Austria, enabling us to win the Year 2 progress prize by a relatively wide margin with an improvement of 9.44%. Midway through Year 3, we expanded again, adding PragmaticTheory, a pair of engineers from Montreal, to form BellKor's Pragmatic Chaos. A 30-day last-call period was triggered in June 2009 when our new team made its first submission, a 10.05% improvement (we had actually reached 10% a few weeks previously but concealed that fact by adding noise to our submissions).

This set off a frenzy of team-building as several new unions formed, finally all coming together in one mega-coalition of 23 teams. Aptly named The Ensemble, this mega-team waited until a little more than 24 hours to go before revealing itself and submitting its first prediction set, overtaking us by a scant 0.01%, 10.09% to 10.08%. In a frantic final 24 hours, each team was able to improve by another 0.01%—on the public leaderboard. But who had done better on the secret half that really mattered?

Our secret RMSE was lower by a whisker: 0.856704 vs. 0.856714; but both values rounded to 0.8567, so it all came down to the tie breaker. In the end, we won the Netflix Prize by submitting 20 minutes earlier!

Epilogue

The contest was a big win for Netflix, as it advanced knowledge about recommender systems by leaps and bounds, in ways that never would have happened organically. As Netflix CEO Reed Hastings put it, “You look at

the cumulative hours and you’re getting Ph.D.’s for a dollar an hour.” But it was hardly work-for-hire. The advances are available to any business or other entity that can benefit.

Furthermore, the Netflix Prize has produced lessons applicable in the much wider field of data mining. It led to great advances in building massive prediction models with millions, and even billions, of parameters. And, it showed the value, for purposes of prediction, of combining many different models and methods. Finally, it demonstrated the power of attacking a problem from many perspectives.

We are often asked what we did with the money. Because we work in industry, “our” part of the prize went to our employer, AT&T. But we are proud to say that AT&T donated its entire share of the million dollars to four organizations that support STEM education, particularly for women and under-represented minorities: Young Science Achievers Program, New Jersey Institute of Technology Pre-College and Educational Opportunity Programs, The North Jersey Regional Science Fair, and Neighborhoods Focused on African-American Youth.

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Classroom Connections: Differential Equations

Archie Wilmer



Archie Wilmer

Students like to see connections among various mathematical concepts, as do I. When I show students the wonderful connections found within mathematics, they learn that knowing certain foundational concepts can help with the understanding of more advanced concepts.

The connections are not always easy to demonstrate. For example, we as educators invest considerable effort in teaching *characteristic equation method*¹, a standard technique used when solving constant coefficient linear differential equations. For the second-order equations, the roots of the characteristic equation can always be found using the quadratic formula. The sign of the *discriminant*² of the quadratic formula leads to one of three cases for the roots (real and distinct, complex, or real and repeated). Based on the sign (positive, negative, or zero), we usually categorize the homogenous solution of the differential equation into one of three general forms:

hyperbolic functions, trigonometric functions, or polynomials multiplied by exponentials.

With second-order equations having variable coefficients, we require more sophisticated techniques such as series, transforms and numerical methods that do not seem to rely on our previous understanding of constant coefficient problems. The connections between constant coefficient and variable coefficient equations seem to vanish.

I enjoy using a transformation approach to solving the second-order linear variable coefficient differential equation,

¹ Given $y'' + py' + qy = 0$, where p and q are constants, it is assumed that $y = e^{mx}$ resulting in $e^{mx}(m^2 + pm + q) = 0$. This requires m to satisfy the characteristic equation $m^2 + pm + q = 0$.

² A discriminant is a measure or quantity that is normally invariant (unchanged) under certain classes of transformations and distinguishes certain properties of a quantity's roots or zeroes



$$(1) \quad y'' + p(x)y' + q(x)y = g(x)$$

where $p, q,$ and g are sufficiently well-behaved (analytic) functions of x on an open interval I . (Here, prime denotes differentiation with respect to the independent variable x .) This approach includes the use of repeated integration and represents a different way to acquire an analytic solution, as compared to say more traditional techniques such as the use of power series. As a result, integration uncovers and underscores a connection between the characteristic equation method for constant coefficient equations and transformation method variable coefficient differential equations.

A common analytic approach to solving equation (1) is to first obtain the set of fundamental solutions to the associated homogeneous equation and then find a particular solution to the nonhomogeneous equation. For constant coefficient equations, using the characteristic equation method is the primary technique to obtain a set of fundamental solutions. For variable coefficient equations, reduction of order is used—but this method requires knowledge of at least one of fundamental solution. In either case, there are several methods for finding particular solutions: two standard ones are undetermined coefficients and variation of parameters.

An alternative approach to solving equation (1) introduces differential operator notation; this provides a foundation for the development of the solution. The approach presented in the sequel, hereafter referred to as an Extended Operator Method (EOM), is an alternative to the aforementioned methods. (See [2], for example). The approach is not completely new: it is sometimes called the inverse operator method. Found in many older texts on differential equations, this method was commonly used to solve linear differential equations with constant coefficients, but rarely for solving equations with variable coefficients.

Derivation of the inverse operator method is described briefly in Zwillinger (see [5]) as a transformation of second order linear ODEs. Zwillinger [5] shows that changing the dependent variable by

$$(2) \quad y(x) = u(x) \exp \left[-\frac{1}{2} \int^x a(z) dz \right]$$

transforms the original equation into

$$(3) \quad y'' + py' + qy = e^{-\frac{1}{2} \int^x a(z) dz} \left[u'' + (p-a)u' + \left(-\frac{1}{2}a' - \frac{1}{4}a(2p-a) + q \right) u \right]$$

which can be written in the normal form of the equation

(when $a(x) = p(x)$). The normal form of the equation includes a discriminant term (useful for classifying the equation of interest).

$$(4) \quad y'' + py' + qy = e^{-\frac{1}{2} \int^x p(z) dz} \left[u'' + \left(-\frac{1}{2} p' - \frac{1}{4} p^2 + q \right) u \right]$$

The connection is now more visible. Consider Equation (4) when the coefficients p and q are constant. In that case, the sign of the expression in parenthesis serves as the discriminant that provides a means to classify the homogeneous solution and eventually solve the equation of interest. The connection between constant coefficient and variable coefficient equations is revealed and will be discussed more fully in future articles of this series.

The EOM combines into a single step the two-step process of solving the homogeneous and nonhomogeneous equations. This represents an alternative method for solving second-order linear equations. Use of the approach can yield explicit solutions for certain classes of variable coefficient second-order linear equations. However, for certain conditions the EOM is more involved than traditional methods.

