Countable Bits

2023-2024 Growth and Change

The start of the 2023-2024 has our department at twice the size it was only ten years ago. After years of often brief chair rotations, **Dr. Luis Garcia Puente** and **Dr. Janet Burge** started their three-year terms as department Co-Chairs. We have a new technical director, Bob Hendrich, who is already helping us do things in our classrooms we have wanted for years.

From left: ***Janet Burge*** *and* ***Luis Garcia Puente***.

Our office space has a new look, with two new faculty offices and a new paraprof/technical director suite. We have a new look online as well—Luis, Janet, and Bob have been busy working with CC Communications to create a new department homepage, which features alumni bios, class profiles, and updated photos and videos of our classes and activities. Please visit our homepage! Looking ahead to 2024-2025, we hope to step up our presence on social media—please join our LinkedIn group: Colorado College Mathematics and Computer Science. We would especially love to hear from our alumni.

Dean of the Faculty Teaching Award

Dr. Danielle Ellsworth

Dr. Danielle Ellsworth was honored with the Dean of the Faculty Teaching Award for her sustained contributions to student success over her seven years at Colorado College. This is demonstrated by her commitment to providing high impact practices for her students, such as her study away class and engaging students in research, as demonstrated when she took students to Washington DC to participate in Posters on the Hill. She also has demonstrated her commitment to ADEI and inclusive teaching practices by "demasculinizing" the CS classroom to break down gender barriers to computing and by experimenting with inclusive grading practices.

2024 Joint Mathematics Meetings

The JMM was held in San Francisco, CA in January 2024. The conference included interesting panels, a bustling undergraduate poster session (with three current CC students presenting), and many great talks, including talks by former CC alums and CC faculty members. A CC reunion dinner took place on

Clockwise from left: ***Nate Mankovich, Hanson Smith, Joseph Rennie, Sam Johnson, Isak Larson, Brendan McCune, Leo Fries, Sarah Wolff, Beth Malmskog, Sophie Aiken,*** *and* ***Molly Moran***.

Thursday evening. Current CC professors **Dr. Beth Malmskog**, **Dr. Molly Moran**, and **Dr. Joseph Rennie** were joined by current CC students **Leo Fries**, **Sam Johnson**, **Isak Larson**, and **Brendan McCune**, as well as CC alums **Sophie Aiken ('19)**, **Dr. Nate Mankovich ('17)**, **Dr. Hanson Smith ('14)**, and **Dr. Sarah Wolff ('10)** for good food and great conversation.

Visit our website:

CC Welcomes Full Professor Rebecca Garcia

Prof. Rebecca Garcia

The Department of Mathematics and Computer Science is delighted to welcome **Rebecca Garcia**, who joined our faculty in Fall 2023. Prof. Garcia brings nineteen years of experience in academia and a wealth of knowledge in developing and running highly successful and impactful undergraduate research programs. Since 2017, she has served as the Program Director for the Mathematical Association of America's National Research Experience for Undergraduates Program (MAA's National REU Program) and a Co-Director for the Mathematical Sciences Research Institute Undergraduate Program (MSRI-UP) in Berkeley, CA. Previous to this, Prof. Garcia founded and co-directed the Pacific Undergraduate Research Experience in Mathematics (PURE Math), a collaborative effort with the Department of Mathematics at the University of Hawai`i at Hilo aimed at bringing research and mentoring opportunities to students in the Pacific Islands.

Prof. Garcia currently works in the area of algebraic combinatorics and has active research groups in the area of generalized graph splines and, separately, in studying lattice structures arising from maximal tubings of cyclic graphs. In 2023, Prof. Garcia received the Mathematical Association of America's Award for Inclusivity, a national award based on efforts to broaden participation in the mathematical sciences. Prof. Garcia was also selected as this year's Baccalaureate speaker. As a native CHamoru woman, Prof. Garcia envisions her purpose as continuing to support her students, both here at CC and at the national levels, in their pursuit of a place in mathematics.

Homecoming Speaker

Dr. David Radke, a 2017 CS graduate as well as former member of CC's hockey team, gave a terrific homecoming talk—Multiagent Systems and the Future of Team Sports Analytics to a packed Tutt Science Lecture Hall. This talk was attended by faculty, staff, and students of our department in addition to a large contingent from Athletics. David finished his PhD from the University of Waterloo in 2023 and now works as a Senior Research Scientist for the Chicago Blackhawks.


