Fall Meeting
of
The Southern California-Nevada Section of
The Mathematical Association of America

Program and Abstracts



CSU Los Angeles October 24, 2026

Acknowledgments

The Southern California-Nevada Section of the MAA welcomes participants to our 2026 Fall Meeting at CSU Los Angeles. This meeting is cohosted by the Mathematics Department at CSULA as well at their Math Club. We are excited that you have joined us!

We would like to thank our invited speakers, our lunch session speakers and facilitators, as well as our contributed paper session presenters for their participation in the meeting. We would also like to thank George Csicsery and ZALA Films for support with the showing of *Not Enough Love*.

Our student volunteers play a vital role in putting on the meeting. Many thanks to our volunteers from CSU Los Angeles for this meeting.

Finally, the Section thanks CSULA, and especially Dr. Mike Krebs from the Mathematics Department and Edgar Yak-Padua, president of the CSULA Math Club, for their leadership, sponsorship, and organization in hosting the meeting and making the meeting possible.

Section Officers, 2026-2027

MAA Representative: David Crombecque
Section Chair: Shanna Dobson
Section Vice-Chair: Ryan Moruzzi
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Program Chair: Amelia Stone-Johnstone
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Student Chapters Coordinator: position open
Section NExT Liaison: Matthew Gherman
Las Vegas Liasion: Zhijian Wu
Web Page Editor: Calum Rickard and Karrolyne Fogel

Looking for a way to engage with and support our math community? Our officer positions rotate frequently. Current openings are the the Student Chapters Coordinator who runs our Student Poster Session at the spring meeting (appointed). Also, each spring we elect a new Section Vice-Chair and 2nd Program Vice-Chair, who serve on the board for three years. If you are interested in serving in any of the Section Officer positions, but especially one of these that will be open soon, please contact the Past Section Chair (Konrad Aguilar).

Schedule

All events take place either in the Los Angeles Room in the Student Union or in the Golden Eagle Ballroom, with the exception of the Contributed Paper Sessions. The rooms for the Contributed Paper Sessions are listed with the individual session schedules on page 3-6 of this program.

9:00-9:05	Welcome Remarks
	Shanna Dobson, CSU Los Angeles, Section Chair, with Cal State LA welcome messages from **Heather Lattimer**, Provost and Vice President for Academic Affairs and **Dr. Steven Traskoma**, and Dean of the College of Natural and Social Sciences
9:10-10:00	Invited Address
	Pamela E. Harris, UW - Milwaukee
	How to Choose Your Own Mathematical Adventures
10:00-10:10	Break
10:45-12:30	Faculty and Student Contributed Paper Session
11:35-11:50	Section Business Meeting
11:50-12:55	Lunch and Activities
	11:55-12:55 Mathart/Math Maker sessions in Golden Eagle Ballroom
	12:10-12:55 Section NExt Workshop: *Grading as the misuse of mathematics in the measurement of student learning* with **Sharona Krinsky**, CSULA and **Robert Bosley** Los Angeles USD
1:00-2:00	Faculty and Student Contributed Paper Session
2:05-2:10	Conference Photo
2:10-3:00	Invited Address
	Evan Rosenman, Claremont McKenna College
	A Statistical Study of Alternative Representational Systems for the LA City Council
3:00-3:05	Break
3:05-3:55	Invited Address
	Anne Cawley, Cal Poly Pomona
	Considering Sense of Belonging in the Mathematics Classroom through Two Lenses
4:00-4:10	Break
4:10-5:10	*Not Enough Love (Evelyn Granville, March 18, 2021)*
	Film Screening and Conversation with Director **George Csicsery**, ZALA Films. Moderated by **José "Goyo" Mijares-Palacios**, CSU Los Angeles
5:10-5:15	Closing Remarks by Section Chair **Shanna Dobson**, CSU Los Angeles

Contributed Paper Sessions Schedule

There are eight concurrent sessions in rooms Los Angeles Room 308, Alhambra Room 305, Pasadena Room 307, Montebello Room 309, San Gabriel Room 313, Boardroom South Room 303B, Boardroom North Room 303A, and the Golden Eagle Ballroom (across bridge). Abstracts are listed at the end of the program.

Time	Presenter(s)	Presentation title
	Golden Eagle Ballroom; Mathematics Education I	
10:10–10:30	Rasha Issa	Examining Reflective Practices Among Mathematics Graduate Student Instructors Through Journaling and Community Discussions
10:30–10:50	Omar Bello	"I feel marginalized in mathematics and tend to feel like an imposter, as if I should not be there": Exploring Factors Influencing Mathematical Identity Development
10:50–11:10	Luc Frost-Neto, Dani Barwin	Care in the College Mathematics Classroom: A Quantitative Exploration of Student Perceptions
11:10–11:30	Kathryn Tickle, Dani Barwin, Eric Wilcox	Mathematics Majors' Challenges of Merging Mathematics and Social Justice
	Montebello Room; Algebra and Number Theory	
10:10–10:30	Roberto Hernandez	Models of Elliptic Curves with Maximal 2-adic Image Subject to a Rational 2-Isogeny
10:30–10:50	Shahed Sharif	A quantum algorithm for principalizaing quaternionic ideals
10:50–11:10	Leo Friedman, Scott Gowdy, Peiting (Tim) Jiang	A bicategorical construction of $\mathrm{Span}_2(\mathcal{C}, \mathcal{F})$
11:10–11:30	Fabian Ramreiz	An Average Version of Artin's Primitive Root Conjecture for Elliptic Curves

Time	Presenter(s)	Presentation title
	San Gabriel Room; Classical and Algebraic Geometry	
10:10–10:30	Ruilin Zhu	Seven Ways to Prove a Triangle Is Equilateral with Complex Numbers
10:30–10:50	Gary Brookfield	Efficient Construction of the Heptadecagon
10:50–11:10	Sehun Jeong	Integral quadratic forms and lattice angles
	Pasadena Room; Graph Theory and Combinatorics	
10:30–10:50	Sihan Tao	Asymptotic Lower Bounds of Diagonal Ramsey Numbers - Bonferroni Inequalities
10:50–11:10	Abdulrahman Sahmoud	Exact Upper Quantum Turan Numbers
11:10–11:30	Kai Mawhinney	Connectivity and Diameter of Friends and Strangers Graphs
	Los Angeles Room; Analysis and Differential Equations	
10:10–10:30	Edgar Rojas	The Fefferman-Stein inequality on a bounded cuspidal domain.
10:30–10:50	Ang Elyn P. Gumanoy	Beyond Gaussianity: Mittag-Leffler Analysis and Generalized Scaling Operators
10:50–11:10	Adam M. Yassine	Compactness of the density space in the Bures metric topology and the non-unital case
11:10–11:30	Jingfan Zheng	A Time-Map Description of the One-Dimensional (p, q)-Laplacian Fučik Spectrum

Time	Presenter(s)	Presentation title
	Alhambra; Statistics, Data, and Information	
10:10–10:30	Janice Lee	Association and Prediction of Particulate Matters (PM2.5) and Nitrogen Dioxide (NO2) Concentrations Using Land Use and Meteorological Variables: A Comparison of Statistical and Machine Learning Models
10:30–10:50	Ji Y. Son	Measuring Statistical Thinking with the Data Investigation Assessment
10:50–11:10	Alejandra Castillo	Statistical Stopping Rules for Randomized Iterative Regression Solvers
11:10–11:30	Anthony Valencia	Entropy in Binary Linear Probability Models
	Boardroom South; Applied Mathematics	
10:10–10:30	Carly Haggard	Efficient Path Continuation for PDE-Constrained Inverse Problems
10:30–10:50	Elysa Tan	From Linear to Piecewise Linear: Solving Two-Point BVPs via the Prüfer Transformation
10:50–11:10	Christina Duron	Epidemic Thresholds on Adaptive Networks with Noncompliance
11:10–11:30	Maria van der Walt	Ensemble Learning for Blood Glucose Prediction
	Boardroom North; Geometry and Geometric Analysis	
10:10–10:30	Henry Wilkinson	Rethinking Binormal Vectors. A Simpler Approach to the Frenet Frame
10:30–10:50	Marshall A. Whittlesey	A proof of the Euler area formula for a triangle in spherical geometry using quaternions
10:50–11:10	Russell W. Howell	Resources in Complex Analysis: A Website, An Open Source Text, Gemini Notebook, and a Cool REU Problem
11:10–11:30	Jonathan Delgado	ϵ-Regularity and Compactness for the Cone Yang-Mills Functional

Afternoon Contributed Paper Sessions

Time	Presenter(s)	Presentation title
	Golden Eagle Ballroom; Mathematics Education II	
13:00–13:20	Satish C. Bhatnagar	PERSPECTIVES ON STUDY GUIDES ?!
13:20–13:40	Tim McEldowney	Knowledge-GAP: Barriers to Applying to Graduate School in Mathematics
13:40–14:00	Snow (Patil) Kaptanian	Beyond Graphs: Exploring Instructors' Beliefs and Their use of Multiple Representations
	Montebello Room; Geometry, Topology, and Graph Theory	
13:00–13:20	Kyle Hansen	Simple Tilings of Nilpotent Lie Groups
13:20–13:40	Matthew Paek	A Computational Tool for Link/Topological Graph Invariants
13:40–14:00	Max Hlavacek	Probability distributions of lattice polytopes
	San Gabriel Room; Graph Theory	
13:00–13:20	John Clairmont	Toward a new proof of the four Color theorem
13:20–13:40	Tutlalee Wines	Path Enumeration and Cyclotomic Factorizations on Finite Hexagonal Tessellations
13:40–14:00	Kevin Iga	A human studies an AI proof of the Cycle Double Cover conjecture
	Pasadena Room; Counting and Random Walks	
13:00–13:20	Omid Khormali	Who Stays on the Ship? A Medieval Counting Puzzle, Secret Sentences, and the Automata That Find Them
13:20–13:40	Elizabeth DeWitt	Counting Leading Shifted Tableaux
13:40–14:00	Owen Xu	Recurrence and transience of excited random walks on trees and lamplighter groups