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This is the first article of a series that will extend ideas in differential equations with an emphasis on the Extended Operator Method (EOM).



The Blackwell-Tapia Conference

Josef Sifuentes

Does Beckham really bend it like Beckham? Can I bend it like Beckham? Exactly how does one lose consciousness before a surgical procedure? How is mathematics playing a role in modeling cancer cells and therapy schedules? Exactly how do microorganisms fluctuate their flagella to fly through fluids? Has climate data failed us in the study of global warming? And perhaps most importantly, when is the best time to take an afternoon martini?

The biennial Blackwell-Tapia Conference, hosted by the Mathematical Biosciences Institute at Ohio State University, answered these questions among many other important challenges facing the scientific community. Of course, what makes this conference special amongst the many other scientific conferences is that these questions were answered by mathematicians of color. The Blackwell-Tapia Conference is named in honor of the late Dr. David Blackwell and Dr. Richard Tapia, mathematicians of color who opened the door for many in the field, including many of the scientists in attendance. The conference highlights the mathematical contributions made by underrepresented minorities and recognizes efforts to address underrepresentation.

The conference also awarded the biennial Blackwell-Tapia prize to Dr. Trachette Jackson. According to the Blackwell-Tapia Committee, the prize “recognizes a mathematical scientist who has contributed and continues to contribute significantly to research in his or her field of expertise, and who has served as a role model for mathematical scientists and students from under-represented minority groups or contributed in other significant way to addressing the problem of the under-represented minorities in mathematics.” The caliber and reputation of the Mathematical Biology Research Group at the University of Michigan, which Dr. Jackson co-founded and co-directs serves as a testimony to why Dr. Jackson is deserving of this



Blackwell-Tapia Prize winners from left to right: William Massey ('06), Rodrigo Banelos ('04), Trachette Jackson ('10), Juan Meza ('08), and Arlie Petters ('02).

award. The cutting edge research she has produced there has given her the opportunity to interact and serve as a role model for many women and minority mathematicians and scientists.

The Blackwell-Tapia Conference was founded by Dr. Carlos Castillo-Chavez, the Regents Professor and Joaquin Bustoz Jr. Professor of Mathematical Biology at Arizona State University. It was Dr. Bustoz who enticed Dr. Castillo-Chavez to Arizona State to continue his work in mathematical biology as well as mentor the young students of Arizona. So it is no coincidence that Dr. Jackson credits Dr. Bustoz for the mentorship she received as a participant



Carlos Castillo-Chavez

in his MathScience Honors Program. Indeed, it is exactly this mentorship that the conference aims to propagate. The awarding of the prize to Dr. Trachette Jackson is not only great achievement in her career, but an example of the brilliant scientists that can be produced from the mentorship nurtured at this conference.

The Blackwell-Tapia conference also remembered Dr. David Blackwell, who passed away July 8th of 2010. Dr. Blackwell was the first African American admitted to the National Academy of Sciences and was a professor at the University of California Berkeley. Dr. Blackwell made many important contributions to the field of probability theory, game theory, and information theory. His work in Bayesian probability is a forerunner for much of the cutting edge work today in dynamic machine learning.

Oh, and the *answers* to the questions. *Yes*. Dr. Edray Goins says yes, but I am not sure if I can really bend it like Beckham. According to the modeling done by Dr. Emery Brown of signal processes in the brain, we lose consciousness not in the way we thought. Math is actively engaged in the battle to fight cancer from Dr. Trachette Jackson's multiscale modeling techniques of cellular processes, to Dr. Illya Hicks' optimization techniques applied to cancer trial data. Microorganisms fluctuate their flagella in complicated ways that are being modeled through computational fluid flow techniques developed by Dr. Ricardo Cortez. As for global warming, according to the Uncertainty Quantification Group, led by Dr. Juan Restrepo, it's uncertain. Lastly, the time for an afternoon martini is 5 p.m., according to Dr. David Blackwell.



Josef Sifuentes

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College Board of Mathematical Sciences (CBMS) Report

Jacqueline Brannon Giles



Jacqueline Brannon Giles

The College Board of Mathematical Sciences (CBMS) hosted a forum on content-based professional development for teachers of mathematics from October 10 through 12 in Reston, Virginia. Jacqueline Brannon Giles, NAM's Community College Representative, attended the forum. NAM has had a representative at the

CBMS national conference for three consecutive years.

At this conference, a group of mathematicians and educators from across the country met to discuss and write proposals to assist in the development of curriculum materials and programs. These documents also hope to improve teacher education for future mathematics instructors at the elementary and secondary levels. The conference encouraged the collaboration of professionals who are leaders in mathematics and mathematics education.

Two-year college curricula often include remediation and guided studies with the intent of bridging cognitive and affective domain proficiencies. Improved attitudes toward

learning that enhance academic achievement in STEM professions are also a concern. For this reason, the conference leaders are encouraging more participation from college professors and leaders at every level of academia and industry. The White Paper synthesizes the recommendations on Standards and Assessments in K-12 Mathematics that emerged from the CBMS Forum that took place October of 2009. This is posted on the CBMS website at http://www.cbmsweb.org/Forum2/CBMS_Forum_White_Paper.pdf.

CBMS is an umbrella organization consisting of seventeen professional societies. For more information on the CBMS conference, contact Ron Rosier, CBMS Director, at rosier@georgetown.edu or visit <http://www.cbmsweb.org/Forum3/Panels.htm>.

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The Fourth Annual Field of Dreams Conference

Philip Kutzko

The Fourth Annual Mathematical Field of Dreams Conference was held from October 8 to 10 at the University of Iowa in Iowa City. The conference, part of the National Science Foundation funded National Alliance for Doctoral Studies in the Mathematical Sciences (the Alliance; www.mathalliance.org), was held in conjunction with the one day, National Institutes of Health Opportunities for Graduate School in Quantitative Biomedical Research Workshop. Seventy-three undergraduate Alliance Scholars, along with fifty-two Undergraduate and Graduate Alliance Mentors, attended this three-day event from colleges and universities from all over the country. They learned about graduate programs in the mathematical sciences as well as professional opportunities in these fields.

The goals of the Biomedical Research Workshop, which are to introduce underrepresented students from minority serving institutions without programs in biomedical research to opportunities for graduate study in the quantitative biomedical sciences, coincide with the mission of the Alliance. That is, the Alliance provides opportunities to underrepresented students who wish to pursue a doctoral degree in the mathematical sciences by providing essential tools, nurturing, and encouragement to ensure that each student will be prepared for a doctoral program.