Dr. David Radke ('17)

2024 MAA Rocky Mountain Sectional Meeting

Colorado College hosted the annual Mathematical Association of America Rocky Mountain Section Meeting on April 19 and 20, 2024. More than 150 mathematicians from across the section gathered to attend amazing talks, engage with colleagues new and old, and play Jeopardy with undergraduates.

The conference opened with a workshop on "AI in the Classroom" delivered by **Dr. Ben Nye** and a plenary talk by 2023 Burton Jones Distinguished Teaching Award winner, and CC's own, Professor **Mike Siddoway**. Three other plenary speakers, **Dr. Marissa Loving** (UW-Madison), **Dr. Adriana Salerno** (Bates College), and **Dr. Jason Rosenhouse** (James Madison University, Distinguished Visiting Professor USAFA) also gave outstanding talks. There were nine special sessions addressing topics related to the history of mathematics, mathematics education, and new advances in mathematical research. The Friday evening banquet recognized two inspirational section teachers, **Dr. Becky Swanson** (Colorado School of Mines) and **Dr. Liz Arnold** (CSU-Fort Collins) and included a talk from 2023 Early Career Teaching Award winner, **Dr. Shelby Stanhope** (USAFA), as well as a Latin dance party!
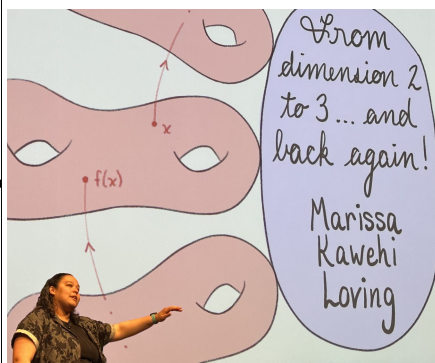
Dr. Marissa Kawehi Loving

HackHarvard Hackathon Win

A CC team comprised by *Kylie Bogar, Primera Hour, David Prelinger,* and *Ronan Takizawa* took Overall Best Hack at the 2023 HackHarvard Hackathon with TeleSpeech, a Chrome extension that converts Telegram messages into custom AI-generated speech. The 2023 competition hosted 634 participants from colleges and universities all over the country, including Harvard, Stanford, Penn, Rutgers, Boston University. In only 36 hours teams designed, tested, and pitched products inspired by the hackathon theme, "Hack to the Future" to a panel of competition judges.

Hackathon team from left: Kylie Bogar, Primera Hour, David Prelinger, and Ronan Takizawa.

Competing, let alone winning, was unexpected. **Ronan Takizawa**, one of this year's coding club leaders, simply wanted to host a hackathon at CC. **Ronan** was invited to participate in the competition after reaching out to the HackHarvard organizers about how to run a hackathon. The CC team met one another for the first time only a week before the competition. **Primera** says: "If the Block Plan prepared me for anything, it was this hackathon. It felt like I was doing a project on finals weekend." Travel costs were covered with help from the Career Center, using funds from the Class of 1981 Professional Development Fund.

Pi Mu Epsilon Induction

On May 3, Colorado College's chapter of the national mathematics honor society Pi Mu Epsilon (PME) celebrated the joy of mathematics with a talk by **Dr. Gene Abrams** of UCCS and inducted eight new members with a ceremony and congratulations. Dr. Abrams talk, entitled "The Graph Menagerie: Abstract Algebra and the Mad Veterinarian," described Mad Vet puzzles, in which a wacky veterinarian has some animal transmogrifying machines that can, for example, change an ant into a bear and a cougar, or a bear into two ants, or a cougar and an ant into a bear. The question of what is possible given this setup has surprising connections to abstract algebra and graph theory. The new members of Pi Mu Epsilon are **Reuben Alter**, **Gwen Hardwick**, **Zoe Harrington**, **Obie Kahne**, **Isak Larson**, **Ella Lippelman**, **Iverson Wang**, and **Haoru Yang**. Students are nomi-

nated for membership in Pi Mu Epsilon for high achievement in mathematics during their undergraduate years. Members of PME are eligible to apply for funding to attend the Joint Mathematics Meetings to present their work, as well as to submit

articles on original research or expository work to the Pi Mu Epsilon Journal. This year, PME member **Leo Fries** was recognized as an outstanding Pi Mu Epsilon student presenter for their talk "The Geometry of Small Chemical Reaction Networks." Colorado College Associate Professor **Molly Moran** is also currently serving as an elected councilor for the national organization. Pictured are new and past Pi Mu Epsilon members together with **Dr. Beth Malmskog** (left) and **Dr. Gene Abrams** (right). Congratulations to new life-long members!

