

CAL POLY POMONA DEPARTMENT OF MATHEMATICS AND STATISTICS NEWSLETTER – 2022-2023

LETTER FROM THE CHAIR

Berit Givens

We're at the end of the semester!

It's been the first year since the start of the pandemic which has been almost entirely in person; classes, exams, and all. While an exhausting academic year for all involved, we continued many of our department offerings. Dr. He Jiang was hired as our new tenure-track statistician; his specialty is in clustering and mixture models. Our colloquium series continued this year, with speakers coming both locally and remotely, across the spectrum of math and statistics. Pictured below is a talk by Roberto Soto of CSU Fullerton.



Our annual distinguished lecture was given by Professor Joseph Teran of UC Davis, who showed a packed room how his research in scientific computing led to the realistic physics seen in movies like *Frozen* and *Moana* and reminds students they can indeed apply their mathematical training (if they so wish).

In some ways, we are glad to have had an otherwise quiet (though productive) year. For those with some memory, our university underwent semester conversion in 2018, and the pandemic followed shortly after in 2020, so it has been a busy five years. This year, we had 356 undergraduates

and 66 Masters students in our department, of which 91 undergraduates and 34 Masters which are finishing in Spring 2023!

A few recent and upcoming events I'm looking forward to:

- Our tenure-track faculty hiring process for Fall 2023 was successful. We will be pleased to welcome Dr. Hyunkyung Yoon, joining us from Arizona State University. Her specialty is in math education; particularly how teachers' meanings influence students' meanings in the classroom, both with K12 teachers as well as university professors.
- Our department is in the processes of approval for a new Masters program in Applied Mathematics and Statistics. The existing Masters program will remain, understood as oriented towards Pure Mathematics and Math Education. We expect having the two programs will help the faculty and department students better succeed in their academic and career goals.

- The Silver Streak – the bus line which spans Los Angeles county – recently restored service to Cal Poly Pomona for the first time in decades. I have taken to using it once per week myself, and hope it is a sign of further future transit options to campus (none of us enjoy the driving situation).

To wrap up, here’s a little math puzzle which I’ll let the reader chew on.

Take the following image (mapped to two colors on the right, for simplicity):



Is it possible to find a straight line to cut the image, such that exactly half the green area is on either side of the line? What about two straight cuts to make three equal-area pieces? Can you *prove* that the same is possible regardless of the shape?

Dr. Berit Givens

Department Chair

OUTREACH SPREADS THE JOY OF MATHEMATICS

Greisy Winicki-Landman



Note from the Editor: Gift of Numbers is an outreach event regularly organized by Dr. Winicki-Landman. This is a program that takes CPP students into the community to share math games with children and their families.

During Fall 2022, students enrolled in MAT 4950 [*Teaching Mathematics in Secondary Schools*] volunteered at the Annual conference of the California Mathematics Council in Palm Springs and they organized games and

presented them during Gift of Numbers in Marshall Middle High (Pomona Unified School District). Students taking the MAT 1940-3940-3950 sequence [*Mathematical Concepts for Elementary School Teachers*] presented their activities at Westmont Elementary School (Pomona Unified School District).

During Spring 2023, MAT 4960 students organized games and presented them during Gift of Numbers in Pioneer Junior High (Upland Unified School district) and Dr. Greisy Winicki Landman collaborated with alumna Jane Rush running a math session for elementary school children visiting her students at Ganesha High School during Pi day. Greisy also represented the department with a short talk at the annual meeting of the local chapter of MathCounts.



INTRODUCING HE JIANG

He Jiang



He Jiang received his B.S. in Applied Mathematics in 2017, from the University of California San Diego. He then went on to completing his Ph.D. in Mathematics with a Specialization in Statistics in 2022, also from UC San Diego. His research focuses on clustering and mixture modeling, the areas within statistics that focus on distributing unlabeled data points into groups. Through this grouping process, data points that are similar to each other are put into the same group, while data points that are more different are put into different groups. He also studies closely related topics like determining the number of groups within a data set, and methods for density estimation in mixture modeling.