Time	Presenter(s)	Presentation title
	Los Angeles Room; Analysis and Mathematical Explorations	
13:00–13:20	John Rock	JEOPARDY! and Arbitrarily Close
13:20–13:40	Brandon Miranda, Omar Garcia, Nathan Hicks, Mark Mun and Andy Zhang	Finding the limit of the recurrent sequence: $a(1) = 0, a(2) = 1, a(3) = 1/2, a(4) = 3/4, a(5) = 5/8, a(6) = 11/16, \ldots$ where $a(n) = [a(n-2) + a(n-1)]/2$ for $n = 3, 4, 5, \ldots$
13:40–14:00	Armando Pena, Adrienne Robertson	Attacking ECDSA with Fourier Analysis
	Alhambra Room; Modeling, Prediction, and Dynamical Systems	
13:00–13:20	Christopher Wang	The quality of a reservoir computer is determined by its relationship to causal states
13:20–13:40	Yi-Szen Tang	From Least Squares Regression to Sensor Fusion: A Mathematical Derivation and Application of the Kalman Filter
13:40–14:00	Marcelo Amaral	Memory, Prediction, and Energy Cost in Spiking Neural Networks
	Boardroom South; Markov Chains and Stochastic Structures	
13:00–13:20	Sofia Vasquez, Evelyn Jimenez	Suppose P^n equals a matrix whose rows are constant for all positive integers $n > N - 1$ where P is the one-step transition matrix of a finite chain and N is some fixed integer.
13:20–13:40	Abel Soto	Creating and Justifying a Metric on Markov Chains
13:40–14:00	Evan Johnson, Kasper Kajewski, Mark B. Mun, Abdel Somera-Fuentes, Theodore De Santos	When can a Markov Chain First Reach its Steady-State Matrix in a Finite Number of Time-Steps
	Boardroom North; Langlands Program	
13:00–13:20	Shanna Dobson	An Introduction to Langlands: A Tale of Two Geometries

Invited Addresses

Invited Address: ***"Considering Sense of Belonging in the Mathematics Classroom through Two Lenses"***
Anne Cawley, Cal Poly Pomona

Sense of belonging in the mathematics classroom has been found to impact students' mathematics learning (Good et al., 2012) and many factors can contribute to sense of belonging. This talk will consider two different projects that attempt to understand sense of belonging. First, I will share about how microaggressions (the intentional or unintentional messages that communicate hostile, derogatory, or negative messages towards a recipient; Sue et al., 2007) present themselves for college mathematics students. Microaggressions that students receive in a math class can impact a students' learning experience and can often lead to feelings of exclusion (Cawley et al., 2023). Second, I will discuss the ways that students define instructor care and its impact on them. Both framings can help students make sense of their college mathematics experiences while also informing mathematics instructors of ways that students develop (or not) a sense of belonging to the mathematics classroom.

Invited Address: ***"How to choose your own mathematical adventures"***
Pamela E. Harris, Univ of Wisconsin, Milwaukee

What is mathematical research? How does a mathematician find problems to work on? How does one build mathematical collaborations? In this talk, I will share my journey to research mathematics, what it entails, how I have developed new research ideas, and how I have found my place within the mathematical community. Mathematical topics of discussion will include lattice point visibility, parking functions, and a connection between vector partition functions and juggling. No prior mathematical background on these topics is expected nor assumed as we will introduce all of the needed concepts from first principles. All that is needed is the willingness to wonder and ask the question: "what happens if. . . ?"

Invited Address: ***"A Statistical Study of Alternative Representational Systems for the LA City Council"***
Evan Rosenman, Claremont McKenna College

Los Angeles recently convened a Charter Reform Commission to evaluate alternative methods for selecting its leaders. The Commission has recommended ranked-choice voting and an expansion of the City Council, with voters likely to weigh in on these reforms in November.

In this project, we develop a data-driven framework to evaluate proposed reforms, focusing on proportionality, racial representation, and electoral responsiveness. Our approach integrates tools from Statistics and Computer Science, including Bayesian ethnicity imputation, ecological inference, and graph-based sampling algorithms to explore the space of possible districting plans. We presented this work to the Commission in October 2025, advocating for adoption of proportional ranked-choice voting (PRCV) in multimember districts. While the Commission did not adopt this proposal, our findings suggest PRCV offers the strongest gains in minority representation. More broadly, our work highlights how computational and statistical methods can clarify tradeoffs in electoral system design.

This project is joint work with Sarah Cannon, Associate Professor of Mathematics and Computer Science at Claremont McKenna.

Invited Address Biographies

Anne Cawley, Cal Poly Pomona

Dr. Anne Cawley is Professor of Mathematics and Statistics at Cal Poly Pomona (CPP). Her research in Mathematics Education relates to DEI, classroom experiences of historically underrepresented and minoritized students, math instruction in the first two years of college, and professional development for mathematics faculty towards equity-minded teaching practices. She is actively involved in the American Mathematics Association for Two-Year Colleges (AMATYC) as West Coast representative for the Research in Mathematics at Two-Year Colleges as well as the Western Regional member of the editorial panel for the MathAMATYC Educator. She also is actively involved in the Special Interest Group of the Mathematical Association of America - Research in Undergraduate Mathematics Education (RUME) as member of their program review committee. Current projects include 1) providing professional development for instructional supports and inclusive teaching practices college math instructors, 2) developing student sense of belonging in the college classroom, 3) understanding the caring relations between instructors and students in undergraduate mathematics classes, and 4) implementing professional development for community college faculty teaching mathematics courses for future elementary teachers.

Pamela Harris, Univ of Wisconsin, Milwaukee

Dr. Pamela E. Harris is a Professor of Mathematical Sciences and Associate Vice Chancellor for Research at the University of Wisconsin–Milwaukee. Her research in algebraic combinatorics has produced over 100 peer-reviewed publications. A Fellow of the American Mathematical Society and the Association for Women in Mathematics, Dr. Harris is an award-winning educator, recognized with honors including the 2025 Louise Hay Award and the MAA Deborah and Franklin Tepper Haimo Award. She has mentored more than 140 undergraduate researchers and is the co-founder and President of Lathisms. Dr. Harris also cohosts the podcast Mathematically Uncensored and coauthors several books on equity and advocacy in mathematics.

Evan Rosenman, Claremont McKenna College

Dr. Evan Rosenman is an Assistant Professor of Statistics at Claremont McKenna College. He conducts methodological research in causal inference, with a particular focus on methods for synthesizing evidence across observational and experimental datasets. He also works in political data science, considering applications to modern electioneering, such as ethnicity imputation, ecological inference, and prediction calibration. Dr. Rosenman earned his Ph.D. from Stanford University in 2020, where he was advised by Art Owen and Mike Baiocchi. He completed his postdoc at Harvard University, working with Kosuke Imai, Luke Miratrix, and Francesca Dominici. His work has appeared in journals such as Biometrics, Statistics in Medicine, and the Electronic Journal of Statistics.

Film Screening

"Not Enough Love (Evelyn Granville, March 18, 2021)"
Film Screening and Conversation with Director George Csicsery of ZALA Films; moderated by José "Goyo" Mijares-Palacios, CSULA

This video portrait of pioneering mathematician Evelyn Granville is part of Journeys of Black Mathematicians, a series produced by George Csicsery and Zala Films documenting the lives and contributions of Black mathematicians.

The second Black woman in the United States to earn a Ph.D. in mathematics, Granville was a faculty member at Cal State LA and a member of our section.

Director and producer George Csicsery will introduce the film. Following the screening, he and Cal State LA's José "Goyo" Mijares-Palacios will share personal recollections of Granville and reflect on her enduring legacy in mathematics and education. Join us for an opportunity to celebrate her extraordinary life through film and conversation.

Lunch Activities

Section NExT Lunch Workshop: ***"Grading as the misuse of mathematics in the measurement of student learning"***
facilitated by Sharona Krinsky, CSU Los Angeles, and Robert Bosley, LAUSD

Grades are everywhere in higher education, but most faculty receive little guidance on how to design a grading system. Instead, we inherit familiar practices, such as points, percentages, partial credit, weighted averages, and letter grades, and rarely have the opportunity to ask what those practices actually communicate about student learning.

In this interactive session, we will take a critical look at the assumptions built into traditional grading. What does an 82% mean? Why do we average learning that happens at different points in time? What happens when we combine measures of mathematical understanding with homework completion, attendance, or other behaviors into a single number?

Using examples from mathematics classrooms, we will explore how seemingly reasonable grading decisions can distort the evidence of what students know and can do. We will then introduce alternative grading, a framework for using grades to communicate student learning. Core principles include clearly defined and measurable learning outcomes, meaningful feedback, opportunities to demonstrate learning over time, and marks that indicate progress. We will examine how these practices can shift students' attention from accumulating points to learning mathematics, make mistakes and revision a productive part of the learning process, increase student agency and persistence, and create a classroom in which grades better reflect what students know and can do.