Putnam Competition

The 84th Putnam Competition took place on December 2, 2023. This nationwide competition challenges undergraduate students to solve twelve challenging math problems over a six hour period. One CC student, **Hunter Markowich**, participated in the competition.

Annual Awards in Computer Science

The **Grace Hopper Award** is given to a senior who demonstrates an unusual commitment to the CS community. This year the award is shared by **Lizzie Blaschke** (above) and **Tyler Chang** (below). Lizzie will join our department as the new CS paraprof and Tyler will join the MS in Computer Engineering program at Columbia University.

Annual Awards in Computer Science (cont.)

The **Steven Janke Prize** is awarded to a senior who demonstrates unusual talent and achievement in computer science. The award is shared this year by **Dylan Chapell** (above), and **Kathleen Shea** (below). Dylan will be working at Hansen Gress in Juneau, Alaska and Kathleen will be a graduate intern at the Lawrence Livermore National Laboratory.

Block Visitors

Our block visitors this year were **Dr. Richard Koo** (special topics in CS), **Dr. Rob Gordon** (intro probability and statistics), and **Dr. Nguyen Nguyen** (calculus sequence). Richard, Rob, and Nguyen have taught courses at CC for several years. We appreciate all the effort, care, and expertise they bring to our classrooms. Thank you Richard, Rob and Nguyen!

Student Conference Travel

Attending conferences is a great way for our students to broaden their horizons. At math and computer science conferences, students can attend talks by distinguished researchers, present their own work, network with students and faculty from other schools, attend career panels, and much more. In just the past twelve months our students have participated in: MAA MathFest (Tampa, FL), the Joint Mathematics Meetings (San Francisco, CA), the Nebraska Conference for Undergraduate Women in Mathematics (Lincoln, NE), Math for All (Boulder, CO), Pikes Peak Undergraduate Mathematics Conference (Colorado Springs), MAA Rocky Mountain Meeting (Colorado Springs), and the Pew Midstates Undergraduate Research Symposium (Chicago, IL).

*From left: **Danielle Ryans** and **Leo Gordon** at NCUWM.*

Several students presented research talks and posters including **Sam Johnson**, **Isak Larson**, and **Brendan McCune** (Joint Math Meetings); **Reuben Alter** (NCAR Symposium); **Dylan Chapell** (IEEE AIPR Workshop); **Eric Tang** (UChicago Undergrad Research Symposium); **Elliot Triplett** (Midstates Consortium Symposium); and **Kathleen Shea**. Senior **Leo Fries** was especially well-traveled this year, giving a talk at JMM and presenting posters at MathFest, NCUWM, and Math for All. **Leo Fries** says: "Going to so many conferences has been a great way to introduce myself to other mathematicians and to new mathematical topics that I otherwise may not have encountered! As I was working on making decisions about grad school, it was very helpful to be able to ask current grad students about their experiences." The department thanks our generous donors whose gifts help make it possible for our students to take part in these wonderful opportunities.

Phi Beta Kappa Honor Society

The Phi Beta Kappa Honor Society is a national honor society that recognizes exceptional achievement by undergraduates in the liberal arts. It dates back to 1776 and is recognized by employers and graduate schools—students inducted into the society are eligible for scholarships for graduate study, for instance. The Colorado Chapter was chartered in 1904. Students must be in the top 5% of their graduating class, demonstrate coursework across disciplines, and also uphold a high standard of integrity and personal conduct. This year fifteen of our majors are being inducted: **Lizzie Blaschke**, **Alisha Bloom**, **Tyler Chang**, **Esa Chen**, **Leo Fries**, **Miranda Hunter**, **Shamdeed Kabir**, **Mai Nguyen**, **Mustafa Sameen**, **Stuart Sessions**, **James Settles**, **Calvin Than**, **Elliot Triplett**, **Iverson Wang**, and **Conor Wellman**. Congratulations to all of you!