Regarding teaching, He taught several sections of STA 1200 and STA 2260 in the 2022-2023 academic year, and is planning to teach a STA 5990 topics course on clustering and mixture modeling, as well as several sections of STA 2100 in the following academic year.

He is very honored to be a faculty at Cal Poly Pomona. He enjoys the small class size here, where the instructor can get to know their students well and develop a great relationship with them in class. He also enjoys talking with students individually and learning about their unique experiences and stories. If asked for general advice on pursuing a career in statistics, he recommends students to start exploring the field early in their undergraduate studies. This may include talking to different professors, seeing some applications of statistical methods to real life situations, and doing some statistical projects.

Some of He's hobbies include watching and playing chess games and going on roadtrips. He is unofficially rated around 1400 in chess. One of his favorite places for roadtrips is the trail on the western side of Torrance, where you can see the ocean, downtown Los Angeles, and the snowy mountains all at once in winter months.

GOINGS-ON IN THE DEPARTMENT

Manuchehr Aminian

Our department is quite large – and many people do and accomplish things which might not be visible to others! This section is the editor's best effort at getting all these down, despite many people being quite shy. *(It's almost certain the editor missed some events. He encourages the readers to celebrate their successes with colleagues, mentors, friends, and future newsletter maintainers. As the saying goes... joy loves company.)*

In no particular order, here are some happenings of the past academic year.

STUDENT EVENTS AND ACCOMPLISHMENTS

- The students in MAT 4111A/4112A (Problem Solving/Putnam Preparation) competed in the annual Putnam competition – one of the most (in)famous math competitions in North America.
- Our department sponsored one team to compete in the Mathematical Contest in Modeling – a weekend-long mathematical modeling and paper-writing competition.
- The SIAM (Society for Industrial and Applied Mathematics) student chapter hosted a number of events throughout Spring 2023, including tutorials and external speakers.
- Masters students Jose Contreras and Ryan Aniceto were both successful in continuing into PhD programs; Contreras will continue at Michigan State, while Aniceto will be at UCSD/SDSU.

EVENTS, ACCOMPLISHMENTS, AND PROMOTIONS

- Greisy Winicki-Landman received the Outstanding Faculty Advisor of the Year award for the College of Science!
- Jill Shirley received a Recognition of Appreciation by student athletes in her courses for her exemplary teaching!
- Arlo Caine received the 2021-2022 Distinguished Teaching Award for the College of Science and gave a presentation in October 2022.

- John Rock has continued to coordinating the *BAMM!* Program, an NSF-funded program which provides sizeable awards, continuous mentoring, and professional development, for awarded CPP Masters students who have an interest in continuing on to pursue a PhD in mathematics.
- Faculty promotions
 - Stacy Brown was promoted to Full Professor.
 - Jill Cannons was promoted to Associate Professor.
 - Briana Foster-Greenwood was promoted to Associate Professor.
 - Fernando Lopez Garcia was promoted to Associate Professor.
 - Ivan Ventura was promoted to Associate Professor.

