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CAL POLY POMONA Mathematics and Statistics

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Dr. Jennifer Switkes Receives Provost's Award for Excellence in Teaching



The Department of Mathematics and Statistics is delighted to congratulate Dr. Jennifer Switkes who has been selected to receive the 2015 Provost's Award for Excellence in Teaching. This highly competitive award recognizes outstanding faculty accomplishment in the area of teaching.

Dr. Switkes has taught classes at Cal Poly Pomona at every available level, from lower-division to graduate, and is universally loved by her students. Her extensive use of project work in her courses allows students to employ the learn-by-doing approach and to learn what mathematical research entails. Her teaching service spreads far beyond Cal Poly Pomona to Makerere University in Uganda, and the California Rehabilitation Center in Norco.

Introducing Dr. Stacy Musgrave



Stacy was born in southern California, but didn't live there until she was 17. She spent her early years playing at the beach in Florida and her teen years studying in northern California. She started college as a history major at UCSB, intending to teach high school. Nobody informed her that college students don't always have to take math, so she continued to enroll in math courses – and enjoyed them! After a year, she transferred to California State University, Long Beach and declared a double major in math and Spanish. Working as a tutor on campus helped Stacy realize she wanted to continue working with college students, so she applied to

graduate schools, ultimately choosing to work on her Ph.D. in mathematics at the University of Georgia.

Though her dissertation research is in non-associative Clifford algebras, Stacy discovered math education as an area of research late in her graduate studies. Exploring mathematical ideas deeply to describe and support how students engage with and learn mathematics meaningfully fascinated her. Stacy pursued these interests during her time as a postdoctoral researcher at Arizona State University, working on various projects to characterize high school teachers' mathematical meanings, investigate calculus students' reasoning about mathematical structures, and direct college instructors' attention towards student thinking. She looks forward to continuing her research on students' development of mathematical practices, instructor professional development and creating mentoring and support systems for women in STEM.

On a personal note, Stacy thrives on sunshine, loves the ocean, and cannot pass an opportunity to play with dogs – especially big ones that think they're lapdogs!

Field of Dreams Conference 2014

By Talin Mirzakhanian

The National Alliance for Doctoral Studies in the Mathematical Sciences held their Annual Field of Dreams Conference in Mesa, Arizona on November 7-9, 2014. Thirteen Cal Poly Pomona undergraduate and graduate students attended the conference, held at the Phoenix Hilton Hotel. We traveled on a bus with about fifty other students from California State Universities. The almost eight-hour ride was quite exciting and adventurous.

This conference provided a great opportunity for us to learn about the benefits and challenges of graduate education. There were presentations and panel discussions by

disciplines by talking about his research and accomplishments. Earlier in his life when he was a postdoctoral fellow, Dr. Gates presented his research about supersymmetry at a conference in England. He inspired the Middle Eastern professor and Nobel Prize winner Dr. Abdus Salam who later became his mentor and invited him to join the Abdus Salam International Centre for Theoretical Physics (ICTP) in Italy to continue his research. ICTP was one of the few organizations dedicated to international disadvantaged students, giving them an opportunity to perform research in the physical sciences. It was inspiring to hear how that incident impacted Dr. Gates' life and helped him advance in his career.



graduate students, postdoctoral fellows, professors, and mathematicians working in industry. We were informed of many graduate education challenges including: hectic schedules, difficult qualifying exams, a shortage of social interactions, and other challenges. I found inspiration from the determination of graduate students after hearing that the high demands of graduate education made some students consider quitting graduate school a few times. The panel discussions gave us good insight into the expectations of graduate study.

Professor Sylvester Gates from the University of Maryland, College Park gave one of the best presentations. He discussed the subtle influence of style and culture in STEM

In addition to the presentations, we had an excellent opportunity to participate in a graduate school/career fair. We were able to discuss research and graduate programs with research faculty from twenty-four different universities. They also referred us to their colleagues in their departments and assisted in making decisions for graduate study. This conference brought many scholars and professors together to share their various paths of success and help us realize the possibilities that many of us did not consider before. Attending this conference instilled a great motivation for the pursuit of graduate education in mathematics.

In Remembrance of Debra Brum

By Karen Vaughn

Debra Lelewer. That's who a few of us remember. She was an outgoing yet gracious and talented graduate student who came to Cal Poly Pomona sometime after earning a BS degree in Math from Michigan State University in 1973. I came to CPP in 1975, but it's likely we met after Building 8 opened in 1976 while I was a student assistant in the Math department office. It just seems like I've always known her.

Debra earned her MS in Math in 1977, I became a lecturer in 1979 in Math, then she became a lecturer in Computer Science in 1983. Sometime around 1985 after she earned her MS in Computer Science, she popped into my office and shared her plan to get a PhD in Computer Science at the University of California, Irvine. Wow! But, she wouldn't just let me wallow in her awesomeness. She asked if I had plans for a doctorate. However, at the time, my hubby Jeff and I had three daughters under five years old, so another degree was out of the picture. Trying to keep the idea alive, Debra replied, "Well, if you change your mind, let me know."