Class Visits to Baca

*Block 2 MA475 students from left: **Tiia Shea**, **Iverson Wang**, **Zhiqi Yao**, and **Eric Tang**.*

During block 2, the MA475 Real Analysis 2 class traveled to the Baca campus, and even further south to view the annular eclipse that passed over New Mexico on October 14th, 2023. The class studied some Celestial Mechanics both before and after the event, while staying at the Baca Campus, and viewed the eclipse with its annular shaped shadows from the Aztec Ruins National Monument in NM, where the class also observed lunar alignments in 12th century structures built there. They observed further alignments including the lunar standstill alignments at Chimney Rock Colorado. In block 8, **Dr. Joseph Rennie**'s MA421 Abstract Algebra 2 students wrote a textbook. The textbook is intended to be an accessible and self-contained 2nd course in Abstract Algebra. In week 4, they traveled to the Baca campus for an editing retreat. The textbook will be publicly available on github.

October 14 Eclipse over NM.

Scientific Simulation In Situ
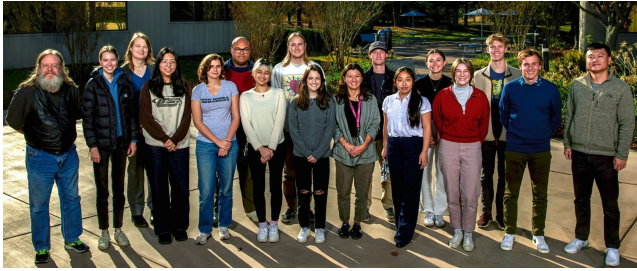
Computer simulations are a critical tool for conducting big science; what does it look like to participate in this work as a computer scientist? 13 CC students were embedded for 2 weeks at Lawrence Livermore National Laboratory (LLNL) to find out. Students were given a simulation code written in C, access to the computational tools used by LLNL scientists, and a little nudge regarding what kinds of code improvements might be useful. From there the students self-organized into teams, implemented and tested code changes, reported daily on progress, and presented the significance of their changes via research posters. LLNL Computer Scientist **Barry Rountree** says: "the students took ownership of their problems as well as their solutions. This level of independence (and productivity) is something I associate more with a strong PhD lab than an undergraduate class." Additionally, students toured world-class laboratory facilities (e.g. the National Ignition Facility) and learned about venture capital through a visit to Acrew Capital's San Francisco office. CC student **Stuart Sessions ('25)** says: "I feel like I really understand and have lived the life of a computing employee at a national lab." This block away course was organized in part by the LLNL Computing Scholar Program and was made possible by generous gifts from Lilly Chen, Acrew Capital, and CC CS alumnus. Pictured are faculty, staff, and CC students participating in this program.

Euclid Scholarhip Awards

The Euclid scholarship recognizes the outstanding potential and passion for Mathematics, Statistics, or Computer Science among first and second-year students. This year, our department received 60 nominations and awarded 15 scholarships, made possible by the generous contributions of alumni and friends. Selections were made based on rigorous evaluations by faculty members and the compelling narratives within students' essays, which described the roles these disciplines play in their lives and how they envision that role evolving over the next few years. Nominated students demonstrated exceptional talent, a strong commitment to learning, and a deep appreciation for at least one of these disciplines. We look forward to seeing the awardees advance their knowledge of mathematics, statistics, and computer science in the years ahead! Not in the picture Maggie Davis, Dakota Hinman, and Sam Lain.