The Alliance began in 2002 as a partnership between the three Iowa Regents universities and four Historically

Black Colleges and Universities (HBCUs) with the specific goal of increasing the number of African American students who would attain doctoral degrees in the mathematical sciences. From the beginning, the Alliance was organized as a community of mentors and students.

As the Alliance grew and became more nationally known, more students from underrepresented groups in the mathematical sciences began to express an interest in attending graduate school. The Alliance presently consists of over 140 Undergraduate Mentors who are math science faculty from a wide variety of colleges and universities. The Mentors serve a substantial percentage of students who are underrepresented in these fields. Also, these mentors



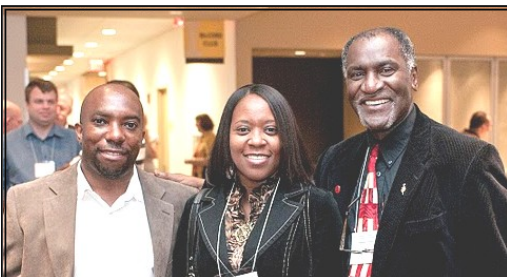
Alliance Scholars and graduate students with mentor Robin Wilson (back row, California State Polytechnic University, Pomona)



nominate Alliance Scholars who are then eligible for various Alliance programs, including our Alliance Postdoctoral Fellowships, the annual Field of Dreams conference, the Mentor Match program, and Alliance Activity Scholarships. There are over 450 current and past Scholars, almost all of whom come from US minority groups which have been historically underrepresented in the mathematical sciences.

Both the Biomedical Research Workshop and the Field of Dreams Conference engaged Scholars and Mentors in informational and community-building activities. The Biomedical Research workshop focused on quantitative science programs with professors and graduate students presenting from the departments of Biostatistics, Mathematics, Engineering, Bioinformatics and Computational Biology, Biochemistry, Chemistry, and Medicine. The Workshop keynote speaker was Dr. Sarah England, Professor of Physiology and Biophysics at the University of Iowa.

The Field of Dreams conference panels focused on graduate opportunities available to students in the mathematical sciences with panels featuring recent Alliance PhDs, graduate students, REU alumni, and professors. Panels were also presented on careers in higher education, industry, and government.

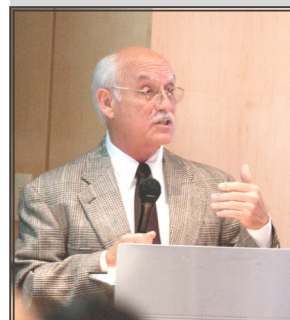


Edray Goins (Purdue University), Kathleen Banks (University of Iowa), and Donald Cole (University of Mississippi)

Keynote speakers included Dr. William Velez, who is currently a Research Affiliate and Martin Luther King Visiting Professor at the Massachusetts



Roosevelt Johnson



Bill Jones

Institute of Technology; Dr. Roosevelt Johnson, Fellow at the American Association for the Advancement of Science Center for Advancing Science and Engineering Capacity; and Dr. Bill Jones, a professor at the Xavier University of Louisiana Department of Mathematics. There were also several opportunities for Alliance Graduate Departments and others to meet with students throughout the three-day weekend.

One of the main goals of the Alliance conference is to familiarize these students with the opportunities and resources available to

them in the mathematical sciences and to build a community of mentors to help these students reach their goals. The Alliance has a long and close relationship with NAM and has sponsored many students to attend NAM's MathFest. We encourage you to become an Alliance member via our website: www.mathalliance.org. We hope to see you at the 2011 Field of Dreams Conference at Arizona State University in Tempe, Arizona, October 14th-16th!

Phil Kutzko is a Professor of Mathematics at The University of Iowa and his email is Philip-Kutzko@uiowa.edu.

Angela Grant Scholarship Fund

The Dr. Angela E. Grant Memorial Scholarship fund seeks applications as well as donations to support their ongoing efforts to remember Dr. Grant. The scholarship is designed to recognize future scholars who "appreciate mathematics and are dedicated to community service and celebrating the spirit of life."

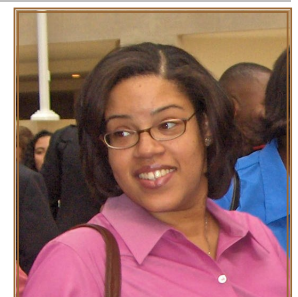
The scholarship panel is actively seeking high school seniors or current college students who exhibit leadership, community involvement, exemplary character, and high academic standards. To apply, each applicant must be a cancer survivor who is actively pursuing or planning to pursue a college education in any field of study, or be an applicant with an immediate family member who is a cancer survivor. Applicants

must be US residents that either attend or plan to attend an undergraduate institution or a graduate school.

Donations to the scholarship fund can be made online at www.drangelagrantscholarship.org or sent to:

Dr. Angela E. Grant Memorial Scholarship Fund
P. O. Box 84481
Pearland, TX 77584

Dr. Angela Grant was Ralph Boas Assistant Professor of Mathematics at Northwestern University as well as an advisor for the Weinberg College of Arts and Sciences. A mathematician full of energy and enthusiasm, she passed away from breast cancer on September 20, 2010, having aged 37 years.



Angela Grant



NAM at the 2011 Joint Mathematics Meetings

Be sure to join us at the JMM 2011 in New Orleans!



Saturday, January 8, 2011

1:00 p.m. - 3:30 p.m. Oak Alley Room, 4th Floor, Sheraton
Granville-Brown-Haynes Session of Presentations by Recent Doctoral Recipients in the Mathematical Sciences

The presenters include Alejandra Alvarado (University of Arizona), Michelle R. Craddock (United States Military Academy), Patrice Benson (United States Military Academy), L. Marie Chism (University of Mississippi), Katrina K. A. Cunningham (Southern University—Baton Rouge), and Michael Young (Iowa State University).

6:00 p.m. - 8:40 p.m. Waterbury Ballroom, 2nd Floor, Sheraton
NAM Banquet and Cox-Talbot Invited Address

Tickets for the banquet are US\$53 each, including tax and gratuity. The *Address* will be given after the dinner by Dr. Robert Bozeman (Morehouse College). His presentation is entitled "Increasing the Pool of Underrepresented Mathematicians."

Sunday, January 9, 2011

9:00 a.m. - 9:50 a.m. Oak Alley Room, 4th Floor, Sheraton
Panel Discussion

The panel discussion is entitled "NAM honors the life of Dr. David Harold Blackwell."

