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CAL POLY POMONA Mathematics and Statistics

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Chair's Message

by Dr. Berit Givens

Welcome to the 2016-2017 academic year! The Department of Mathematics & Statistics is busy with many changes and new students. In particular, the department welcomes three new faculty members to the tenure-track faculty: Dr. Jillian Cannons, Dr. Briana Foster-Greenwood, and Dr. Ivan Ventura. We are very happy to have been able to hire these three talented faculty members and look forward to many years working with them.

Another big change is that I am the new Department Chair. Dr. Krinik served us well for many years and is now taking a much-deserved sabbatical. I became the chair this summer and plan to continue as chair for the next four years. I'm humbled and grateful that the faculty of the department has chosen to entrust me with this position.

This year the university experienced a record high entering freshmen class, and the department was no exception --- 146 new freshmen and 83 new transfer students enrolled into the major. This is both good news and provides us with challenges: It's wonderful that so many students are interested in math, but we will have to be creative to meet the demand for classes.

I'm looking forward to getting to know all of you and serving as your chair. My favorite things about working at Cal Poly are (1) the amazing diversity of our community; and (2) the character of our students. Hands down, Cal Poly math majors are among the kindest, hard-working, most wonderful people I have ever met.

Finally, a fun fact I recently heard about: How much is 1% of 1 day plus 1 hour? The answer is a surprisingly nice round number.

New Faculty Introductions



Dr. Jillian Cannons

Jillian could not be happier to now be a full-time member of the Cal Poly Department of Mathematics and Statistics. Her path here has been circuitous, as she is originally from Winnipeg, Canada. At a young age Jillian found her love of mathematics and computers, combining the two when she wrote her first program to give her younger brother practice at addition and subtraction. She continued in this direction, obtaining her B.Sc. in Computer Engineering from the University of Manitoba. She then decided to pursue graduate school, obtaining her M.S. in

Electrical Engineering from the University of Illinois at Urbana-Champaign. Completing her journey southwards, Jillian moved to San Diego where she completed her Ph.D. in Electrical Engineering at the University of California, San Diego. She spent the next six years at a small company working on agricultural robots. While both interesting and challenging, her work in industry lacked the human interaction and rewarding aspects of teaching, which brought Jillian back into the world of academia.

While falling under the umbrellas of engineering and robotics, applied mathematics has been at the heart of Jillian's research both in graduate school and in industry. She focuses on applying mathematical optimization to real-world areas including network communications and robotics. After working with large robots in agriculture, her current research interests are optimization problems in the control of small, unmanned aerial vehicles. She hopes to capture the interest of her students at Cal Poly and demonstrate the fun to be had in applying mathematics to the problem of flying robots.

Dr. Briana Foster-Greenwood



Briana grew up in the desert southwest before heading to college at the University of North Texas. She considered majoring in music or geology, but ultimately settled on mathematics with a minor in computer science. Her favorite project as an undergrad was programming a Connect Four game, and the experience of a challenging but exciting geometry course motivated her to continue at UNT for graduate school. After completing her PhD in 2012, Briana spent four years as a Visiting Assistant Professor at Idaho State University. Her research interests include noncommutative algebra, representation theory, graph theory, and combinatorics, especially as relates to complex reflection groups. (Search for images of complex polytopes if you are curious!)

Briana is also energized by teaching. She enjoys getting to the core of concepts and thinking about, discussing, and experimenting with various teaching strategies to help lead students to develop their own understanding. When not doing mathematics, Briana might be found playing the flute or enjoying the outdoors.

Dr. Ivan Ventura

Ivan Ventura was born in Guatemala City, Guatemala and grew up, mainly, in Irvine, California. He completed his BS in Mathematics at Harvey Mudd College in 2007 and received his PhD Mathematics from UC Berkeley 2012. From 2012-2016 he was an NSF Alliance Postdoctoral Fellow at the University of Arizona and at Harvey Mudd College. His research interests lie in partial differential equations, especially those arising from mathematical physics. In his free time Ivan enjoys a variety of hobbies, from playing and watching soccer, playing ultimate Frisbee, rock climbing, cooking, and playing board games with friends. Ivan is excited to be joining the faculty at Cal Poly Pomona and having a chance to interact with the amazing student body.