2024 Euclid Scholars and CC faculty.

AI Conversations at Colorado College

Artificial Intelligence, and especially generative AI tools such as ChatGPT, has been a topic of conversation at CC as it is everywhere else. Our role in conversations about AI at CC started with quotes from **Dr. Cory Scott**, **Dr. Blake Jackson**, **Dr. Ben Nye**, and **Dr. Janet Burge** in the article "AI Discussion Remains in Full Force at Colorado College," published in CC's on-line magazine, The Peak. This was followed up by talks hosted by the Crown Center for Teaching and Learning on "Intro to Generative AI" by Ben and Blake and "The Ethics of ChatGPT" with Cory, **Dr. Helen Daly** (Philosophy), **Dr. Leland Tabares** (Race, Ethnicity, and Migration Studies) and CC student **Elliot Triplett**. This then led to Cory, Ben, and Blake giving the first ever computer science First Monday—"Artificial Intelligence: Where are we, where are we going, and what does it all mean?" in Block 6. A video of their presentation can be found at https://vimeo.com/919692816.

Fearless Award

The **Fearless Award** is given to a senior mathematics or computer science student who submits the best collection of summaries of Fearless Friday talks. This year's recipient is **Simay Cural**. Simay will join the MS in Computer Science program at Columbia University this fall. Congratulations Simay!

2024 Euclid Scholars

First Year Students:
Maggie Davis
Sonia Gutierrez
Oliver Keeley
Stewart Kristiansen
Evelyn Needham
Andrew Peng
Cheyan Sundell-Turner

Second Year Students:
Abby Burnham
Dakota Hinman
Sam Lain
Erin Liedeker
Jevon Lipsey
Oliver Ramirez
Yousef Sengal
Katie Smela

Annual Awards in Mathematics

The Florian Cajori Prize is awarded to a senior who demonstrates unusual talent and achievement in mathematics. The award is shared this year by **Leo Fries** (above), and **Haoru Yang** (below). Leo and Haoru will begin PhD programs this fall; Leo in Mathematics at the University of Oregon, and Haoru in Applied Mathematics at the University of Colorado Boulder.


Prof. Rebecca Garcia co-edited "Aspiring and Inspiring: Tenure and Leadership in Academic Mathematics," a collection of essays from successful women and gender minority mathematicians on what it takes to build a career in mathematics.

Student Organizations

The **United Math Clubs** (UMC) had another fun year of creating community for students who love math. Led by students **Porter Barnes**, **Aiden Ingenthron**, **Jingyi Liu**, **Willow Ma**, **Hunter Markowich**, **Eowyn Poplawski**, and **Tiia Shea**, the clubs planned several activities. Lots of students came to Tutt Science Center for a Halloween escape room, where groups tested their wit against puzzles developed by UMC leaders. The student chapter of the Association for Women in Mathematics (part of UMC) sponsored a tea and mentoring session for students to talk about their experiences at Sacred Grounds in Shove Chapel. A Pi day celebration and Pi-K run/walk was well attended, though the pies proved more popular than running on a cold, blustery March day. The last big event of the year was a talk by **Dr. silviana amethyst** entitled "A Rabbit Hole of Mathematics via 3D Printing of Algebraic Surfaces." Dr. amethyst, an Associate Professor at the University of Wisconsin Eau Claire, described some of the mathematics that she has encountered in her quest to print beautiful and accurate tactile models of algebraic surfaces, as well as connecting the material to identity, sameness, and tolerance. This talk was sponsored by the student chapter of the Society for Industrial and Applied Mathematics. UMC wants to thank CCSGA for funding these great events and looks forward to more next year.
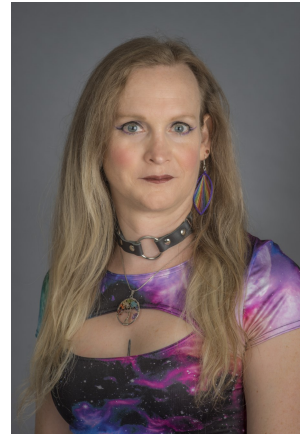
Dr. silviana amethyst

The **Colorado College Coding Club** continues to deliver experiences and opportunities to students interested in computation. In addition to winning HackHarvard, the club has hosted blockly professional development events this year. Event highlights include two resume workshops, an internship application process primer, a web portfolio tutorial, and a student project showcase.