10:00 a.m. - 10:50 a.m. Oak Alley Room, 4th Floor, Sheraton
Business Meeting

This meeting is for all NAM members and those interested in membership. Reports on the organization will be presented as well as the recruitment of committee and Board members.

1:00 p.m. - 1:50 p.m. Oak Alley Room, 4th Floor, Sheraton
Claytor-Woodard Lecture

The lecture will be given by Dr. Edray Goins, (Purdue University). His presentation is entitled "Galois representations and L Series: A Tour Through Mathematics."

NAM Calendar

The **Joint Mathematics Meeting** will be held in New Orleans, Louisiana on **January 6-9, 2011**. NAM's activities can be found above. Dr. Robert Bell of AT&T will give an MAA invited address on "Lessons from the Netflix Prize".

The Department of Mathematics at Harvey Mudd College will host the twelfth annual **Harvey Mudd College Mathematics Conference** with the theme *Broadening Participation in the Mathematical Sciences* on **February 4-5, 2011**. Registration deadline is **February 14, 2011**. See: <http://www.math.hmc.edu/conferences/2011/>

The **Underrepresented Students in Topology and Algebra Research Symposium (USTARS)** will be held on **April 1-3, 2011** at the University of Iowa in Iowa City, Iowa. The keynote speaker is Dr. Emille Davie Lawrence of California State Polytechnic University, Pomona, California. See: <http://www.mathalliance.org/ustars.asp>

Tapia Celebration of Diversity in Computing will be held **April 3-5, 2011** in San Francisco, California. The

Conferences & Workshops

program includes invited speakers, a student poster competition, and networking opportunities. See: <http://tapiaconference.org/2011/>

CAARMS 17 will be held in **June 1-4, 2011** at IPAM/UCLA in Los Angeles, California. See: www.caarms.net

The **EDGE summer program** will be held **June 6-July 1, 2011** at Florida A&M University in Tallahassee, Florida, with local coordinator Dr. Roselyn Williams. A stipend plus travel, room and board will be awarded to participants. The application deadline for the program is **February 21, 2011**. See: www.edgeforwomen.org

MSRI summer undergraduate research program will take place from **June 11-July 24, 2011**. Applications are due **February 28, 2011**. The on-site Director is Dr. Suzanne Weeks (Worcester Polytechnic Institute). See: www.msri.org/web/msri/education/for-undergraduates/msri-up



Stephon Alexander

PBS has segments in its newsmagazine NOVA entitled *The Secret Life of Scientists and Engineers*. In the first episode, there is a feature of a theoretical physicist Dr. Stephon Alexander, who is an Associate Professor at Haverford College, Pennsylvania. To find out his secret, see: <http://www.pbs.org/wgbh/nova/secretlife/scientists/stephon-alexander/>

Dr. Alexander spoke at CAARMS 10 in 2004 which was hosted by the Mathematical Sciences Research Institute (MSRI) and the Lawrence Berkeley National Laboratory.

"Dare to think the unthinkable."



Job Openings

Institutional Members

Enhancing Diversity in Graduate Education (EDGE)

Summer Program

The 2011 EDGE Summer Program will be held June 6 – July 1 on the campus of Florida A&M University, Tallahassee, FL, with Dr. Roselyn Williams as local coordinator. Enhancing Diversity in Graduate Education (EDGE) is a post baccalaureate program designed to strengthen the ability of women students to successfully complete graduate programs in the mathematical sciences, with particular inclusion of women from underrepresented groups. The summer session provides courses in analysis and algebra, a topical minicourse, guest lecturers, and advanced graduate student mentors. EDGE participants also benefit from follow-up mentoring and networking opportunities throughout the academic year.

Applicants to the EDGE Program must be women who are (1) graduating seniors who have applied to graduate programs in the mathematical sciences for Fall 2011 (2) recent recipients of undergraduate degrees who are now entering graduate programs, or (3) first-year graduate students. All applicants must be accepted into doctoral programs prior to their entry into EDGE and should have completed standard junior/senior-level undergraduate courses in analysis and abstract algebra. Participants are provided travel, room and board, and a stipend of \$2,000.

For application materials and additional details, visit the website at <http://www.edgeforwomen.org/> The deadline for applications is **February 21, 2011**.

University of South Carolina

Professorships

Applications are invited for (1) a **tenure-track Assistant Professor** and (2) a **tenured Associate or Full Professor**, both in **Applied and Computational Mathematics** for research related to modeling and computation of biomaterials and function of engineered tissues. Candidates should have a Ph.D. in Mathematics or a related field, and have sufficient background in mathematical modeling, mathematical/numerical analysis, simulation, and/or visualization of biomaterials. The beginning date for the positions will be August 16, 2011. The initial screening of ap-

plicants will begin on **Dec. 10, 2010** for the assistant professor position and **Jan. 31, 2011** for the tenured position. The positions will remain open until filled. For full consideration, all supporting materials should be submitted electronically through <http://www.mathjobs.org>. Inquiries and nominations of potential candidates can be sent to [hiring@math.sc.edu](mailto: hiring@math.sc.edu). The University of South Carolina is an affirmative action, equal opportunity employer. Women and minorities are encouraged to apply.

Non-Institutional Members

University of Southern California

Tenure-Track Assistant Professorship

The Department of Mathematics in the College of Letters, Arts, and Sciences of the University of Southern California seeks to fill the following positions. The start date for all positions is August 2011.

Tenure-Track Assistant Professorship. Subject area: open, with a preference for candidates in geometry, topology, and related fields. Candidates should have demonstrated excellence in research and a strong commitment to graduate and undergraduate education. A Ph.D. is required.

Assistant Professor Non-Tenure Track. Subject area: any field of mathematics of interest to senior members of the department. Candidates should demonstrate great promise in research and evidence of strong teaching. This is a three-year non-tenure-track appointment with a teaching load of three semester courses per year. A Ph.D. is required.

To apply, please submit the following materials: letter of application and curriculum vitae, including your e-mail address, telephone and fax numbers, preferably with the

standardized AMS Cover Sheet. Candidates should also arrange for at least three letters of recommendation to be sent, one of which addresses teaching skills. Applications through MathJobs at www.mathjobs.org are preferred. Otherwise, all materials should be mailed to:

Search Committee
Department of Mathematics
College of Letters Arts and Sciences
University of Southern California
3620 Vermont Avenue, KAP 108
Los Angeles, CA 90089-2532.

Review of applications will begin **November 15, 2010** and will continue until the positions are filled. Additional information about the USC College Department of Mathematics can be found at our website <http://college.usc.edu/mathematics/home/>

USC strongly values diversity and is committed to equal opportunity in employment. Women and men, and members of all racial and ethnic groups are encouraged to apply.