Lunch Activities: ***"Mathart Presentations"***
facilitated and organized by Shanna Dobson, CSULA

This session celebrates MathArt: the rich and evolving intersections of mathematics, art, and pedagogy. Bringing together mathematicians and artists, it features interdisciplinary research, artistic practice, and creative approaches to teaching that explore mathematical ideas through film, dance, music, textile art, and other imaginative forms of creative inquiry. The session highlights how artistic perspectives can reveal unexpected mathematical structures and inspire innovative modes of mathematical expression.

Featured works include Shanna Dobson and Brian Carter's short film The Sound of Resolution, which renders the experience of working in p-adic geometry as an interior glassy landscape shaped by music, movement, and reflection. Tuyetdong T. Phan-Yamada will present her work in mathematical quilting, revealing how mathematical patterns and structures can take vivid material form through textile art.

Lunch Activities: ***Math Maker Activities***
facilitated by Joan Horvath and Rich Cameron Nonscriptum LLC

Join us to play with hands-on math models! This session will feature hands-on math models and an origami demonstration, with the theme of math discovery through playing with physical objects. Activities will include:

- A sampler of Joan Horvath and Rich Cameron's open source, 3D printable geometry, trig and calculus puzzles and visualizations from their Make: Math series of books;
- A demo Geometile build of a Los Angeles landmark, and audience-participation table by Yana Mohanty of Imathination LLC;
- An origami activity by Jill Dunham of Chapman University

Lunch Activity Facilitator Biographies

Sharona Krinsky, CSU Los Angeles

Sharona Krinsky has dedicated over 30 years to teaching mathematics in higher education, bringing extensive experience and expertise to her role as a course coordinator for first-year mathematics. Her passion for mathematics education is evident in her ongoing efforts to enhance learning outcomes for students, making complex concepts more accessible and engaging. Since 2016, Sharona has been actively involved in the alternative grading movement, advocating for assessment methods that more accurately reflect students' understanding and foster deeper learning. She has worked with fellow educators to explore and implement grading practices that emphasize growth, mastery, and student-centered approaches, seeking to create learning environments where all students can thrive. In addition to her work in the classroom, Sharona is a seasoned faculty development professional, providing mentorship and professional learning opportunities to colleagues. She is committed to the continuous improvement of STEM education, believing that high-quality teaching is a critical component of student success in science, technology, engineering, and mathematics.

Robert Bosley, LAUSD

Robert Bosley is a dedicated educator with over 19 years of experience teaching high school mathematics. His passion for teaching extends beyond the classroom, as he also serves as a faculty coach and peer mentor, guiding fellow educators in their professional growth. Since 2019, Robert has been actively involved in the alternative grading movement, working to implement equitable grading practices that provide a fairer and more accurate assessment of student learning.

In his role as a certified EGI (Equitable Grading and Instruction) coach for the Los Angeles Unified School District, Robert plays a key role in supporting educators as they adopt grading practices that emphasize student mastery and equity. His work in this area is grounded in his commitment to creating learning environments where all students have the opportunity to succeed, regardless of their background or starting point.

In addition to his high school teaching experience, Robert has been teaching Statistics in higher education since 2019, further broadening his impact on students and contributing to the field of mathematics education. His extensive experience as a faculty development professional and coach has made him a valuable resource for educators looking to improve their teaching practices and create more inclusive classrooms.

Shanna Dobson, CSU Los Angeles

Dr. Shanna Dobson is a Visiting Assistant Professor of Mathematics at Harvey Mudd College, a Mathematics Lecturer at Cal State LA, and an Assistant Adjunct Professor of Mathematics at ArtCenter College of Design. She serves as Section Chair of the SoCal-Nevada Section of the MAA, Associate Editor of the Anneli Lax New Mathematical Library, and Chair of the Faculty Council at ArtCenter. Her research interests include fractal and arithmetic geometry and categorical methods in geometry.

A mathematician, poet, and MathArt practitioner, Dr. Dobson approaches mathematics as an imaginarium, where abstract structures become the architecture of poetic and cinematic composition. Her creative work gives artistic form to category theory, p-adic geometry, and mathematical memory, composing these abstract worlds in the expressive language of literature, music, and film. She founded the AWM research network Women, Art, and Mathematics to amplify variations in mathematical thinking and advance research and pedagogy at the intersections of mathematics and the arts. Her teaching cultivates imagination, curiosity, and inquiry, using creative, multimodal pedagogy to open accessible pathways to conceptual understanding.

Her editorial work includes Women in MathArt: Research, Creativity, and Teaching (Springer, 2024, editor); Cutting EDGE Mathematics: Celebrating the 25th Anniversary of the Enhancing Diversity in Graduate Education Program (Springer, 2025, lead co-editor); and Local Langlands Conjectures and Noncommutative Geometry (AMS, in preparation, co-edited with Igor Nikolaev).

Joan Horvath and Rich Cameron , Nonscriptum LLC

Joan Horvath and Rich Cameron founded Nonscriptum LLC (www.nonscriptum.com) in 2015. Nonscriptum focuses on teaching educators and scientists how to use maker tech to teach math and science, and to facilitate making these topics more accessible to all. They have authored 11 books together, including the Make: Math series of books that include open-source repositories of freely available math models. Joan is an MIT alumna, recovering rocket scientist and educator, and Rich is an open-source 3D printer hacker who designed the RepRap Wallace and Bukito 3D printers.

Morning Contributed Paper Session Abstracts

Abstracts are listed by session

Golden Eagle Ballroom (across bridge) (Mathematics Education I)

10:10-10:25 in Golden Eagle Ballroom (across bridge)
Presenter(s): Rasha Issa, University of California, Riverside
Title: *Examining Reflective Practices Among Mathematics Graduate Student Instructors Through Journaling and Community Discussions*
Abstract: Mathematics Graduate student (MGs) instructors play a vital role in undergraduate education, yet limited pedagogical preparation often leads them to default to traditional, survival-driven teaching practices. This qualitative study examines a low-stakes professional development model designed to cultivate teacher noticing and reflection among novice MGS primary instructors during a summer term. Grounded in Schon's theory of reflective practice and Mason's Discipline of Noticing, the model combined weekly "brief-but-vivid" journaling with peer-faculty community discussions. Analysis of post-program exit interviews demonstrates that writing objective classroom accounts heightened instructors' real-time classroom awareness. Group discussions introduced key pedagogical disturbances, such as re-evaluating unscripted board delivery and integrating dynamic visualization tools—that disrupted routine habits. The interplay between objective journaling and collective dialogue fostered vicarious learning, enabling instructors to translate critical reflections into prospective, student-centered instructional changes. We share actionable insights for structuring reflection-centered professional development for graduate instructors. *Math Education/Pedagogy*
Audience: *General audience (faculty, graduate students, and undergraduate instructors)*

10:30-10:45 in Golden Eagle Ballroom (across bridge)
Presenter(s): Omar Bello, California State University, Fullerton
Title: *"I feel marginalized in mathematics and tend to feel like an imposter, as if I should not be there": Exploring Factors Influencing Mathematical Identity Development*
Abstract: Students' mathematical learning is seen through performance-based measurements such as grades, coursework, and standardized tests. These measurements provide insight about mathematical achievement, yet offer a partial understanding of the experiences that shape students as doers of mathematics. This research study examines the mathematical autobiographies of 51 California State University, Fullerton students who participated in the Math Reflection Survey. We analyzed participants reflections on their K-12 mathematics experiences to identify themes related to the development of mathematical identities. Reported positive mathematical identities include classroom factors, sociopolitical factors, and familial factors. Reported negative mathematical identities include classroom factors, sociopolitical factors, personal factors, and systemic factors. These findings demonstrate that students' autobiographies provide an additional perspective for understanding mathematical identities that extend traditional measures of achievement and the values of centering students' lived experiences within mathematics education. *Math Education/Pedagogy*

10:50-11:05 in Golden Eagle Ballroom (across bridge)
Presenter(s): Luc Frost-Neto (UC Santa Barbara), Dani Barwin (Cal Poly Pomona)
Title: *Care in the College Mathematics Classroom: A Quantitative Exploration of Student Perceptions*
Abstract: Care in the classroom is widely linked to K-12 student engagement and success, yet student perceptions of care in college mathematics are far less studied. We surveyed students enrolled in mathematics at a large minority-serving institution about their experience receiving care in the classroom. Students largely agreed that care was a meaningful component of their mathematics classroom experience. One-way ANOVAs found little difference in affect and experiences with care across demographic groups, though gender and transfer status emerged as leads for further investigation. An exploratory factor analysis was used to better understand how students conceptualize care in the classroom. We frame such results as hypothesis-generating for a larger confirmatory study. This study provides preliminary evidence and groundwork for developing validated measures of care in undergraduate mathematics classrooms. *Math Education/Pedagogy*

11:10-11:25 in Golden Eagle Ballroom (across bridge)
Presenter(s): Kathryn Tickle, Dani Barwin, Eric Wilcox, California Polytechnic University, Pomona
Other Author(s): Research advisor: Dr. Anne Cawley, Cal Poly Pomona
Title: *Mathematics Majors' Challenges of Merging Mathematics and Social Justice*
Abstract: Teaching mathematics for social justice (TMfSJ) encourages meaningful learning by connecting lessons to social injustices and students' lived experiences. In this study, we examined social justice mathematics lessons (SJMLs) created by 15 mathematics students. We analyzed the SJMLs and post-lesson reflections focusing on how students engaged with both mathematics and social justice (SJ) topics. Analysis shows varying ways that the students engaged the mathematics and SJ topics, with most lessons focused on statistics content. In their reflections, students reported that educating themselves on their SJ topic was time-consuming and difficult, and more than half of the students referenced choosing to cut down their SJ discussion to allow more time for mathematical activities. Through this study, we found that planning and executing SJMLs is an incredibly challenging task. *Math Education/Pedagogy*
Audience: Mathematics Education/Mathematics for Social Justice