Math Modeling Contest

The Mathematical Contest in Modeling and Interdisciplinary Contest in Modeling (MCM/ICM) is a unique contest that challenges students to tackle real-world problems with limited time and resources. It's an opportunity for motivated students from around the world to delve into the complexity of real-world applications under pressure. This year, the contest took place from February 1 to February 5. Five CC students participated in the contest this year, but only one team, **Obie Kahne** ('24) and **Cooper Tull** ('25), successfully submitted their final solution. They chose the MCM problem C, which asked them to model the "momentum" of winning points in tennis matches. The hypothesis was that even when the two players at the same level are playing against each other, there is a flow of points where one player dominates a game within a single match. The task was to prove the hypothesis based on the Wimbledon 2023 Men's Singles. In addition, the students were to identify the indicators before the shift of momentum occurred so that coaches and players could build a strategic plan. The final contest result will be announced on May 31, 2024.

Fearless Fridays Recap

The 2023-2024 academic year brought many wonderful speakers to our department for our Fearless Friday seminar series. In addition, we were treated to several talks from our own faculty about their own passions and research interests in mathematics, statistics, and computer science. We began the year with University of California Berkeley's Chancellor's Professor of EECS **Venkat Guruswami** who talked about finding efficient algorithms for constraint satisfaction. We then heard about the saga of "the hardest logic puzzle ever" from USAFA's Distinguished Visiting Professor **Jason Rosenhouse** and about how applied statisticians contribute to medical research in the analysis of cognitive data from CSU's Associate Professor **Kirsten Eilertson**. The current President of the Mathematical Association of America and Haimo Award winner **Hortensia Soto** shared with us her work in creating metaphors for linear algebra concepts and bringing an embodied cognition perspective to mathematics education. We also enjoyed beautiful presentations from Editor Emeritus of The American Mathematical Monthly and Texas State System Regent's Professor **Scott Chapman**; CSU-Pueblo's Emeritus Professor **Janet Heine Barnett**; Regis College's Visiting Assistant Professor **Angel Chavez**; CU Boulder's NSF Postdoctoral Fellow **Padi Fuster**; CSU's Postdoctoral Fellow **Mayla Boguslav**; and UC Irvine's Professor of Informatics **Andre van der Hoek**. We're looking forward to more illustrious visitors and interesting talks next year!

Faculty Research Retreat at Baca Campus

A group of ten faculty members descended on the Baca campus August 16-19, 2023 to collaborate on research and enjoy the beautiful scenery of the San Luis Valley. This is our 2nd departmental research retreat. The group worked on a project in topological data analysis (TDA). TDA is a relatively new field of mathematics that uses theoretical concepts from topology, in particular homology, to analyze the shape of data and to see what features appear to be fundamental to the shape by persisting for long periods of "time." While at Baca, faculty members attempted to use these tools on a type of data that has not yet been analyzed with TDA: categorical data. The Baca retreat also provided the time to build community over meals, nightly game sessions, walks into Crestone, and hikes. The 2024 research retreat will be held in June with a focus on redistricting.

Undergraduate Research

Colorado College SCoRE program supports CC students to work on exciting research with CC faculty and present their work at the SCoRE Research Symposium. During Summer 2023, several math and CS students received SCoRE fellowships to engage in research. A few others were funded to participate in prestigious and highly-selective Research Experiences for undergraduates (REU) programs across the country.

- **Hayley Heinecken** worked with **Dr. David Brown** on pattern formation in arid grasslands.
- **Tiia Shea** worked with **Dr. David Brown** on using maximum likelihood as an example of optimization in a calculus class. Her materials have already been used in our calculus classes!
- **Owen Rask** worked with **Dr. Minho Kim** and **Dr. Dan Johnson** (Economics) on intergenerational socioeconomic mobility, focusing on minority groups in the US.
- **Yael Homa** and **Vlad Palma** worked with **Dr. Varsha Koushik** to create prototypes for a contextual communication display for nonverbal individuals with Autism.
- **Kathleen Shea** worked with **Dr. Varsha Koushik** on creating study protocols for observing individuals with cognitive disabilities in their daily activities.
- **Eric Uerling** worked with **Dr. Varsha Koushik** on creating concept prototypes for a collaborative math educational tool for elementary students with visual impairments.
- **Cooper Tull** worked with **Dr. Beth Malmskog** on parameters of Hermitian-lifted codes.
- **Sam Johnson, Isak Larson**, and **Brendan McCune** worked with **Dr. Joseph Rennie** on Homotopy-Type Theoretic proofs of Sylow Theorems.
- **Zahra Cheeseman** worked with **Dr. Cory Scott** on theoretical machine learning.
- **Elliot Triplett** and **Judy Gonzalez** worked with **Dr. Cory Scott** on projection operators for protein modelling.
- **Reuben Alter** did research at the National Center for Atmospheric Research on low-cost, automated weather stations.
- **Dylan Chapell** did research at the University of Missouri on computer vision.
- **Leo Fries** participated at the Pomona Research in Mathematics Experience (PRiME). Leo did research on the algebraic geometry of chemical reaction networks.
- **Jingyi Liu** did research at UCLA on machine learning and non-negative matrix factorization.