Austin Peay State University

The Department of Mathematics at Austin Peay State University invites applications for positions in **statistics, mathematics education, and applied mathematics**. Positions are **tenure-track** with rank and salary commensurate with experience. Potential for excellence in teaching is required, as well as the ability to support the programs of

the department at both graduate and undergraduate levels. APSU is a regional university of about 10,500 students, located in Clarksville, Tennessee, an attractive mid-size town an hour's drive from Nashville. Browse to <http://www.apsu.edu/human-resources/faculty/currentjobopenings> to apply.

Tenure-Track Positions

Gettysburg College

Gettysburg College invites applications for **two tenure-track positions in mathematics or statistics** at the rank of **Assistant Professor** beginning August 2011. Candidates in all fields will be considered, but for one of the positions preference will be given to those candidates with a demonstrable interest in some area of applied mathematics or statistics, including probability, financial mathematics, discrete optimization, mathematical biology, operations research, and numerical analysis. Applicants must have a Ph.D. in one of the mathematical sciences, including statistics, or expect to complete all requirements for the degree by September 2011. A record of excellent and innovative teaching, a clear promise of outstanding achievements in research, and a desire for a career in a liberal arts environment are essential. A successful candidate will have the opportunity to shape the mathematics program of an energetic department, to teach a broad range of topics in undergraduate mathematics, and to involve students in a variety of mathematical activities outside the classroom. The regular teaching load for this position is five courses per academic year. The College is prepared to assist newly appointed faculty members in establishing a research program; this assistance may include generous start-up funds and a paid pre-tenure leave.

Gettysburg College is a highly selective liberal arts

college located within 90 minutes of the Baltimore/Washington metropolitan area. It is consistently ranked in the top 50 liberal arts colleges in the nation. Established in 1832, the College has a rich history and is situated on a 220-acre campus with an enrollment of over 2,600 students. Gettysburg College celebrates diversity and invites applications from members of any group that has been historically underrepresented in the American academy. The College assures equal employment opportunity and prohibits discrimination on the basis of race, color, national origin, gender, religion, sexual orientation, age, and disability. You may learn more about the College and the Department through the website:

<http://www.gettysburg.edu/academics/mathematics/>.

Please submit a letter of application, a curriculum vitae, a brief description of your teaching methods and objectives, and a summary of your research goals online at <http://www.mathjobs.org>. Your letter of application should explicitly address your interest in our department and how you plan to contribute to our program. Also arrange for the committee to receive three letters of recommendation addressing teaching effectiveness and research potential. Completed applications received by **November 30, 2010** will receive full consideration.

Two Tenure-Track Positions

Hood College

The Hood College Department of Mathematics announces a full-time **tenure-track position** in mathematics, beginning August 2011. The successful applicant will have Ph.D. in mathematics in hand, will be committed to teaching mathematics in the context of a liberal arts college, and will give evidence of scholarly achievement or promise. She or he will be expected to teach a broad range of courses in our curriculum, and should be comfortable using non-traditional teaching methods and appropriate technology. Applicants with an interest in and willingness to teach introductory and calculus-based probability and statistics are especially welcome.

Please send a letter of application addressing teaching interests and scholarship goals in the context of Hood College's environment, together with a curriculum vitae and three letters of recommendation (at least one addressing teaching effectiveness) to the College via MathJobs.Org.

Hood College is committed to diversity and subscribes

to a policy of hiring only individuals legally eligible to work in the United States. (EOE) Hood College does not discriminate on the basis of sex, race, color, national origin, sexual orientation, marital status, pregnancy, disability, religion, or age in recruitment, admission and access to, or treatment, or employment in its programs, services, benefits, or activities as required by applicable laws including Title IX of the Educational Amendments of 1972 and Section 504 of the Rehabilitation Act of 1973, and complies with the law regarding reasonable accommodation for disabled applicants and students. Inquiries about discrimination or reasonable accommodation should be referred to the Title IX and Section 504 Coordinator at Alumnae Hall, 401 Rosemont Avenue, Frederick, MD. 21701 (AD 312), (301) 696-3592. For complete information on Hood College's nondiscrimination policy, please visit www.hood.edu/non-discrimination.

Tenure-Track Position



Lafayette College

Assistant Professor, Statistics

Lafayette College invites applications for a **tenure-track assistant professor** position in the Mathematics Department beginning in August 2011. A Ph.D. in **statistics** is required, although an ABD candidate may be considered for appointment as an Instructor pending completion of the doctorate.

Lafayette is a highly selective private college offering programs in Liberal Arts and Engineering to approximately 2400 students. The Department of Mathematics offers A.B. and B.S. programs in Mathematics and a joint A.B. in Mathematics and Economics, in addition to serving students in a variety of other programs and contributing to Lafayette's required interdisciplinary first- and second-year seminars.

The successful candidate must demonstrate a strong commitment to undergraduate teaching, be willing and able to provide leadership in curricular development in the area of statistics, and conduct an ongoing program of scholarly development. Evidence of the success of such a program may include publication of peer-reviewed research in statistics or joint authorship of peer-reviewed publications in other disciplines. The teaching load will be 4 courses per

year for the first year and 5 in subsequent years. More information on the Department may be found at <http://math.lafayette.edu/>.

APPLICATION PROCESS: Please have an AMS cover sheet (<http://ams.org/coversheet>), application letter, vita, statements regarding teaching and research interests, and three letters of recommendation, at least one of which addresses teaching, sent to Mathematics Search Committee, Department of Mathematics, Lafayette College, Easton, PA, 18042-1781. Applications received by **November 30, 2010**, are guaranteed consideration. Representatives of the Department will be present at the Joint Mathematics Meetings in New Orleans.

ABOUT THE COLLEGE: Lafayette College is committed to creating a diverse community: one that is inclusive and responsive, and is supportive of each and all of its faculty, students, and staff. All members of the College community share a responsibility for creating, maintaining, and developing a learning environment in which difference is valued, equity is sought, and inclusiveness is practiced. Lafayette College is an Equal Opportunity Employer and encourages applications from women and minorities.

Institute for Pure and Applied Mathematics, UCLA

Associate Director

The Institute for Pure and Applied Mathematics (IPAM) at UCLA is seeking an **Associate Director (AD)**, to begin a two-year appointment on July 1, 2011. The AD is expected to be an active and established research mathematician or scientist in a related field, with experience in conference organization. The primary responsibility of the AD will be running individual programs in coordination with the organizing committees. The selected candidate will be encouraged to continue his or her personal research

program within the context of the responsibilities to the institute. For a detailed job description and application instructions, go to www.ipam.ucla.edu/jobopenings/assocdirector.aspx. Applications will receive fullest consideration if received by **February 1, 2011**, but we will accept applications as long as the position remains open. More information on IPAM's programs can be found at www.ipam.ucla.edu. UCLA is an equal opportunity/affirmative action employer.