San Gabriel Room 313
(Classical and Algebraic Geometry)

10:10-10:25 in San Gabriel Room 313
Presenter(s): Ruilin Zhu, Troy High School and Fullerton Math Circle
Title: *Seven Ways to Prove a Triangle Is Equilateral with Complex Numbers*
Abstract:
Abstract: In the complex plane, complex numbers correspond to their affixes, and this allows the use of vectors and their geometric properties. As a result, complex-number computation can be used to solve a wide range of geometry problems. This talk focuses on one such class: proving that a triangle is equilateral. I present seven complex-number criteria for equilaterality, some derived from geometric methods and others from purely algebraic reasoning. I then use a classical result, Napoleon's Theorem, as a worked example to demonstrate the application of some of these criteria. The complex-number approach is often direct and computational, offering a systematic alternative to the geometric intuition and creativity that challenging geometry problems can otherwise demand. *Algebra, Geometry*
Advisor: Dr. Bogdan Suceavă and Dr. Shoo Seto, California State University, Fullerton

10:30-10:45 in San Gabriel Room 313
Presenter(s): Gary Brookfield, Cal State LA
Title: *Efficient Construction of the Heptadecagon*
Abstract: In 1796, Gauss showed that the complex 17th roots of unity can be expressed as the roots of quadratic polynomials. Consequently, a regular 17-sided polygon (a regular heptadecagon) can be constructed using a straightedge and compass. The fact that expressing a single 17th root of unity requires the solution of four levels of quadratic equations, and that solving a quadratic equation geometrically requires drawing at least one circle means that any geometric method for constructing one vertex of a regular heptadecagon requires at least four circles. This talk shows that this optimal construction is possible, leading to an efficient construction of the entire heptadecagon. *Algebra, Geometry*

10:50-11:05 in San Gabriel Room 313
Presenter(s): Sehun Jeong, Claremont McKenna College
Other Author(s): Co-Author: Lenny Fukshansky, Claremont McKenna College
Title: *Integral quadratic forms and lattice angles*
Abstract: Let us consider angles between two vectors in the integer lattice $\mathbb{Z}^n$. Fixing one such possible angle and one integer vector x, is there always another integer vector y that makes this angle with x? Assuming that x makes a given angle with some vector, how can we find the shortest such vector y? What if we designate a forbidden set of vectors, what is the shortest y making a given angle with x outside of this forbidden set? It turns out that all of these questions can be reformulated in terms of a search for integer zeros of integral quadratic forms, a rich arithmetic theory. I will discuss this research direction and show results by several authors, then present my recent joint work with Lenny Fukshansky at Claremont McKenna College. *Algebra, Geometry, Number Theory*

Montebello Room 309
(Algebra and Number Theory)

10:10-10:25 in Montebello Room 309
Presenter(s): Roberto Hernandez, University of California
Title: *Models of Elliptic Curves with Maximal 2-adic Image Subject to a Rational 2-Isogeny*
Abstract: Let E be a non-CM elliptic curve defined over $\mathbb{Q}$. We present models of curves that have 2-adic image as large as possible, given the constraint that they have a rational 2-isogeny. These curves are known to be generic, and one of the aims of this article is to make that fact explicit. Our techniques make use of modular curves and their j-maps, as well as classification results on isogeny-graphs that have appeared in the literature recently. *Number Theory*

10:30-10:45 in Montebello Room 309
Presenter(s): Shahed Sharif, CSU San Marcos
Title: *A quantum algorithm for principalizaing quaternionic ideals*
Abstract: We extend an algorithm of Page (2014) to compute a generator of a principal ideal for a quaternion algebra defined over a number field. Our method makes use of a quantum computer to navigate Bruhat-Tits trees—that is, at each prime we work with a group action on an infinite graph, where the vertices of the graph classify localizations of ideals. This is work in progress, joint with A. Silverberg and J. Voight. *Algebra, Number Theory*

10:50-11:05 in Montebello Room 309
Presenter(s): Leo Friedman, Scott Gowdy, Peiting (Tim) Jiang, Pomona College
Title: *A bicategorical construction of Span$_2(\mathcal{C}, \mathcal{F})$*
Abstract: Span categories provide a framework to compose certain physical systems. Given a category with pullbacks $\mathcal{C}$, we can form a span category Span($\mathcal{C}$) whose objects are objects in $\mathcal{C}$ and morphisms are isomorphism classes of spans in $\mathcal{C}$. In 1967, J. Bénabou introduced bicategories and showed that one can construct a bicategory of spans from a category $\mathcal{C}$, that has pullbacks, denoted by Span$_2(\mathcal{C})$. If the category does not have pullbacks, we can bypass this obstruction using the following construction due to D. Weisbart and A.M. Yassine. Given categories $\mathcal{C}$ and $\mathcal{C}'$ and a functor $\mathcal{F}\colon \mathcal{C} \to \mathcal{C}'$, we can form a generalized span category Span$(\mathcal{C}, \mathcal{F})$ using $\mathcal{F}$-pullbacks instead of pullbacks and if $\mathcal{F}$ is span tight. We extend the construction of the generalized span category Span$(\mathcal{C}, \mathcal{F})$ to a bicategory Span$_2(\mathcal{C}, \mathcal{F})$. *Algebra, Category Theory*

11:10-11:25 in Montebello Room 309
Presenter(s): Fabian Ramreiz, University of California, Irvine
Title: *An Average Version of Artin's Primitive Root Conjecture for Elliptic Curves*
Abstract: Let E be an elliptic curve over $\mathbb{Q}$, and let $P \in E(\mathbb{Q})$ be a point of infinite order. For a prime p of good reduction, we say P is a primitive point modulo p if $E(\mathbb{F}_p) = \langle P \bmod p \rangle$. The Lang-Trotter primitive-point conjecture predicts the natural density of primes such that P is a primitive point, providing a natural elliptic curve analogue of Artin's primitive root conjecture. We prove an average version of this conjecture for the family of elliptic curves $y^2 + ay = x^3 + bx^2 + cx$ where $a, b, c \in \mathbb{Z}$ and $P = (0, 0)$. More precisely, if $A, B, C \geq x^{1+\epsilon}$, then the average, over $|a| \leq A, |b| \leq B, |c| \leq C$ of the number of primes $p \leq x$ for which $(0, 0)$ generates $E(\mathbb{F}_p)$ is asymptotic to $C_{EA}\frac{x}{\log x}$ where $C_{EA} = \prod\left(1 - \frac{\ell^3-\ell-1}{\ell^2(\ell^2-1)(\ell-1)}\right) = 0.44014739\ldots$. *Number Theory*

Los Angeles Room 308
(Analysis and Differential Equations)

10:10-10:25 in Los Angeles Room 308
Presenter(s): Edgar Rojas, Cal Poly Pomona
Other Author(s): Research advisor: Dr. Fernando Lopez-Garcia
Title: *The Fefferman-Stein inequality on a bounded cuspidal domain.*
Abstract: This research focuses on the restricted sharp maximal function where we investigate its role in establishing local Fefferman–Stein inequalities. We show that the classical unweighted inequality fails on the cuspidal domain by demonstrating its implication of the improved Poincaré inequality, which does not hold in non-John domains. We then prove a weaker weighted version of the local Fefferman-Stein inequality on the cuspidal domain. Our approach relies on a decomposition of the domain, followed by localized analysis on each component and a local-to-global argument to piece together the global estimate. *Analysis Real Analysis*
Audience: Real Analysis, Functional Inequalities, Harmonic Analysis

10:30-10:45 in Los Angeles Room 308
Presenter(s): Ang Elyn P. Gumanoy, California State Polytechnic University, Pomona
Title: *Beyond Gaussianity: Mittag-Leffler Analysis and Generalized Scaling Operators*
Abstract: Gaussian analysis provides powerful tools for studying stochastic processes and generalized functions, but many phenomena particularly those involving fractional diffusion and anomalous behavior may require a non-Gaussian framework. Mittag-Leffler analysis provides a non-Gaussian infinite-dimensional framework in which the exponential function in the Gaussian characteristic function is replaced by a Mittag-Leffler function. In this talk, we provide an overview of Mittag-Leffler analysis and its associated Mittag-Leffler measure. We then discuss extensions of generalized Gauss kernels and scaling operators to this setting. We highlight their relationship through a generalized Wick-type formula. *Analysis*

10:50-11:05 in Los Angeles Room 308
Presenter(s): Adam M. Yassine, Pomona College
Title: *Compactness of the density space in the Bures metric topology and the non-unital case*
Abstract: Building off work of Farenick and Rahaman, we extend the definition of the density space and the Bures metric to the setting of non-unital C^*-algebras equipped with a faithful tracial state and prove that the Bures metric is also a metric in this case. Furthermore, we prove a Heine-Borel type theorem for C^*-algebras and the density space. In particular, we prove that for any C^*-algebra (unital or non-unital) equipped with a faithful tracial state, the density space equipped with the Bures metric topology is not compact if and only if the C^*-algebra is infinite dimensional. We also exhibit several examples of sequences that have no converging sequence in the unital and non-unital case including both commutative and noncommutative C^*-algebras. This is joint work with Konrad Aguilar, Karina Behera, Katrine von Bornemann Hjelmborg, Tron Omland, Gregory Wickham, and Nicole Wu. *Analysis*