Mathematics Block Abroad

In Fall 2024 block 2, **Dr. Molly Moran** will teach a block abroad on "Mathematical Symmetry in Spain." This special topics course will focus on the study of symmetry from a mathematical perspective. Symmetry groups of bounded figures, frieze patterns and wallpaper patterns in the Euclidean plane will be classified using the Mosaics, tiling, art, and architecture in Southern Spain as motivation. Fifteen students will join Molly in this incredible mathematical adventure, and we cannot wait to report on their experiences in the next newsletter. Stay tuned!

Annual Award in Mathematics (cont.)

The Sophie Germain Award is given to a student of mathematics whose passion for the subject is strong enough to overcome significant challenges. This year's recipients are **Jingyi Liu** (above) and **Dani Santillan** (below). Jingyi has been admitted to the PhD in Mathematics program at UCLA and Dani will join Teach For America in Texas while simultaneously completing an MA in Education.

Honors Convocation from left:
***Minho Kim, Lizzie Blaschke, Flavia Sancier-Barbosa, Kathleen Shea, Haoru Yang, Leo Fries,** and **Janet Burge**.*

Sabbatical Plans

Dr. Minho Kim primary goal is to reflect on his teaching practices and complete pending research projects, he is embarking on a significant collaboration. He, along with **Dr. Sancier-Barbosa**, will be working with a local engineering company to analyze temperature and pressure data linked to tragic accidents in pulp and paper plants. This collaboration will involve CC students, providing them with a unique opportunity to contribute to a real-world project.

Dr. Flavia Sancier-Barbosa will be on sabbatical in the Spring of 2025. She will spend some time working on a stochastic modeling problem and working with collaborators from psychology and plant ecology on ongoing projects. She also plans to further develop the project components of her courses by connecting with community partners.

Faculty Achievements in Research

Conducting research is an important activity that helps faculty stay current in their fields and enriches their teaching and mentoring, while contributing to the wider world of knowledge. Our department's faculty have had a productive year, carrying out research with CC students and other collaborators from near and far. A partial list of the accomplishments includes **Mike Siddoway** and his longtime collaborator **Pham Ngoc Anh** have an upcoming paper to appear in the *Israel Journal of Mathematics*: "Module Types of Localizations, With Applications to Leavitt Path Algebras." **Rebecca Garcia** and several collaborators received a grant from the American Mathematical Society to run a Mathematics Research Communities (MRC) program – a weeklong research workshop this summer for early-career mathematicians in the field of algebraic combinatorics. **Beth Malmskog** and several coauthors published a survey paper about error correcting codes for cloud computing: "Mathematical LoRE: Local Recovery of Erasures – Local Recovery Using Polynomials, Curves, Surfaces, and Liftings," in *IEEE BITS*. **Varsha Koushik**'s paper "Ability + Motivation: Understanding Factors that Influence People with Cognitive Disabilities in Regularly Practicing Daily Activities" was a candidate for the best technical paper at the 2023 *ACM Web for All* conference. **Ben Nye** and several coauthors published a paper in *Machine Learning for Healthcare*: "Jointly Extracting Interventions, Outcomes, and Findings from RCT Reports with LLMs." **Janet Burge** and coauthors (including CC alumni **Liz Seero** and **Emily Evans**) presented their paper "Characterizing Software Maintenance Meetings: Information Shared, Discussion Outcomes, and Information Captured" at the *International Conference on Software Engineering* in Lisbon, Portugal. **Molly Moran** had a survey article on the generalization of group boundaries accepted for publication in a forthcoming volume of the AMS series *Contemporary Mathematics*. **Luis Garcia Puente** and coauthors had their paper "Computing Algebraic Degrees of Phylogenetic Varieties" accepted by the journal *Algebraic Statistics*. Luis was also Research Director at the 2023 Pomona Research in Mathematics Experience. **Cory Scott** and CC student **Daniel Lewinsohn** published a paper in the journal *Bioinformatics*: "Consensus Label Propagation with Graph Convolutional Networks for Single-Cell RNA Sequencing and Cell Type Annotation." **Flavia Sancier-Barbosa** and coauthors (including CC biology professor **Roxaneh Khorsand**) published a paper in the journal *Arctic Science*: "Effects of Short- and Long-Term Experimental Warming on Plant-Pollinator Interactions and Floral Rewards in the Low Arctic." Finally, several current and former departmental faculty (**Shishir Agrawal** and **Minho Kim**, along with Luis and Flavia) are currently revising their manuscript on exact tests using algebraic statistics that they submitted to the journal *The American Statistician*. This paper had its genesis at our department's first research retreat at the Baca campus in the summer of 2022.