Swarthmore College

Two Visiting Positions

The Department of Mathematics and Statistics at Swarthmore invites applications for **two visiting positions**, starting in late August, 2011. One position is for 2 years, possibly renewable for a third. The other is for one year. Applications that are complete by **December 1, 2010** will receive full consideration.

Swarthmore is a leading national liberal arts college with 1500 students. Information about the College is available at <http://www.swarthmore.edu> and about the department at http://www.swarthmore.edu/NatSci/math_stat/.

The teaching load is three courses in one semester and two courses in the other. Applicants should have records of excellence in both scholarship and undergraduate teaching. A Ph.D. in mathematics by the starting date is also expected. All fields of mathematics will be considered.

Applications should include a curriculum vitae and three letters of recommendation, at least one of which ad-

dresses teaching. A cover letter and personal statements regarding research and teaching should also be included.

Please indicate in your cover letter if you will be attending the Joint Mathematics Meetings in New Orleans in January 2011.

Please submit all application materials to <http://www.mathjobs.org>. Only if this is not possible, send the materials to Mathematics Search Committee, Department of Mathematics and Statistics, Swarthmore College, 500 College Ave, Swarthmore, PA 19081-1390. Any other correspondence about this position (e.g., questions) should be sent only to mathsearch@swarthmore.edu, which will be checked every few days during the search.

Swarthmore College is an Equal Opportunity Employer. Women and minorities are encouraged to apply. A diverse faculty, staff and student body are critical components of the educational mission of the College.



Norfolk State University

Tenure-Track Position

The Department of Mathematics at Norfolk State University is seeking applicants for a nine-month **tenure-track position** at the level of Assistant or Associate Professor (F0045). Special consideration will be given to candidates with a doctoral degree in Mathematics Education. Information about the position is listed below.

Responsibilities: Duties include teaching mathematics courses at all levels. Additionally, the successful candidate is expected to advise students; develop the curriculum; establish and maintain a relationship with industry; serve on departmental, school, and university committees; and perform appropriate scholarly and service activities.

Qualifications: Doctorate in Mathematics or Mathematics Education (with at least 18 graduate course hours in mathematics); commitment to academic excellence, record of teaching and scholarly achievement, evidence of research and grantsmanship.

Salary/Rank: Commensurate with qualifications and ex-

perience.

Application Procedure: Candidates for this position will submit a letter of application, a state application form; resume which includes a list of publications, transcripts, and three current letters of recommendation to:

Chair, Department of Mathematics
Norfolk State University
700 Park Avenue
Norfolk, VA 23504
Tel: (757) 823-8820
Fax: (757) 823-8427
E-mail: makhan@nsu.edu

Application Deadline: Applications will be accepted until position is filled.

Individuals with disabilities requiring accommodations in the application process should contact the Office of Human Resources at (757) 823-8160 (Voice)/ (757) 823-2876 (TDD).

Northeastern University

Tenure-Track Position

The Department of Mathematics at Northeastern University invites applicants for a **tenure-track position** at the Assistant Professor level to start as early as September of 2011. We seek a junior faculty member at the Assistant Professor level. Exceptionally qualified candidates could be considered at a higher level. Appointments are based on exceptional research contributions in Mathematics combined with strong commitment and demonstrated success in teaching. Outstanding candidates with research in any area of Mathematics and with an interest and ability to collaborate across disciplines and units in the university are urged to apply

Minimum Qualifications: Candidates must have a Ph.D., research experience, and demonstrated evidence of excellent teaching ability.

Review of applications will begin immediately. Complete applications received by **November 1, 2010** will be guaranteed full consideration. Additional applications will be considered until the position is filled.

To apply, all applicants must complete the following two steps:

1. Visit "Careers at Northeastern" at: https://psoft.neu.edu/psc/neuhrprdpub/EMPLOYEE/HRMS/c/NEU_HR.NEU_JOBS.GBL. Click on "Faculty Positions" and search for the current position under the College of Science. Applications can also be submitted by visiting the College of Science website at: <http://www.northeastern.edu/cos/> and clicking on the Faculty Positions button.
2. Submit at least three letters of recommendation at <http://www.mathjobs.org>. These letters should address the applicant's research accomplishments and supply evidence that the applicant has the ability to communicate and teach effectively.

Northeastern University is an Equal Opportunity, Affirmative Action Educational Institution and Employer, Title IX University. Northeastern University particularly welcomes applications from minorities, women and persons with disabilities. Northeastern University is an E-Verify Employer.

Western Michigan University

Two Tenure-Track Positions

The Department of Mathematics at Western Michigan University invites applications for **two tenure-track assistant professor positions** in mathematics, pending budgetary approval. The department is particularly interested in strong applicants in graph theory, analysis, combinatorics, and applied mathematics, with a start date of August 2011.

More details are available at the department's web site: <http://www.wmich.edu/math>. Western Michigan University is an affirmative action/equal opportunity employer consistent with applicable federal and state law. All qualified applicants are encouraged to apply.



Tufts University

Tenure-track Assistant Professorship, Scientific Computing

Applications are invited for a **tenure-track Assistant Professorship** to begin September 1, 2011. Applicants must show promise of outstanding research in the area of **Scientific Computing** and evidence of strength in teaching a broad range of courses in mathematics, including upper-level undergraduate and graduate courses in applied mathematics. The teaching load will be two courses per semester. Preference will be given to candidates who show potential for interaction with existing applied mathematics research efforts in the department, including computational partial differential equations, computational neuroscience, numerical linear algebra, and inverse problems.

Applications should include a cover letter, curriculum vitae, a research statement and a teaching statement. All of these documents should be submitted electronically

through <http://www.mathjobs.org>. In addition, applicants should arrange for three letters of recommendation to be submitted electronically on their behalf through <http://www.mathjobs.org>. If a recommender cannot submit online, we will accept signed PDF attachments sent to misha.kilmer@tufts.edu or paper letters mailed to SC Search Committee Chair, Department of Mathematics, Bromfield-Pearson Hall, Tufts University, Medford, MA 02155. Review of applications will begin on **November 22, 2010** and will continue until the position is filled. Tufts University is an Affirmative Action/Equal Opportunity employer. We are committed to increasing the diversity of our faculty. Members of underrepresented groups are strongly encouraged to apply.