Student Research

By Dr. Alan Krinik

Dr. Alan Krinik led a student research seminar during summer 2016 that continued during the first half of the fall 2016 quarter and will resume after fall finals in December. The students are Pedram Ostadhassanpanjehali (a CPP graduating senior), Ali Oudich (CPP graduate student), Uyen Nguyen (CPP graduate student) and Ryan Kmet (freshman at Univ of Minnesota). The research is on determining the eigenvalues of a certain class of tridiagonal matrices. This work has applications for finding the n th power of stochastic matrices and ruin probabilities corresponding to suitable birth-death Markov chains.

* Some of this research was presented (by Pedram and Ali) in a talk entitled *Eigenvalues of a Class of Tridiagonal, Stochastic Matrices*, which took place in a Contributed Paper Session of the Fall 2016 Mathematical Association of America Sectional Meeting at Cal State Los Angeles on October 22, 2016.

* Pedram, Ali and Uyen also presented an expanded version of *Eigenvalues of a Class of Tridiagonal, Stochastic Matrices* at a Cal Poly Pomona Colloquium on October 27, 2016. Their talk was one of three student presentations given at this colloquium, which was designed to acknowledge Cal Poly Pomona student research that took place during summer 2016.

* Uyen Nguyen was selected to attend the 19th annual Nebraska Conference for Undergraduate Women in Mathematics. The conference was held the weekend of February 3-5, 2017 on the University of Nebraska-Lincoln campus and at the Embassy Suites. Uyen Nguyen's abstract was approved as part of the Conference Poster Session. Her poster represented the continuing work on determining eigenvalues for various stochastic matrices. This content material will also comprise part of Uyen's master's thesis at Cal Poly Pomona.

* There was an invited talk entitled *Exploring a Class of Finite, Tridiagonal, Stochastic Matrices* by Alan Krinik, Uyen Nguyen, Ali Oudich, Pedram Ostadhassanpanjehali and Ryan Kmet which was scheduled to take place at a American Mathematical Society Special Session on Stochastic Matrices and Applications at the Joint Mathematics Meetings of the Mathematical Association of America and the American Mathematical Society in Atlanta, Georgia, January 4, 2017.

Mathematics at the RSCA Conference

By Dr. Stacy Musgrave

On Friday, March 3, CPP students gave oral, performance and poster presentations at the 5th Annual RSCA (Research, Scholarship, and Creative Activities) Conference. The Math Department was well represented at this event by the following students:

- * Alexis Ayala, Joshua Brajas & Austin Nakamoto presented a poster titled, "Mosaic Numbers of 9-Crossing Alternating Knots" (Faculty Mentor: Robin Wilson)
- * Hsien-Te Kao gave an oral presentation entitled, "Religious Radicalization Model: Branch Davidians" (Faculty Mentor: Jennifer Switkes)
- * Vincent Moya gave an oral presentation entitled, "Structure Sense" (Faculty Mentor: Stacy Musgrave)
- * Kim Reece gave an oral presentation entitled, "Extension of the Simon invariant to K_p graphs" (Faculty Mentor: Robin Wilson)

Vincent Moya will be presenting at the CSU System-Wide Research Conference in San Luis Obispo in late April.