11:10-11:25 in Los Angeles Room 308
Presenter(s): Jingfan Zheng, Pomona College
Title: *A Time-Map Description of the One-Dimensional (p, q)-Laplacian Fučik Spectrum*
Abstract: We study the one-dimensional Fučik-type problem

$$-\left(|u'|^{p-2}u' + |u'|^{q-2}u'\right)' = \lambda(u^+)^{p-1} - \mu(u^-)^{q-1}, \qquad u(0) = u(L) = 0,$$

where $1 < q < p$ and $\lambda, \mu \in \mathbb{R}$. Because the operator contains two different homogeneities, the usual scaling argument for the homogeneous p-Laplacian does not directly produce the Fučik branches. We show that every sign-changing solution must lie in the positive (λ, μ) quadrant and use a one-dimensional time-map method to characterize such solutions. If a solution has m positive nodal intervals and n negative nodal intervals, then all intervals share a common energy $E > 0$, and the parameters satisfy

$$2m\lambda^{-1/p}A(E) + 2n\mu^{-1/q}B(E) = L.$$

This yields a necessary-and-sufficient description of the corresponding spectral regions and gives formulas for their boundaries and asymptotes. *Analysis, Differential Equations*

Pasadena Room 307
(Graph Theory and Combinatorics)

10:10-10:25 in Pasadena Room 307
Presenter(s): José Mijares-Palacios, California State University Los Angeles
Title: *On quantum Ramsey theory*
Abstract: Ramsey theory can be understood as an evolving framework to study colorings (or partitions) of mathematical structures admitting interest- ing monochromatic substructures (that is, substructures contained in one single class of the partition, satisfying a desired property). Many phenomena arising in different contexts can be studied within this framework and that is why Ram- sey theory has proved to be useful and very fruitful, with applications in several mathematical fields and other areas of science and technology. In this talk, after reviewing key results from classical Ramsey theory and its connections with in- formation theory, we will discuss recent "quantum" or noncommutative counter- parts to some of those results, including a generalized infinite quantum Ramsey theorem for operator systems that we proved recently (arXiv.2604.26894).

Operator Systems/Combinatorics (finite and infinite)/Ramsey Theory/Logic/Quantum Information
Audience: Combinatorics/Logic/Some functional analysis would be helpful

10:30-10:45 in Pasadena Room 307
Presenter(s): Sihan Tao, University High School
Title: *Asymptotic Lower Bounds of Diagonal Ramsey Numbers - Bonferroni Inequalities*
Abstract: In graph theory, diagonal Ramsey numbers $R(k, k)$ are the minimum number of vertices n ensuring a monochromatic k-clique in a two-colored complete graph K_n. Exact values remain unknown for $k > 4$, making asymptotic bounds a major research focus. Paul Erdős famously established an exponential lower bound by using a union bound to overestimate the probability of achieving a monochromatic clique in randomly colored graphs. We extend this probabilistic framework by using higher-order Bonferroni inequalities to achieve tighter probability overestimations. Specifically, we explicitly compute the third-order Bonferroni inequality and compute lower bounds of certain small diagonal Ramsey numbers. Based on our computational data, we hypothesize that higher-order Bonferroni inequality terms can be approximated with a Poisson paradigm. Using Poisson approximations and determining when event dependencies are negligible, we construct a heuristic argument asymptotically improving upon Erdős's bound by a constant factor of $2^{\frac{3}{4}}$. While slightly weaker than the current best-known bound, which beats Erdős by a factor of 2, our result surpasses other advanced bounds, demonstrating potential to match or exceed current bounds by further extending this Bonferroni framework. *Graph Theory/Combinatorics, Probability/Statistics*

10:50-11:05 in Pasadena Room 307
Presenter(s): Abdulrahman Sahmoud, California State University, Los Angeles
Title: *Exact Upper Quantum Turan Numbers*
Abstract: Operator systems are matrix spaces that provide a noncommutative analogue of graphs and arise naturally in quantum information theory. Weaver introduced quantum analogues of clique and Turan problems for operator systems. Writing $q = n - k - 1$, we prove the exact formula

$$T^{\uparrow}(n, n-q-1) = n^2 - q^2 - 4q - 1.$$

The proof translates the covering condition into an incidence variety of Hermitian matrices and q-dimensional subspaces. After passing to a smooth rank stratum, Sard's theorem supplies a regular point, and first- and second-order tangent calculations force the sharp dimension bound. In the equality case, the argument also gives a structural description of all extremal operator systems. *Graph Theory/Combinatorics, Quantum Information Theory / Operator Systems*

11:10-11:25 in Pasadena Room 307
Presenter(s): Kai Mawhinney, Harvey Mudd College
Title: *Connectivity and Diameter of Friends and Strangers Graphs*
Abstract: Friends and strangers graphs, denoted $\mathrm{FS}(X, Y)$, are constructed from graphs X and Y on n vertices. The vertices of $\mathrm{FS}(X, Y)$ are bijections from $V(X)$ to $V(Y)$, and two bijections f and g are adjacent if they differ by a transposition (ab) such that a and b are adjacent in X and $f(a)$ and $f(b)$ are adjacent in Y. We examine the connectivity and the diameter of $\mathrm{FS}(X, Y)$ based on the minimum degrees of X and Y, denoted $\delta(X)$ and $\delta(Y)$. We resolve a conjecture of Bangachev that if X and Y are connected graphs and $2\min\delta(X), \delta(Y) + 3\max\delta(X), \delta(Y) \geq 3n$, then $\mathrm{FS}(X, Y)$ is connected, and we show that this bound is sharp up to a convex hull. Under the same conditions on $\delta(X)$ and $\delta(Y)$, we show that the diameter of $\mathrm{FS}(X, Y)$ is $O(n^2/\min\{\delta(X), \delta(Y)\})$ and that this bound is sharp. *Graph Theory/Combinatorics*
Audience: General audience, familiarity with graphs and permutations is helpful

Alhambra Room 305
(Statistics, Data, and Information)

10:10-10:25 in Alhambra Room 305
Presenter(s): Janice Lee, Larchmont Charter High School
Title: *Association and Prediction of Particulate Matters (PM2.5) and Nitrogen Dioxide (NO2) Concentrations Using Land Use and Meteorological Variables: A Comparison of Statistical and Machine Learning Models*
Abstract: Air pollution remains a major environmental and public health concern in California's San Joaquin Valley, where meteorological conditions and urban development contribute to elevated concentrations of fine particulate matter (PM2.5) and nitrogen dioxide (NO2). This study investigates the effects of land use characteristics and meteorological variables on daily PM2.5 and NO2 concentrations in the Fresno and Clovis metropolitan areas. Daily air quality observations from two regulatory monitoring stations were combined with land use data from the National Land Cover Database and meteorological data from the National Oceanic and Atmospheric Administration. Seven forecasting models were evaluated: multiple linear regression, stepwise regression, LASSO, uni-LASSO, XGBoost, neural networks, and support vector regression. Performance was assessed using rolling origin expanding window cross validation and Diebold–Mariano tests. Lagged pollutant concentrations and meteorological variables, especially wind speed, consistently improved forecasts, while land use variables provided additional predictive value. Machine learning models generally outperformed linear regression, with XGBoost producing the most accurate NO2 forecasts and SVR or LASSO performing best for PM2.5. These findings show the value of combining land use and meteorological data with machine learning methods to improve urban air quality forecasting. *Data Science, Statistics*

10:30-10:45 in Alhambra Room 305
Presenter(s): Ji Y. Son, California State University, Los Angeles
Title: *Measuring Statistical Thinking with the Data Investigation Assessment*
Abstract: If the goal of teaching statistics is to develop statistical thinking, how should we assess it? Most statistics assessments use independent, multiple-choice items that capture isolated concepts but not how students coordinate them for a purpose such as a data investigation. We developed the Data Investigation Assessment (DIA), a performance assessment in which students use a Jupyter notebook to explore a research question with an unfamiliar dataset (e.g., are longer passwords stronger using 192 leaked passwords). Students must coordinate competencies identified in the GAISE College Report (variables, representations, modeling, computation, and communication) as they explore data, build models, and draw conclusions. Across 16 introductory statistics sections (N = 319), students demonstrated proficiency on approximately two-thirds of DIA tasks. Performance depended on which competencies had to be coordinated; for example, students were more successful coordinating modeling with computation than with communication. We also found that students' perceived competence increased substantially and became better aligned with demonstrated performance after instruction. Together, these findings position DIA as a step toward more authentic assessment of students' statistical thinking.
Data Science, Math Education/Pedagogy, Probability/Statistics, Statistics

10:50-11:05 in Alhambra Room 305
Presenter(s): Alejandra Castillo, Pomona College
Title: *Statistical Stopping Rules for Randomized Iterative Regression Solvers*
Abstract: We investigate statistical stopping rules for randomized iterative methods applied to linear regression, with a focus on variants of the randomized Kaczmarz method. In the presence of observation noise, increased numerical accuracy need not improve coefficient estimation or prediction. We examine stopping criteria based on prediction error and residual information and compare them with conventional numerical convergence criteria. Our work considers simulation settings with varying sample sizes, noise levels, and condition numbers of the design matrix. In particular, we assess coefficient estimation error, prediction error, and computational cost, including the cost of evaluating the stopping criteria. The aim is to identify settings in which statistically motivated stopping can reduce computation while preserving or improving estimation and prediction accuracy. This is joint work with Sophia Shalz. *Probability/Statistics, Applied Mathematics*
Audience: Linear algebra and introductory statistics