Tufts University

Norbert Wiener Assistant Professorship

Applications are invited for a **Norbert Wiener Assistant Professorship**. This is a non-tenure track appointment starting on September 1, 2011, for one year and renewable to a maximum of three years. Applicants must show promise of outstanding research in the area of **Integral Geometry and Harmonic Analysis**. Possible specialties include, but are not limited to, Radon transforms, harmonic analysis on Lie groups and homogeneous spaces, representation theory, microlocal analysis, and aspects of geometric analysis, convexity theory, algebraic analysis, and Lie theory related to integral geometry and harmonic analysis. Ph.D. required by the appointment date. Preference will be given to candidates whose interests bridge those of Tufts faculty. Applicants must also show evidence of excellent teaching. The teaching load will be two courses per semester.

Applications should include a cover letter, curriculum

vitae, a research statement and a teaching statement. All of these documents should be submitted electronically through <http://www.mathjobs.org>. In addition, applicants should arrange for three letters of recommendation to be submitted electronically on their behalf through <http://www.mathjobs.org>. If a recommender cannot submit online, we will also accept signed PDF attachments sent to IGHAHiring@elist.tufts.edu or paper letters mailed to IGHA Search Committee Chair, Department of Mathematics, 503 Boston Avenue, Tufts University, Medford, MA 02155. Review of applications will begin on **December 1, 2010** and will continue until the position is filled. Tufts University is an Affirmative Action / Equal Opportunity employer. We are committed to increasing the diversity of our faculty. Members of underrepresented groups are strongly encouraged to apply.

Tufts University

Tenure-Track Assistant Professorship

Applications are invited for a **tenure-track Assistant Professorship** to begin September 1, 2011. Applicants must show promise of outstanding research in the area of **Dynamical Systems and Geometry**, that is, the study of dynamical aspects of geometric problems or applications of dynamical systems to geometry. Possible specialties include, but are not limited to, actions of the mapping-class group, Teichmüller flows, geodesic flows in nonpositive curvature, dynamics or rigidity of group actions, dynamics on the boundary at infinity. Preference will be given to candidates whose interests bridge those of Tufts faculty in Geometric Group Theory, Topology, and Dynamical Systems. Ph.D. required. Applicants must also show evidence of excellent teaching. The teaching load will be two courses per semester.

Applications should include a cover letter, curriculum

vitae, a research statement and a teaching statement. All of these documents should be submitted electronically through <http://www.mathjobs.org>. In addition, applicants should arrange for three letters of recommendation to be submitted electronically on their behalf through <http://www.mathjobs.org>. If a recommender cannot submit online, we will also accept signed PDF attachments sent to DGHiring@elist.tufts.edu or paper letters mailed to DG Search Committee Chair, Department of Mathematics, 503 Boston Avenue, Tufts University, Medford, MA 02155. Review of applications will begin on **December 1, 2010** and will continue until the position is filled. Tufts University is an Affirmative Action / Equal Opportunity employer. We are committed to increasing the diversity of our faculty. Members of underrepresented groups are strongly encouraged to apply.



Tufts University

Applications are invited for a **non-tenure-track Assistant Professorship** to begin September 1, 2011 with an initial appointment for one year renewable for two more. Applicants must show promise of outstanding research in the area of **algebraic geometry** and related fields. Preference will be given to candidates whose interests bridge those of Tufts faculty including classical algebraic geometry, algebraic groups and equivariant cohomology. Applicants must also show evidence of excellent teaching. The teaching load will be two courses per semester.

Applications should include a cover letter, curriculum vitae, a research statement and a teaching statement. All of these documents should be submitted electronically through <http://www.mathjobs.org>. In addition, applicants

Non-Tenure-Track Assistant Professorship

should arrange for three letters of recommendation to be submitted electronically on their behalf through <http://www.mathjobs.org>. If a recommender cannot submit online, we will also accept signed PDF attachments sent to montserrat.teixidoribigas@tufts.edu or paper letters mailed to AG Search Committee Chair, Department of Mathematics, 503 Boston Avenue, Tufts University, Medford, MA 02155. Review of applications will begin on **January 2, 2011** and will continue until the position is filled. Tufts University is an Affirmative Action / Equal Opportunity employer. We are committed to increasing the diversity of our faculty. Members of underrepresented groups are strongly encouraged to apply.

University of Hartford

The Department of Mathematics, University of Hartford, is now accepting applications for a full-time **tenure-track Assistant Professor** position in **Applied Mathematics** to begin in August 2011. An earned doctorate in mathematics, applied mathematics or related areas is required; ABDs will be considered providing they document a degree completion date.

Our academic mission is to engage students in acquiring the knowledge, skills and values necessary to thrive in, and contribute to, a pluralistic, complex world. The full text of our academic mission, along with more information about the university, can be seen at www.hartford.edu.

The University of Hartford is an open and welcoming community, which values diversity in all its forms. In addition, the University aspires to have its faculty and staff reflecting the rich diversity of its student body and the Hartford region. Candidates committed to working with diverse populations and conversant in multicultural issues are en-

Tenure-Track Assistant Professorship

couraged to apply.

The full job description can be found at <http://math.hartford.edu/longad.pdf>. Review of applications will begin **December 1, 2010**, and continue until the position is filled. Applicants should submit a letter of application; curriculum vitae (include email address and other contact information); a statement of interest in teaching and scholarship; graduate transcripts (unofficial for application, official prior to interview); and three letters of reference, either electronically in PDF format to mathsrch@hartford.edu or by mail, to:

Dr. Joel Kagan, Chair
Department of Mathematics
University of Hartford
200 Bloomfield Avenue
West Hartford, CT 06117

Members of under-represented groups are encouraged to apply. EEO/AA/M/F/D/V.

University of Illinois at Chicago

The Department of Mathematics, Statistics, and Computer Science has active research programs in a broad spectrum of centrally important areas of pure mathematics, computational and applied mathematics, combinatorics, mathematical computer science and scientific computing, probability and statistics, and mathematics education. See <http://www.math.uic.edu> for more information.

Applications are invited for the following position, effective August 16, 2011. Final authorization of the position is subject to the availability of state funding.

Research Assistant Professorship. This is a non-tenure track position, normally renewable annually to a maximum of three years. This position carries a teaching responsibility of three courses per year, and the expectation that the incumbent play a significant role in the research life of the

Research Assistant Professorship

Department. The salary for AY 2010-2011 for this position is \$55,000. Applicants must show evidence of outstanding research potential in mathematics, computer science, statistics, mathematics education or related field, and should expect to have a Ph.D. or equivalent degree by the start date.