Harmonic equations: A Mathematical Exploration of Music

By Daniel Mateo

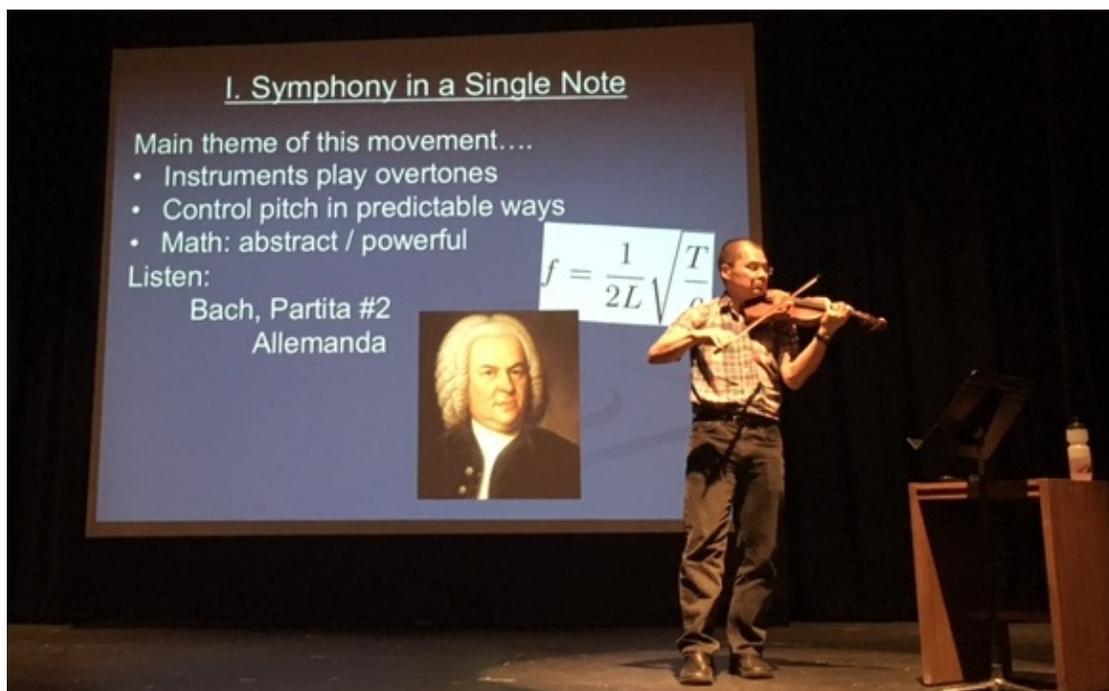
This talk had a lot of interesting factors. For one, it brought together two of my biggest influences in life; Music and Mathematics. Dr. David Kung, from St. Mary's College of Maryland, began the talk with a brief introduction on how the left side of the brain and the right side of the brain work together to produce incredible things. It is generally assumed that we use one side or the other. However, Dr. Kung not only assured us that everyone is able to use both sides, but also encouraged us to do so.

After that, he transitioned into the difference between stringed instruments and wind instruments. In general, stringed instruments use the vibrations of the plucked string to produce sound. Whereas wind instruments use the air flow through various holes and keys to produce sound. Dr. Kung focused on stringed instruments since the assumption was that sound produced by strings was a result of a sine wave in motion. Through the use of technology and a violin, he was able to demonstrate that the sound produced in fact was not just a simple sine wave. It was a combination of waves unique to the sound itself. He showed that sound was a spectrum which includes various frequencies of sound.

The next topic was on overtones to explain how a string moves while in motion. This was demonstrated by using a rope in which one side was moved up and down and the audience was able to view the ways that the rope moved in a sine wave. The trick was to change the speed at which the rope moved in order to produce different levels of frequency, thus in hypothetical terms, producing a different pitch of sound.

Overall I felt that the talk was very interesting, the practical applications being performed and the demonstrations were very consistent with the theory that was being discussed. Dr. Kung

was also an excellent violinist and was very enthusiastic about his craft. I think that sometimes as mathematicians we become so involved with theory that we fail to see the application in real time. This was a joy to watch as everything was also explained in mathematical terms. In the end, I was pleasantly surprised by the fact that Dr. Kung was able to show that the left brain and the right brain can work in together in harmonious ways.



Gift of Numbers!

By Anne Shedden

On November 9th, the students in Math 194, 394, 395 and 495 sections put on our Fall Quarter 2016 Gift of Numbers at Westmont Elementary in Pomona. This was the first time we have worked with Westmont, and we plan to return again next fall. The K-6th grade students were excited to play the standards based games that our Cal Poly students designed! It was a very positive experience to both sets of students.