11:10-11:25 in Alhambra Room 305
Presenter(s): Anthony Valencia, California State University Dominguez Hills
Title: *Entropy in Binary Linear Probability Models*
Abstract:
Abstract: Higher-order entropy compares the entropies of all subcollections of a collection of random variables. We study binary linear models in which each random variable has the form

$$X = a \cdot U = \bigoplus_{i=1}^{d} a_i U_i, \qquad 0 \neq a \in \mathbb{F}_2^d$$

where U is a random vector in $\mathbb{F}_2^d$ with the uniform distribution. In this setting, the entropy of any subcollection equals the rank of the matrix whose rows are the corresponding coefficient vectors. Cube entropy therefore reduces to an alternating sum of matrix ranks. We give a complete classification for three variables: the cube entropy is -1 bit when all three variables are equal, $+1$ bit when their coefficient vectors are distinct and satisfy the parity relation $a_1 + a_2 + a_3 = 0$, and 0 in every other case. For $n \geq 4$, we are investigating the connection between the entropy of the n-cube associated with $A \cdot U$ and the Crapo's beta invariant of the vector matroid of A. *Graph Theory/Combinatorics, Information Theory & Linear Algebra*

Boardroom South Room 303B (Applied Mathematics)

10:10-10:25 in Boardroom South Room 303B
Presenter(s): Carly Haggard, Westmont College
Title: *Efficient Path Continuation for PDE-Constrained Inverse Problems*
Abstract: Inverse problems work backwards: given a mathematical model and state data, we aim to reconstruct structure in the model that is not directly observable. We consider physical systems constrained by partial differential equations (PDEs) that include uncertain auxiliary parameters. The standard approach involves solving the inverse problem independently at each perturbation of the auxiliary parameters. However, this strategy is computationally expensive since it ignores previous computations, and it becomes prohibitively so in the case of multiple perturbations due to the increasing number of required PDE solves. We develop efficient methods for solving inverse problems under multiple perturbations of the auxiliary parameters. We employ a predictor–corrector framework with pseudo-time continuation, which uses sensitivity information to continuously track the solution across the auxiliary parameter space. We combine pseudo-time continuation with a minimum spanning tree (MST) over the sample of perturbations. Numerical experiments indicate that this method reduces the number of PDE solves by up to a factor of three compared to the standard approach. *Applied Math, Differential Equations*

10:30-10:45 in Boardroom South Room 303B
Presenter(s): Elysa Tan, Pomona College
Title: *From Linear to Piecewise Linear: Solving Two-Point BVPs via the Prüfer Transformation*
Abstract: Boundary value problems of the form $-u'' = g(x, u)$ on (a, b), with $u(a) = u(b) = 0$, always admit the trivial solution when $g(x, 0) = 0$. We investigate the parameter values for which these problems admit nontrivial solutions. We study two cases: the linear eigenvalue problem $-u'' = \lambda w(x)u$ with positive weight function $w(x)$, and the piecewise linear problem $-u'' = \mu u^+ - \nu u^-$, whose set of admissible pairs (μ, ν) is the Fučík spectrum. We use the Prüfer transformation, which writes solutions of the associated initial value problem in polar form, $u = r \sin\theta$ and $u' = r\cos\theta$. Because both nonlinearities are positively homogeneous, the equation for the Prüfer angle θ decouples from the amplitude r, and the boundary conditions reduce to the requirement that $\theta(b)$ be a multiple of π. A shooting argument on the parameters recovers the eigenvalues and eigenfunctions in the linear case and the curves of the Fučík spectrum in the piecewise linear case. *Differential Equations*

10:50-11:05 in Boardroom South Room 303B
Presenter(s): Christina Duron, Pepperdine University
Title: *Epidemic Thresholds on Adaptive Networks with Noncompliance*
Abstract: Classical compartmental epidemiological models often rely on well-mixed mean-field assumptions. However, human behavior during public health crises is inherently dynamic, with many susceptible individuals modifying social contacts in response to local infection threats. We propose an epidemiological model incorporating adaptive human behavior over an Erdős–Rényi network, where individuals remove contacts once infected neighbors reach or exceed a threshold h. By combining next-generation matrix linearizations at the disease-free equilibrium with local exposure threshold probabilities, we formulate an effective basic reproduction number, R_0^{eff}, as a probabilistic expectation framework bridging static network dynamics with adaptive edge deletion. Numerical simulations validate R_0^{eff} across low and high infectivity regimes (with relative error $< 1.53\%$) and reveal an approximate transition from an adaptive to a static regime. Finally, we model a targeted 25 *Applied Math*

11:10-11:25 in Boardroom South Room 303B
Presenter(s): Maria van der Walt, Westmont College
Title: *Ensemble Learning for Blood Glucose Prediction*
Abstract: Reliable blood glucose prediction is an important aspect of diabetes management. There are numerous existing methods for blood glucose prediction using various methodologies, ranging from classical least-squares type methods to machine learning. In this project, we investigate the idea of combining several existing methods in ensemble learning models to improve prediction performance. Specifically, we demonstrate that combining empirical mode decomposition, Tikhonov regulariztaion and neural networks improve prediction performance as compared to using these methodologies by themselves. *Applied Math, Data Science*

Boardroom North Room 303A (Geometry and Geometric Analysis)

10:10-10:25 in Boardroom North Room 303A
Presenter(s): Henry Wilkinson, Cal Poly Pomona
Title: *Rethinking Binormal Vectors. A Simpler Approach to the Frenet Frame*
Abstract: Finding the tangent, normal, and binormal vectors of a space curve is often presented as a sequence of multiple normalization steps. Although this traditional procedure is mathematically correct, it can create unnecessary algebra and confusion for students learning the geometric relationships among the three vectors. This talk presents a direct formula for finding the unit binormal vector,

$$\mathbf{B}(t) = \frac{\mathbf{r}'(t) \times \mathbf{r}''(t)}{\|\mathbf{r}'(t) \times \mathbf{r}''(t)\|},$$

whenever $\mathbf{r}'(t) \times \mathbf{r}''(t) \neq \mathbf{0}$. I will compare this formula with the traditional procedure used in calculus textbooks by Stewart, Thomas, and Regawski. The goal is not to replace the geometric meaning of the Frenet frame, but to show how a more direct computational method can make the tangent, normal, and binormal vectors easier to learn and understand. By reducing unnecessary algebraic steps, this approach may lead to less confusion, fewer computational errors, and a clearer understanding of the geometry of space curves. *Education/Pedagogy; Geometry*
Audience: Multivariable Calculus students and instructors

10:30-10:45 in Boardroom North Room 303A
Presenter(s): Marshall A. Whittlesey, California State University San Marcos
Title: *A proof of the Euler area formula for a triangle in spherical geometry using quaternions*
Abstract: Unlike Euclidean geometry, the easiest formula for the area of a triangle in spherical geometry depends on the angles of the spherical triangle. There are, however, several formulas for the area in terms of the sides of the spherical triangle. The Euler formula is one of these. We present an unusual proof of it which involves using quaternions. This technique using quaternions to prove theorems in spherical geometry is featured in the speaker's book "Spherical Geometry and its Applications," with CRC Press. *Geometry*

10:50-11:05 in Boardroom North Room 303A
Presenter(s): Russell W. Howell, Westmont College
Title: *Resources in Complex Analysis: A Website, An Open Source Text, Gemini Notebook, and a Cool REU Problem*
Abstract: For a variety of reasons many students are not able participate in an REU experience away from their home institutions. This talk begins by introducing a website that has accessible explorations for undergraduate students in complex analysis that can be pursued during the standard academic year, or as a local summer REU experience. It also has links to an open source text (in HTML and PDF formats). We then explore how this text can be used with Gemini Notebook, and discuss an unsolved question in the REU website section that emerged from a local REU project whose results recently appeared in the American Mathematical *Monthly. Complex Analysis, AI, and Student Research*
Audience: General, with some exposure to "imaginary number" arithmetic.

11:10-11:25 in Boardroom North Room 303A
Presenter(s): Jonathan Delgado, University of California, Irvine
Title: *ϵ-Regularity and Compactness for the Cone Yang-Mills Functional*
Abstract: We introduce the cone Yang-Mills functional: a Yang-Mills-Higgs-type functional where the Higgs field interacts with the curvature through a closed 2-form representing a geometric structure of interest, e.g. a symplectic form or Ricci form. This framework allows us to incorporate the additional geometric data directly into a gauge-invariant functional, with the goal of constructing moduli spaces sensitive to the geometry. We prove a monotonicity formula, ϵ-regularity, and a compactness theorem in the sense of Nakajima as a first step towards studying these moduli spaces. *Geometry*

Afternoon Contributed Paper Session Abstracts

Abstracts are listed by session

Golden Eagle Ballroom (across bridge) (Mathematics Education II)

1:00-1:15 in Golden Eagle Ballroom (across bridge)
Presenter(s): Satish C. Bhatnagar , University of Nevada Las Vegas (UNLV)
Title: *PERSPECTIVES ON STUDY GUIDES ?!*
Abstract: Over the last five decades at UNLV, whenever a test or final exam approaches, students start inquiring about the Study Guide for it. Lately, the demand has increased. Two weeks ago, when I heard this call from quite a few students, I decided to put my thoughts together on the subject of study guides, and shared it with my colleagues and students. This paper is an outcome of that serial encounter - like fresh from the oven

The US is undergoing a cultural shift and math pedagogy cannot escape from it. Some of the offshoots of cultural shift may be politically sensitive. But if we do not discuss it, then what good is academic freedom that we champion about in the US especially. In the nuts and bolts of the paper, the paper describes what is a study guide and what is not.