Applicants should include a vita, research and teaching statements, and at least three (3) letters of recommendation. Applications should be submitted through mathjobs.org. No applications will be accepted by surface mail or e-mail. To ensure full consideration, application materials must be received by **December 31, 2010**, but applications will be accepted through **January 31, 2011**. Minorities, persons with disabilities, and women are particularly encouraged to apply. UIC is an AA/EOE.



University of Illinois at Chicago

The Department of Mathematics, Statistics, and Computer Science invites applications for a **tenure-track Assistant Professor** position in **statistics or probability**. The position is effective August 16, 2011 and the salary is negotiable. Applicants must have expertise in statistics, probability, or related areas, a demonstrated commitment to research and teaching, and should expect to have a Ph.D. or equivalent degree by the start date. Final authorization of the position is subject to the availability of state funding.

The Department has active research programs in a broad spectrum of centrally important areas of pure mathematics, computational and applied mathematics, mathematical computer science, probability and statistics, and math-

Tenure-Track Assistant Professorship

ematics education. See <http://www.math.uic.edu> for more information.

Applicants should include a vita, research and teaching statements, and at least three (3) letters of recommendation. Applications should be submitted through mathjobs.org. No applications will be accepted by surface mail or e-mail. To ensure full consideration, application materials must be received by **December 1, 2010**, but applications will be accepted through **January 15, 2011**. However, we will continue considering candidates until the position is filled. Minorities, persons with disabilities, and women are particularly encouraged to apply. UIC is an AA/EOE.

University of New Hampshire

The Department of Mathematics & Statistics at the University of New Hampshire, Durham invites applications for a **tenure-track position in Mathematics Education** at the assistant professor level. Expected start date, August 2011.

The University of New Hampshire is committed to creating a more diverse community, knowing *that "inclusion, diversity and equity are values inextricable linked to our mission of educational excellence."*

Qualifications: The successful candidate will have an earned doctorate in mathematics education with a master's degree in one of the mathematical sciences or an earned doctorate in mathematics with extensive research experience in mathematics education. We seek applicants who have a commitment to high quality teaching and mentoring of undergraduate and graduate students, and who are committed to advancing the university's goals of diversity of students, faculty, and staff. Candidates should present strong evidence of research potential in mathematics education. For more information on the Department of Mathe-

Tenure-Track Professorship

tics & Statistics and for the complete position description, visit the website: <http://www.math.unh.edu>.

The Application Process: Review of applications will begin **December 1** and will continue until the position is filled. Applicants are strongly encouraged to apply online at mathjobs.org. Applicants may also apply by sending a letter of application, curriculum vitae, a statement of teaching philosophy, a statement of research interests, graduate transcripts, and three letters of recommendation, at least one of which addresses teaching, to:

Mathematics Education Search Committee Chair
 Department of Mathematics & Statistics
 University of New Hampshire
 Kingsbury Hall
 33 Academic Way
 Durham, NH 03824

UNH is an AA/EEO Employer. UNH is committed to excellence through the diversity of its faculty and staff and encourages women and minorities to apply.

Duke University

Applications are invited for a **postdoctoral position in mathematical biology**. Candidates should have completed a doctorate since April, 2010 and before August, 2011. Applicants must be US citizens or permanent residents. The teaching load will be one course each semester, and the salary includes summer support. The appointment is for three years and begins on August 1, 2011. Duke University seeks to build a diverse faculty: women and under-represented minorities are encouraged to apply.

Applicants are asked to submit (a) an AMS standard coversheet; (b) a vita; (c) a description of current and past research (1-3 pages); (d) a plan for future research, and have at least four letters of recommendation, including one that evaluates the applicant's teaching, uploaded at mathjobs.org or sent to Duke by mid-January. Each applicant is

Postdoctoral Position in Mathematical Biology

also requested to provide the name(s) of one or more members of the faculty of the Department of Mathematics at Duke who are working in the applicant's general area of research. The AMS Standard Cover Sheet should be completed online at www.mathjobs.org/jobs/duke/. Applicants are encouraged to submit all of their materials electronically at this site. Applicants who do not have internet access may mail their materials to: Appointments Committee: attention mathematical biology Department of Mathematics Box 90320 Duke University Durham, NC 27708-0320 Applications received by **January 4, 2011** will be guaranteed full consideration; early application is advisable.

Duke University is an affirmative action/equal opportunity employer. E-mail inquiries: reed@math.duke.edu; Departmental home page: www.math.duke.edu.



University of Virginia

Whyburn Instructorship

The Department of Mathematics at the University of Virginia invites applications for a **Whyburn Instructorship** beginning August 25, 2011. This position carries a three-year appointment. Preference will be given to candidates who have received their Ph.D. within the last three years. Candidates must have a Ph.D. by the date of hire, an outstanding research record, and demonstrated teaching success. Preference will be given to researchers working in an area of analysis covered by the department. In the cover letter, it will be very helpful to indicate which members of our department are closest to their research interests. See <http://artsandsciences.virginia.edu/mathematics/research/researchguide/index.html>.

To apply, please submit the following required documents electronically through www.MathJobs.org: A cover letter, an AMS Standard Cover Sheet, a curriculum vitae, a publication list, a description of research, and a statement about teaching interests and experience. The applicant must also have four letters of recommendation submitted, of which one letter must support the application's effective-

ness as a teacher. In addition, all candidates are required to complete the Candidate Profile through the University of Virginia's employment system, which is Jobs@UVA (<http://jobs.virginia.edu>); posting number 0606116. Your application process will not be complete until all required documents are available on MathJobs, and you receive a confirmation number for your Candidate Profile from Jobs@UVA. Priority consideration will be given to applications received by **November 15, 2010**; however, the position remains **open to applications until filled**. Additional information about this position and our department is available on our website:

<http://artsandsciences.virginia.edu/mathematics/>. Women and members of underrepresented groups are encouraged to apply. The University of Virginia is an Affirmative Action/Equal Opportunity Employer and is strongly committed to building diversity within its community.

For more information about the position or institution: <http://artsandsciences.virginia.edu/mathematics/aboutus/employment/index.html>.

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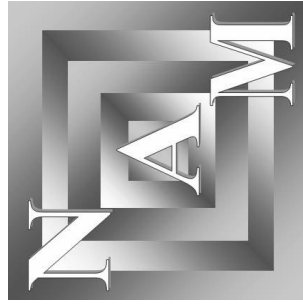
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