Department Teaching Awards

By Sharon Meulbacher

The 2015 – 2016 Department of Mathematics and Statistics Annual Excellence in Teaching Award was presented to Mr. Daniel Bortis. His students remarked that he “made everything clear” and has “an approachable personality and gains respect from his students with the quality of his teaching.” Mr. Bortis attended Cal Poly Pomona for both his undergraduate and graduate mathematical studies. His master’s thesis, *A Deterministic Model for the Spread of Polio*, was completed and published under the guidance of Dr. Randall Swift. Mr. Bortis also teaches at Mt. San Antonio College and Saddleback College. In his spare time, Mr. Bortis enjoys playing basketball and rooting for the Los Angeles Lakers. He is also very active in his church where he plays the bass guitar.



The Department Teaching Award Committee, consisting of Dr. Amber Rosin, Dr. Ryan Szykowski, Ms. Sharon Muehlbacher, and Mr. Wesley Griffith, made the announcement of Daniel Bortis’ award after reviewing departmental nominations.



Congratulations to Mr. Wesley Griffith who received the 2014 – 2015 Department of Mathematics and Statistics Annual Excellence in Teaching Award. Mr. Griffith came to Cal Poly Pomona in 1998 where he started the MASH tutor center and managed student facilitators in the PMP Program. He became a full-time lecturer in 2012. Mr. Griffith’s education focused on pure mathematics and math education. He enjoys teaching all of his courses, his favorite being Calculus III, Linear Algebra, and Multivariable Calculus. He has a low-key home life where his hobbies are collecting illustrated books, and listening to gothic rock music.

Dr. Amber Rosin, Dr. Ryan Szykowski, and Ms. Sharon Muehlbacher, made the announcement of Wes Griffith’s award after reviewing departmental nominations.

“I teach students.” – A Reflection from the 2017 Critical Issues in Math Education Workshop

By Dr. Stacy Musgrave

In March 2017, I attended the Critical Issues In Mathematics Education 2017 workshop at the Mathematical Sciences Research Institute (MSRI) in Berkeley, CA. The theme of this year’s workshop was “Observing For Access, Power, And Participation In Mathematics Classrooms As A Strategy To Improve Mathematics Teaching And Learning.” Mathematicians, math educators, K-16 administrators, K-12 teachers, and students (high school, undergraduate, and graduate) were in attendance to discuss issues of equity in mathematics education.

While I am admittedly still processing the what, so what, and now what of this experience, I would like to share some of the ideas from the workshop with the hopes of sparking a dialogue within our CPP Math Department.

A major theme introduced by Rochelle Gutierrez (Univ of Illinois) in the workshop was the notion that mathematics classrooms dehumanize students. Some of the ways this dehumanization takes form includes:

- o Valuing speed over reflection and careful analysis.
- o A sense among students that they are not creators of mathematics, rather they are working on “problems” the teacher already knows the answer to.
- o Having students critique each other’s reasoning before having them first appreciate and understand one another’s reasoning.

Darryl Yong (Harvey Mudd) asked us to generate a list of mathematical microaggressions (actions

and/or words that might dehumanize, marginalize, or create self-doubt in students):

- o A teacher saying, “The rest of the proof is trivial.” (As a community, we’ve developed this saying to signal to the reader that the remainder of the argument may be accomplished through some calculations or an application of a lemma, or the like, but students often don’t know this!)
- o A teacher ignoring wrong answers, and only calling on people he or she knows has the right answer.
- o Students not listening to another student who is asking or answering a question.
- o Students excluding a quiet or shy classmate from group work.

To counter the above bullet points, we must address how to re-humanize the mathematics classroom. Who is participating in the mathematics? What is the nature of the mathematics that we’re including in our classrooms? How can we create a safe and brave space for students to engage in mathematics classrooms?

At the end of the workshop, I was reminded that “I teach students” more than “I teach mathematics.” In 5 years, I anticipate many of the definitions and theorems will be long forgotten, but the experiences I create to support the development of students’ curiosity and confidence may leave a lasting impression. At least, that is my goal.

If you wish to engage in further conversations about this article, or related issues, keep an eye out for an email announcing a time and place to meet in May.