CONFERENCE PARTICIPATION

- **Research in Undergraduate Mathematics Education** (Omaha, NE)
 - Masters students Seth Ricarte, Ryan Aniceto, and Professor Anne Cawley presented work titled *Well, it's obvious": Students' Experiences with Mathematical Microaggressions*
- **CSU Mathematical Conference** (Northridge, CA)
 - Leandro L. Recôva gave a talk on *An asymmetric problem at resonance with a one-sided Ahmad—Lazer—Paul condition.*
 - Manuchehr Aminian gave a talk on *Controlling transport properties of passive tracers in channels via cross section.*
 - Hubertus von Bremen gave a talk on *Some results on the stability of time delayed control of structural system using single and multiple actuators.*
 - Ryan Aniceto gave a talk titled *'Well, it's obvious": Students' experiences with mathematical microaggressions.*
 - Adam King gave a talk titled *Semiparametric Bayesian survival modeling of CSU graduation rates.*
 - Briana Foster-Greenwood gave a talk titled *Metric dimension and a puzzle on a chessboard.*
- **Joint Mathematics Meetings** (Boston, MA)
 - Berit Givens gave a talk on *The trinomial coefficients in a knit shawl pattern.*
 - Manuchehr Aminian gave a talk on *Geometric Approaches to Anomaly Detection and Multiple Data Modalities with Circadian Time Series in Mice.*
 - Alan Krinik and Randy Swift co-organized a special session on *Advances in Markov Models* with 18 invited presentations.
 - Theodore De Santos gave a talk on *Explicit Transient Probabilities Of Markov Chains Generally Having Transition Steps Of Size 0 or 2.*
 - Heba Ayeda gave a talk on *Explicit Calculation of Gambler's Ruin, Absorption and Generalized Absorption Probabilities.*
- **AMS Eastern Sectional Meeting** (*virtual*)
 - Alan Krinik and Randy Swift co-organized a *Special Session on Analysis of Markov, Gaussian and Stationary Stochastic Processes* involving 22 invited speakers with a good number of Cal Poly representation:
 - Professor Hubertus von Bremen gave a talk on *Closed form expressions for powers of some banded matrices*
 - Theodore DeSantos gave a talk on *Explicit Transient Probabilities of Finite Markov Chains Having Mostly One-Step Transitions of Size 0 or 2*
 - Evelyn Guerra gave a talk on *An Application of Deterministic Epidemic Models to the Calculation of Insurance Premiums and Benefit Reserve Values*

- Xiao Xiao Cui gave a talk on *Explicit Eigenvalues of Symmetric, Toeplitz, Penta-diagonal Matrices of Low Dimension*
- Heba Ayeda gave a talk on *Using Algebraic Duality to Calculate Gambler's Ruin or Absorption Probabilities*
- Professor Jillian Cannons gave a talk on *Heuristic Truck and Drone Delivery Scheduling*
- Professor He Jiang gave a talk on *Extending the Patra-Sen Approach to Estimating the Background Component in a Two-Component Mixture Model*
- Professor Jimmy Risk gave a talk on *Genetic Algorithm Applications of Gaussian Process Kernels with Mortality Surface Inference Applications*

SCHOLARLY WORKS PUBLISHED

- Benjamin, Noah, **Leandro Recôva**, and Adolfo Rumbos. "Existence and multiplicity of periodic solutions for a second-order ODE at resonance with an Ahmad–Lazer–Paul condition." *Results in Applied Mathematics* 17 (2023): 100345. <https://doi.org/10.1016/j.rinam.2022.100345>
- **Givens, Berit Nilsen**. "The trinomial triangle knitted shawl." *Journal of Mathematics and the Arts* (2023): 1-16. <https://doi.org/10.1080/17513472.2023.2197832>
- Scoggin, Kristin, Jyotsana Gupta, Rachel Lynch, Aravindh Nagarajan, **Manuchehr Aminian**, Amy Peterson, L. Garry Adams, Michael Kirby, David W. Threadgill, and Helene L. Andrews-Polymenis. "Elucidating mechanisms of tolerance to Salmonella typhimurium across long-term infections using the collaborative cross." *MBio* 13, no. 4 (2022): e01120-22. <https://doi.org/10.1128/mbio.01120-22>
- Sharma, Kartikay, **Manuchehr Aminian**, Tomojit Ghosh, Xiaoyu Liu, and Michael Kirby. "Using machine learning to determine the time of exposure to infection by a respiratory pathogen." *Scientific Reports* 13, no. 1 (2023): 1-10. <https://doi.org/10.1038/s41598-023-30306-7>
- **Foster-Greenwood, Briana**, and Christine Uhl. "Metric Dimension of a Diagonal Family of Generalized Hamming Graphs." *arXiv preprint arXiv:2208.01519* (2022). <https://doi.org/10.48550/arXiv.2208.01519>

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Photographs –

- Photograph of colloquium by Roberto Soto is provided by courtesy of Fernando Lopez Garcia
- Photograph of Gift of Numbers is provided by courtesy of Greisy Winicki-Landman
- Photograph of He Jiang is provided by courtesy of He Jiang
- Photograph of Bucky the Bronco in a swimsuit is provided by courtesy of Sabrina Otero

For questions, concerns, or errata, please contact Manuchehr Aminian (maminian@cpp.edu)