The next time I saw Debra, she was overseeing the project to have all of Building 8 hard-wired for computers, and her first name was now "Doctor." I don't recall which came first, the chair-ship in Computer Science in 1992 or matrimony to Dr. Gil Brum from Biology, but I was very happy for her on both counts.

Really Debra was amazing. In 1995 she became Vice President of Faculty Affairs and I suddenly saw more of her. She was a strong supporter of the campus lecturers' involvement in university and community activities. She was instrumental in developing the Lecturer's Luncheon and Colloquium events as well as the Merit Pay Increase Program. Around 2000, at Debra's coaxing, I applied for and won the CSU Chancellor's Forgivable Loan Program Award. I had to decline the honor, but I'm so deeply grateful for her advice and guidance.

In 2005 Debra became Vice President of Instructional and Information Technology, a perfect fit for her CS and leadership backgrounds. I started emailing her at Christmastime, updating her about my family. In the fall of 2008 she took a leave of absence, and then she retired the following year. When I emailed my well-wishes, she shared her and Gil's plan to own a vineyard. Again, Wow!

Even retired, Debra continued to give sound advice. She helped me choose a good cruise for Jeff and me to take for our 30th anniversary in 2010. I did not send out a holiday email message in 2014 and missed getting one more response and perhaps hear about her and Gil's globe trekking adventures.

The Math department stands in a long line to claim Debra as their very own. But we can all say, "Deb, thank you for your inspiration, professionalism, integrity, and brilliance. Your absence leaves a huge void. You will be deeply missed."

Summer PUMP – Preparing Undergraduates for PhD's

By Michelle Leslie

Senior year for a math major at Cal Poly Pomona can mean one of two things- either you've completed real analysis and you are ready to conquer the world or you have yet to embark on the gruesome task of proving the calculus and are shaking in your college-kid sneakers. For me, the latter applied. Luckily, I received an email in the spring quarter leading up to the summer before my senior year that proved to be one of the best things to enter my Gmail inbox since the solution manual to my integral calculus book sophomore year.

The email explained a program that was designed to prepare participants for the more difficult upper division math classes which include linear algebra, advanced calculus and, of course, my nemesis -- real analysis. As if this didn't already sound appealing, they put you up in the Cal Poly dorms and granted a generous stipend. I applied immediately.

On the day of check-in, introductions were made, awkward moments shared, and the schedule for the following day was distributed. My heart sank at the day that lay ahead of me. A 9 am check in time for linear algebra and advanced calculus lecture, followed by a short break, a workshop to solve assigned lecture problems, breaks, real analysis lecture, another workshop, then guest speakers ending at 5 pm. After the day was finished, the groups headed back to the dorms for a quick bite and then started on the difficult homework due the following day. This schedule continued six days a week for 4 weeks (Sundays were rest days, a.k.a. catch up on homework days).

While some may say this sounds miserable, I must argue differently. I pushed myself every day to finish my work and try to understand one of the most feared subjects in mathematics. When I struggled, I found help among my peers and we bonded through long nights, tired mornings and cheap beer. What I thought would be an individual endeavor, turned out to be the best team experience I have ever been involved in. With Dr. John Rock staying after hours to ensure those of us who needed extra help received it, to Dr. Arlo Caine's animated lectures proving linear algebra and



advanced calculus can actually be exciting at nine in the morning, I found a passionate group of mathematicians and friends.

The guest speakers demonstrated what it takes to become a graduate student, from fellow students discussing their personal experiences to varied university faculty informing us of expectations and possible routes to take. We left PUMP well informed of our future opportunities. I could not be more thankful for the experience given to me last summer. I was able to complete real analysis with confidence and understanding and look forward to what the future holds for me as a graduate student next year.

Q and A with Dr. Adam King

We recently caught up with new faculty member, Dr. Adam King, over email to ask him about the trajectory of his career leading here to Cal Poly Pomona, as well as his passion for mathematics and statistics!

Q. Did you always know that you wanted to be a statistician? Any other careers that you considered or pursued?

A. Throughout college, I wavered between math and computer science as my field of choice. At the beginning of my senior year in college, I finally had to make a decision so that I could gear my fall courses towards helping me get into grad school the following year. I ended up choosing math by a very slim margin, but I decided I'd apply to grad programs where I could do logic and discrete math, which are strongly related to computer science. The next year I started UCLA's math Ph.D. program intending to focus on logic, but I quickly realized I missed programming a lot. So my second year in the program, I switched to studying numerical analysis. This was a lot more fun since I got to program for almost every assignment, but I didn't really like that almost all the applications we used were to differential equations. Around that time, by chance I met a student in UCLA's biostatistics grad program. She set up a meeting for me with a biostat professor who essentially told me "in biostat, we use a lot of math, we do tons of programming, and we solve lots of serious problems in science and medicine." I had always been interested in medicine, so this sounded perfect for me. Despite never having taken a statistics class in my life, I decided to change departments to biostat the following year.