1:20-1:35 in Golden Eagle Ballroom (across bridge)
Presenter(s): Tim McEldowney
Title: *Knowledge-GAP: Barriers to Applying to Graduate School in Mathematics*
Abstract: Entry into graduate education in mathematics is governed by an application process which serves as a barrier for students looking to advance in our discipline. How permeable this barrier is depends on a great number of factors, many of which are inherent in the lives and demographics of potential applications. In the 2022/2023 academic year, I sent a survey to undergraduate mathematics majors at institutions across the US as part of the Undergraduate Knowledge of the Mathematics Graduate School Application Process (Knowledge-GAP) project. This survey asked participants about their knowledge of the application process, barriers they may face in applying to graduate school, and a wide range of demographics questions. Using data from over 500 responses I have published four conference papers and have another four articles in progress. This presentation will be a greatest hits album of our results focusing on themes of interest to faculty looking to support their students applying to graduate school in mathematics like: the cost of applying, the Graduate Record Examination (GRE), and the impact of mentoring and advising. *Math Education/Pedagogy*

1:40-1:55 in Golden Eagle Ballroom (across bridge)
Presenter(s): Snow (Patil) Kaptanian, Cal Poly Pomona
Title: *Beyond Graphs: Exploring Instructors' Beliefs and Their use of Multiple Representations*
Abstract: The introduction of functions is an important opportunity to adequately prepare students for future mathematics courses. Considering multiple representations, this study is framed through the five strands of mathematical proficiency (Kilpatrick et al., 2001). I analyze how instructors' beliefs of and instructional practices in using representations shape a student's learning opportunity. In this study, I observed college algebra instructors' introductory lessons of functions and interviewed them to understand their beliefs and values on different representations. Findings show that emphasis of certain representations found in practice were intentional, relating to the instructors' goals for the course. However, the instructors' uses of representations and the connections made between them partly aligned with their beliefs, with some notions not reflected in practice. Introducing functions with an emphasis on one representation, without demonstrating other connections, can present a challenge for students in the subsequent lessons or mathematics course. *Algebra, Math Education/Pedagogy*

San Gabriel Room 313 (Graph Theory)

1:00-1:15 in San Gabriel Room 313
Presenter(s): John Clairmont, None
Title: *Toward a new proof of the four Color theorem*
Abstract: A new alternating chain algorithm is presented for vertex coloring planar graphs which overcomes difficulties which have stymied previous algorithms. *Graph Theory/Combinatorics*

1:20-1:35 in San Gabriel Room 313
Presenter(s): Tutlalee Wines, California Institute of Technology
Title: *Path Enumeration and Cyclotomic Factorizations on Finite Hexagonal Tessellations*
Abstract: This project explores a novel, graph-theoretic interpretation of the Fibonacci sequence. We begin with a 2-row hexagonal tessellation, with hexagons indexed by (n) beginning at 1, from top to bottom then left to right. We then determine the number of non-recursive paths to each hexagon (n), where hexagons indexed greater than (n) cannot be used. The Fibonacci sequence is identical to the sequence formed from the sequence of numbers of paths. This research focuses on extending past 2 rows to (r) rows. We derive a recurrence for the total count of acceptable paths and find that they are determined by a finite-dimensional transfer matrix. The characteristic polynomial of this matrix establishes a factorization into cyclotomic polynomials which are indexed by the divisors of $(r + 1)$, offering an explicit expression of the structure underlying the recurrences. We ultimately conclude with an explicit formula for the number of paths to each hexagon given arbitrary (n) and (r) and explore various number-theoretic properties of the sequences and their structures. *Graph Theory/Combinatorics, Number Theory*

1:40-1:55 in San Gabriel Room 313
Presenter(s): Kevin Iga, Pepperdine University
Title: *A human studies an AI proof of the Cycle Double Cover conjecture*
Abstract: On July 10 2026, OpenAI announced a proof of the Cycle Double Cover conjecture in graph theory, which states that every finite bridgeless undirected graph has a multiset of cycles in which every edge appears exactly twice. I will present an overview of this proof, and reflect on the human readability of the paper. *Graph Theory/Combinatorics, AI*

Montebello Room 309
(Geometry, Topology, and Graph Theory)

1:00-1:15 in Montebello Room 309
Presenter(s): Kyle Hansen, Westmont College
Title: *Simple Tilings of Nilpotent Lie Groups*
Abstract: We define simple tilings in the general context of a G-tiling on a Riemannian homogeneous space M to be tilings by Riemannian simplices. As evidence that this definition is natural, we prove that a large class of tilings of M are MLD to simple ones. We demonstrate the utility of this definition by generalizing previously known results about simple tilings of $\mathbf{R}^n$. In particular, it is shown that there is an isomorphism between Čech cohomology and pattern equivariant cohomology of simple tilings in connected, simply connected, nilpotent Lie groups. *Geometry, Topology*

1:20-1:35 in Montebello Room 309
Presenter(s): Matthew Paek, Harvey Mudd College
Title: *A Computational Tool for Link/Topological Graph Invariants*
Abstract: Knot theory is interested in algebraic invariants of knot-like structures embedded in space, well-defined up to ambient isotopy. Link invariants such as the bracket, Jones, and HOMFLY polynomial are well-studied. Yokota's invariant is concerned with topological 4-regular graphs with arbitrary weighting. With constant weights, the computational difficulty reduces to computing various bracket polynomials associated with the graph. This case is used to construct a tight lower bound of the number of crossings n in *any* diagram of a topological graph G. Unlike well-known invariants like the Jones polynomial, it appears there are no computational tools to compute the constant-weight invariant of an arbitrary graph diagram. As an early step in ongoing research, the authors developed Python code to directly compute constant-weight Yokota invariant of an admissible graph diagram, along with a visual editor allowing the user to construct those graphs. The package stores data for each topological object with information akin to planar codes. Indeed, the functionality extends generally to knots and links, and supports the computation of Kauffman's bracket and the Jones polynomials. *Algebra, Topology, Knot Theory*

1:40-1:55 in Montebello Room 309
Presenter(s): Max Hlavacek, Pomona College
Title: *Probability distributions of lattice polytopes*
Abstract: Every polynomial with real non-negative coefficients yields a finite probability distribution after normalization. The Ehrhart h^*-polynomial of a lattice polytope P is a non-negative integer polynomial that encodes the integer-point counts for positive integer dilations of P. We study the corresponding finite distributions, which we call h^*-distributions. We determine the mean and variance of these distributions, establish a connection between higher moments and Ehrhart polynomial coefficients, and study their cluster points in the$d$-dimensional probability simplex. Throughout, we will look towards some well-studied polyhedra as examples. *Graph Theory/Combinatorics, Probability/Statistics*

Los Angeles Room 308
(Analysis and Mathematical Explorations)

1:00-1:15 in Los Angeles Room 308
Presenter(s): John Rock, Cal Poly Pomona
Title: *JEOPARDY! and Arbitrarily Close*
Abstract: A formal definition for arbitrarily close provides a fresh perspective on concepts in topology and analysis: A point is arbitrarily close to a set if every neighborhood of the point intersects the set. In the setting of a complete metric space, a point is arbitrarily close to a set if and only if there is a sequence in the set whose limit is the point. With this notion for arbitrarily close in mind, let's play a round of JEOPARDY! to see classic concepts in a new light. *Analysis, Math Education/Pedagogy, Topology*

1:20-1:35 in Los Angeles Room 308
Presenter(s): Brandon Miranda, Omar Garcia, Nathan Hicks, Mark Mun and Andy Zhang, Cal Poly Pomona
Title: *Finding the limit of the recurrent sequence:* $a(1) = 0,\ a(2) = 1,\ a(3) = 1/2,\ a(4) = 3/4,\ a(5) = 5/8,\ a(6) = 11/16, \ldots$ *where* $a(n) = [a(n-2) + a(n-1)]/2$ *for* $n = 3, 4, 5, \ldots$
Abstract: Since the preceding sequence is a Cauchy sequence of real numbers, the sequence converges to a finite limit, a, using results from undergraduate real analysis. We determine the limit a, without using an explicit formula for the nth term of this sequence (usually found by using an eigenvalue approach). Our method also applies for more general recurrent sequences. We will share some of these examples during our talk. *Analysis, Probability/Statistics*

1:40-1:55 in Los Angeles Room 308
Presenter(s): Armando Pena, Adrienne Robertson , California State University San Marcos
Title: *Attacking ECDSA with Fourier Analysis*
Abstract: The Elliptic Curve Digital Signature Algorithm (ECDSA) is a widely used cryptographic protocol for generating and verifying digital signatures. Its security depends on a secret signing key d, which must remain hidden. Fourier analysis provides a way to identify dominant frequencies within complex signals. A frequency is the number of times a pattern repeats within a specified time frame. Breitner and Heninger showed empirically that Fourier analysis can be used to detect frequencies in ECDSA signatures and, under certain conditions, recover information about the secret key. *Analysis, Applied Math, Cryptography*

Pasadena Room 307 (Counting and Random Walks)

1:00-1:15 in Pasadena Room 307
Presenter(s): Omid Khormali, Harvey Mudd College
Other Author(s): Ghaya Mtimet, University of Evansville; Nuh Aydin, Kenyon College
Title: *Who Stays on the Ship? A Medieval Counting Puzzle, Secret Sentences, and the Automata That Find Them*
Abstract: Centuries-old Arabic texts tell of thirty passengers on a sinking ship, seated in a circle, with every ninth person removed until fifteen remain. Seats are assigned by the letters of a verse whose dotted and dotless Arabic letters are arranged so that exactly the intended fifteen survive. In this talk, we unpack the mathematics hidden in such verses. We first show that circular stepping with any step size k can split n objects into r groups using both elimination and non-elimination procedures. We then record a sentence's alternation pattern as a generalized run-length encoding and count these encodings using Stirling numbers of the second kind and multinomial coefficients. Finally, given a dictionary, a grammar, and a prescribed block pattern, we ask whether a meaningful sentence exists. Using finite automata and context-free parsing, we show this is decidable in polynomial time, and we present English sentences, built from straight-line and curved letters, that reproduce the historical solution. *Graph Theory/Combinatorics, History/Philosophy of Mathematics*
Audience: General audience; no background beyond basic counting needed

1:20-1:35 in Pasadena Room 307
Presenter(s): Elizabeth DeWitt, University of Southern California
Title: *Counting Leading Shifted Tableaux*
Abstract: From two partitions of distinct parts with one contained in the other, we can create a skew shifted tableau by filling the cells of the difference of the diagrams with marked and unmarked positive integers. The number of assignments that give the leading content according to lexicographic order has long been known to be a power of two and is easy to find for a given pair of partitions by filling the diagram by hand. After an introduction to shifted tableaux, we will discuss a closed formula for this exponent based only on the partitions. *Graph Theory/Combinatorics*

1:40-1:55 in Pasadena Room 307
Presenter(s): Owen Xu, Caltech
Title: *Recurrence and transience of excited random walks on trees and lamplighter groups*
Abstract: Multi-excited random walks on a graph $G$are random walks in which the transition probabilities at any particular vertex x in G depend on the number of times x has been previously visited. A (usually finite) number of cookies $\omega(x, i)$ are placed on each vertex x of G, each with their own specified transition probabilities $\omega(x, e, i)$. At the ith visit of the vertex x, the random walker moves according to the transition probabilities $\omega(x, e, i)$ and consumes the cookie shortly afterward. After all cookies are consumed at a vertex, the walker moves from that vertex with transition probabilities equivalent to that of a simple random walk.

In this project, we examine multi-excited random walks on trees of exponential growth; in particular, we show that on a tree of exponential growth, there exists a recurrent multi-excited random walk with finitely many cookies on each vertex. Separately, we also look at the once-excited random walk on the lamplighter group $\mathbb{Z}/2\mathbb{Z} \wr \mathbb{Z}$— we provide a streamlined proof of the transience of the simple random walk on the lamplighter group, and we modify this proof to show transience of the once-excited random walk on the lamplighter group. *Probability/Statistics*

Alhambra Room 305
(Modeling, Prediction, and Dynamical Systems)

1:00-1:15 in Alhambra Room 305
Presenter(s): Christopher Wang, Scripps College
Title: *The quality of a reservoir computer is determined by its relationship to causal states*
Abstract: We show that if a reservoir computer makes the best possible prediction, its internal states must contain an accessible representation of the causal states (minimal sufficient statistics of prediction) of the input. In doing so, we develop multiple expressions for the best possible prediction in terms of the causal states depending on the cardinality of the data-generating Hidden Markov Model, input space, and whether time is discrete or continuous assuming we aim to minimize mean-square error. We show that the reservoir's causal state representation must be unique — distinct causal states are prohibited from mapping onto the same reservoir state for optimal prediction. We quantify how well a reservoir predicts in cases where it does not make the best possible prediction and show that it is related to how well the reservoir represents the causal states. We also show that reservoirs with similar prediction functions have similar representations of causal states. These results establish a new bridge between dynamics and computation. *Applied Math, Mathematical Modeling, Probability/Statistics*

1:20-1:35 in Alhambra Room 305
Presenter(s): Yi-Szen Tang, Cal Poly Pomona
Title: *From Least Squares Regression to Sensor Fusion: A Mathematical Derivation and Application of the Kalman Filter*
Abstract: The Kalman filter is commonly introduced as a recursive prediction-correction algorithm. But its connection to least-squares estimation provides useful interpretations of both its equations and practical behavior. Condensing previous information as additional, uncertainty-weighted observations reveals a more practical estimation method than a least-squares solution. This is known as a state-space model and is the basis for Kalman filtering. As an application, we consider one-dimensional position estimation using an inertial measurement unit (IMU) and an ultrasonic distance sensor. By augmenting the state-space model, we can take advantage of the cross-variance between position and acceleration bias to indirectly improve the accelerometer-bias estimate. Experimental data compare IMU-only, ultrasonic-only, and fused estimates to examine estimation error, innovation behavior, and uncertainty propagation. *Applied Math, Mathematical Modeling, Probability/Statistics*
Audience: Linear Algebra and Multivariate Calculus (some basics physics will help)

1:40-1:55 in Alhambra Room 305
Presenter(s): Marcelo Amaral, Scripps College
Title: *Memory, Prediction, and Energy Cost in Spiking Neural Networks*
Abstract: How well do neural networks predict, and how efficiently do they use memory and energy? We study two spiking-network models with fixed long-term weights, driven by a binary continuous-time Markov stimulus. An exact information-theoretic frontier specifies the greatest prediction possible at each memory budget, while firing activity supplies an energy-cost estimate. For this source, the current state is sufficient for prediction; elapsed time in that state provides no additional predictive information. In small recurrent networks, stronger coupling beyond an intermediate regime increases estimated energy cost while reducing average estimated predictive information. The association between estimated memory and energy cost also changes with activity regime. In a larger biologically motivated model, stronger afterhyperpolarization reduces firing by approximately 46% without reducing observed current-state decoding in matched comparisons. Reading recent spike history improves decoding, and slower stimuli favor longer readout windows. These results distinguish predictive performance, memory efficiency, and energy cost, and support time scale matching among stimulus, network, and readout as a design principle for predictive neural systems. *Applied Math, Mathematical Modeling, Probability/Statistics*

Boardroom South Room 303B
(Markov Chains and Stochastic Structures)

1:00-1:15 in Boardroom South Room 303B
Presenter(s): Sofia Vasquez, Evelyn Jimenez , Cal Poly Pomona
Title: *Suppose P^n equals a matrix whose rows are constant for all positive integers $n > N - 1$ where P is the one-step transition matrix of a finite chain and N is some fixed integer.*
Abstract: Then the sequence of Markov random variables, $X^n, X^{n+1}, X^{n+2}, ...$ form a sequence of second order stationary random variables. Furthermore, the finite-time gambler's ruin probabilities and the infinite-time gambler's ruin probabilities on the dual Markov chain are the same. *Mathematical Modeling, Probability/Statistics*

1:20-1:35 in Boardroom South Room 303B
Presenter(s): Abel Soto, Cal Poly Pomona
Title: *Creating and Justifying a Metric on Markov Chains*
Abstract: A Markov chain is a random process with the Markov property. Examples include random walks and queuing. we ponder the idea of these types of situations being closely related or "close together". We seek to construct a metric where the objects are the entire Markov chain Itself. A Markov chain can be thought of as a sequence of random variables, a matrix, a multivariate function, and even a graph. Problems that arise include – how should we choose to represent the Markov chain? How should we define the metric? With the help of linear algebra, we argue that there's a natural answer to these questions and that multiple constructions of this topology are actually equivalent. This helps to justify that our construction is the "natural" choice. We do further justification by investigating the structure of the quotient topology, and proving that it takes a somewhat expected form. *Metric Spaces and Probability*
Audience: Linear Algebra, Topology, and Random Processes

1:40-1:55 in Boardroom South Room 303B
Presenter(s): Evan Johnson, Kasper Kajewski, Mark B. Mun, Abdel Somera-Fuentes, Theodore De Santos, Viren Kumar, Milad Khazani, Cal Poly Pomona
Title: *When can a Markov Chain First Reach its Steady-State Matrix in a Finite Number of Time-Steps*
Abstract: Consider all irreducible 3-state Markov Chains that have a steady-state distribution $\vec{\pi} = \begin{bmatrix}\pi_0 & \pi_1 & \pi_2\end{bmatrix}$ then the family of one-step transition probabilities $P = \begin{bmatrix}1-a-b & a & b \\ c & a & 1-a-c \\ 1-a-b & a & b\end{bmatrix}$, where $c \neq 1-a-b$ and all entries are probabilities, represent all 3-state Markov Chains who reach their steady-state distributions in 2 time-steps for the first time. We show there does not exist a 3×3 P matrix such that $P^n = \begin{bmatrix}\pi_0 & \pi_1 & \pi_2 \\ \pi_0 & \pi_1 & \pi_2 \\ \pi_0 & \pi_1 & \pi_2\end{bmatrix}$, for the first time when $n = 3, 4, ...$ We also consider generalizations of this result for higher-dimensional P matrices. *Probability/Statistics, Linear Algebra*

Boardroom North Room 303A (Langlands Conjecture)

1:00-1:15 in Boardroom North Room 303A
Presenter(s): Shanna Dobson, Harvey Mudd College and Cal State LA
Title: *An Introduction to Langlands: A Tale of Two Geometries*
Abstract: The Langlands program reveals unexpected connections between arithmetic and representation theory. How can geometry help us understand these connections? This talk offers a gentle introduction to the local Langlands correspondence, beginning with a simple example involving one-dimensional representations. We then meet two geometries in the Fargues–Scholze program: a geometry of bundles on the Fargues–Fontaine curve and a geometry of Langlands parameters. Drawing on the speaker's survey work, we explore how these two geometric perspectives illuminate the relationship between arithmetic and representation theory. No prior knowledge of the Langlands program is assumed. *Number Theory*