I think my story highlights a few unique things about statistics as a career path that I want to point out. Most professional statisticians today did not start out pursuing statistics as a career in college. Many majored in math, biology, economics, business, etc., and then encountered statistics when they needed to use it in their jobs after finishing college. Only then did they decide to go back to school to get a master's or Ph.D. in statistics or biostatistics. In fact, there are actually a lot more statistics master's degrees awarded

each year in the U.S. than bachelor's degrees! The upshot is that if you think you want to pursue statistics as a career, it's OK to study something else first. Just make sure you have a strong math background (demonstrated by excellent grades in advanced math classes), since that will really help you get admitted into a (bio)stat grad program. However, this trend of few students majoring in statistics has really started to reverse over the past few years, as people realize just how much demand there is for people with good data analysis skills. The job market right now for people with statistics degrees is really hot. So if you like statistics, there's no reason to wait until after undergrad to dive in!

Q. What was your favorite statistics or mathematics class that you have ever taken? Ever taught? Why?

A. This is a really tough one, but I think my favorite class as an undergrad was my cryptography class (taught in a math department). It had a little of everything: we learned about, wrote, and broke classic substitution ciphers; learned about how Alan Turing broke the German's Enigma machine; and used elementary number theory to study public key encryption schemes. Every assignment for this class required us to either break a cipher by hand or using a computer program we wrote. Finally, the regular textbook was supplemented by a non-technical "popular" book on the history of cryptography called "The Code Book" (which I highly recommend reading). It was really awesome to learn about the theory of cryptography in class, and then go home and read a lively description of the history behind its development. I also had the chance to be the Teaching Assistant for UCLA's cryptography class while I was in the math department there and enjoyed that very much too. Maybe I will teach a special topics class on cryptography in the next few years!

Fall Gift of Numbers and More!

By Dr. Greisy Winicki-Landman

In fall quarter 20 math majors enrolled in MAT 495 participated in two off-campus math related activities. During the last weekend of October, they volunteered as student hosts at the annual conference of the California Mathematics Council-South (CMC-S) that took place in Palm Springs. On Nov. 5th, they led the Gift of Numbers event at Simons Middle School in the Pomona Unified School District. This math night was attended by about 300 local students and parents and is becoming a tradition at the school. The next Gift of Numbers was scheduled for mid-February. For more information, contact Prof. Greisy Winicki-Landman at greisyw@cpp.edu.



Kappa Mu Epsilon News

KME, a national honors society in Mathematics, has a mission of assisting undergraduate students to pursue careers in Mathematics and furthering their interests in Mathematics. As a local chapter of KME, our goal for this year was to promote the possibilities one can achieve by pursuing a Mathematics Degree.

In Fall, we promoted the importances of REU's (Research Experience for Undergraduates), followed by a PhD panel from our very own Cal Poly Pomona professors.

We regularly encourage our members to attend conferences, social events, and community services. This year, 10 of our members even attended the Joint Mathematics Meetings (JMM) in San Antonio, Texas. The JMM is billed as the largest mathematics meeting in the world and is a joint conference of both the Mathematical Association of America (MAA) and the American Mathematical Society (AMS) and hosts sections by the Association for Symbolic Logic (ASL), the Association for Women in Mathematics (AWM), the National Association for Mathematicians (NAM), and the Society for Industrial and Applied Mathematics (SIAM).

Something new that was started this year, thanks to Dr. Berit Givens, is the Problem Solving Competition. The Problem Solving Competition allows students and professors to solve semi-weekly challenging math problems.

We also had a number of fun social events this year including broomball and hiking at Eaton Canyon Falls. And, as always, we ended the year in style with a fun banquet. The theme this year was a Masquerade ball.

Look for more fun KME adventures in the 2015-2016 academic year. The new executive board is:

Xavier Ruiz-Pantoja
President

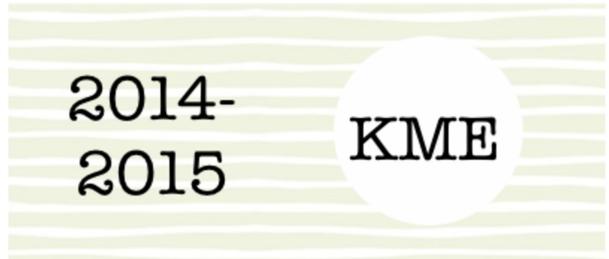
Alexis Ayala
Vice President

Ashlee Spradley
Treasurer

Erin Bullard
Social Chair / Scheduler

Monica Quintero
Science Council Representative

Frank Aguirre
Web Master



Department Scholarship News



Every year, the department celebrates the achievements of some of our top students with scholarship awards. During U-hour on January 29, 2015, the department hosted a scholarship reception to recognize the recipients. Many attended to speak and hear about our fantastic students, including faculty, students, and donors. A big thank you goes out to Dr. Stacy Brown for organizing the event!

Congratulations to the recipients:

Alexis Ayala
 Shant Danielian
 Thu Dinh
 Airel Jimenez
 Mirian Juan
 Grace Lim
 Cory Neff
 Quang Nguyen
 Ali Oudich
 Jesus Romero Jr.
 Matthew Shanahan
 Noel Somoza
 Ashlee Spradley
 Rui Zhao
 Talin Mirzakhianian

Recipients for this year's scholarships will be selected and notified soon. Expect another celebration for our amazing students some time next year!

Department Colloquium

by Dr. Arlo Caine

From epidemic modeling to algebraic geometry, from the business of data analytics to mathematics teacher education, from cryptography to the mathematics of games and gambling, the department colloquium series offered sixteen events over the year showcasing the breadth of mathematics,



statistics, their applications and teaching. We welcomed presentations by alumni working in the private sector, the public sector, and higher education and research: Dr. John Flaig (Managing Director of Applied Technology), Dr. Ray Beaulieu (National Security Agency), and Prof. Blake Hunter (Claremont McKenna College). The series began with presentations by some of our fantastic students: Grace Lim (Cell Swimming, MIT Summer Research Program), Aaron Gaut (Text Recognition through Computational Topology, CPP). Our newest faculty member, Prof. Adam King, delivered a thought-provoking talk about the statistics of DNA evidence. We were challenged by Prof. Tommy Dreyfus (Education, Tel Aviv University) to examine our own understanding of what constitutes proof in mathematics scholarship, teaching, and learning. And, for the third year in a row, we concluded the series with a special event for our students and faculty. Colloquia are typically offered every other week during the fall, winter, and spring quarters, concluding with the distinguished lecture in the spring. The schedule is available on the department website at <https://www.cpp.edu/~sci/mathematics-statistics/colloquium-and-newsletter/index.shtml> and the talks are announced regularly throughout the terms. The 2015 Distinguished Lecture in Mathematics and Statistics was given by the mathemagician, Prof. Art Benjamin, of Harvey Mudd College, who educated us on The Mathematics of Games and Gambling and entertained us with mental mathemagic. Join us next year and enlarge your own view of the mathematical horizon.

Cal Poly Pomona Summer Conference on Lattice Path Combinatorics and Applications

The Department of Mathematics and Statistics will be hosting the 8th International Conference on Lattice Path Combinatorics and Applications which will take place Monday, August 17, 2015 through Thursday, August 20, 2015 on the first floor of Cal Poly Pomona's library. Researchers from all over the world will be visiting our campus to take part in this conference. The Conference will be dedicated to well-known mathematicians Shreeram Shankar Abhyankar (1930-2013) and Philippe Flajolet (1948-2011). Professors George Andrews and Lajos Takács will also be honored at this Conference.

In fact, George Andrews, who was president of the American Mathematical Society from 2008-2009, will attend this Conference. Professor Andrews, who works in analysis and combinatorics, is giving a talk entitled, Congruences for the Fishburn numbers, on joint work with James Sellers. Professor Cyril Banderier, of the Centre National de la Recherche Scientifique/Univ. Paris-Nord, France

will talk on The analytic combinatorics point of view of Philippe Flajolet on lattice paths. Professor Art Benjamin of Harvey Mudd College, who in May 2015 was Cal Poly Pomona's Distinguished Lecturer, will also be speaking at this Conference. In addition, a few Cal Poly Pomona faculty and students will also be presenting talks.

Students, faculty and alumni are all invited to take part in this summer Conference on Lattice Path Combinatorics and Applications. More details about the Conference, including speakers, registration and submission of talks may be found at the following link:

<http://www.cpp.edu/~sci/mathematics-statistics/lattice-path-combinatorics/index.shtml>

For more information, contact local campus organizers: Alan Krinik, Randy Swift or Robin Wilson.



Epsilons and Deltas

- On the left is a picture from the most recent Gift of Numbers at Allison Elementary on May 27, 2015 including Ann Shedden, Dr. Greisy Winicki-Landman, Dr. Alan Krinik, and Principal Elizabeth Valenzuela.

- Many students will be enjoying summer REU experiences this year, including Miguel Landeros who will be at the University of Hawaii at Hilo for PURE Math (or Pacific Undergraduate Research Experience), and Diana Gonzales who will be at East Tennessee State University for their REU program.