Tutt Science Center Renovations

The Department of Mathematics and Computer Science is currently in its twentieth year in the Tutt Science Center, having moved from historic Palmer Hall into the then-newly constructed building in fall 2003. At that time the department was comprised of just 11 faculty. Our newly designed building had a generous amount of space for all department members, including offices for technical director, staff assistant, a paraprofessional, and with two computer labs and two visitor offices to boot.

Over the past two decades the department expanded more than 50%. In addition to two paraprofessionals, a technical director, and administrative assistant, the department has by now enlarged to include 18 faculty. This expansion led to the department giving up visitor offices and subdividing other spaces. The large computer lab became a classroom, and the smaller one became an office. By giving up the seminar room that the department had outgrown, two small offices were gained and the now-cherished break room. Despite frequent summers of wall-moving, the department still needed one additional office to accommodate new tenure track faculty arriving in the fall of 2023.

Architects drew up multiple renovation designs. The department eventually chose to convert the former paraprofessional office into two new faculty offices with windows. The medium-sized classroom TSC215 is now the new paraprofessional office, with an embedded glass-walled office for our technical director. Department members are now all on the same floor of TSC, and students continue to use the lounge space with access to faculty and paraprofessional offices.

Paraprofessionals

*From left: **Cooper Doe** and **Lilly Davis.***

Our paraprofessionals this year were **Lilly Davis** ('22) and **Cooper Doe** ('23). Lilly returned for a second year as paraprofessional for mathematics, while Cooper had a very successful transition from mathematics major to computer science paraprofessional. Lilly and Cooper continued their fantastic work to build a sense of fun and community in the department. They also continue to modernize many of our routines and practices, including departmental guidelines for grader expectations. As their tenure in our department comes to an end, new and bright opportunities are in the horizon. Cooper will join the PhD in Applied Mathematics program at CU Boulder and Lilly will finish her paralegal certificate and an internship this summer and plans to pursue a career in that realm. We wish them the best of luck in their future and thank them for their deep commitment to improving the life of our departmental community. We will miss you Lilly and Cooper!

Building Community

This year was full of fun events and activities that brought our ever-growing community of people who love math and computer science together. Pi Day was celebrated by the department in partnership with the United Math Club in March, although it was a tragically bad approximation for the mathematical constant due to spring break pushing the celebration to March 8. But faculty, staff, and students enjoyed walking, or biking a Pi-K (3.14 km around campus) and eating pie! The paraprofs, Lilly and Cooper, once again hosted iconic Nails & Pizza event a few times this year, to the delight of everyone who loves a cheesy slice, sparkly polishes, and hot, juicy

Blockly Doodle Sheets Honor Wall.

gossip. Some students even colored in posters to be used for when the event is held next year! Speaking of coloring, the blockly Doodle Sheets continue to be the creative outlet of all students stressed out by the pressures of class. Past sheets now have a place of honor on the wall of the new paraprof office, a visual representation of communities of blocks past. We all thank our Academic Administrative Assistant **Marita Beckert** for being the driving force making sure every detail is in place to support all these wonderful activities. Marita's love and dedication continues being a foundational piece upon which we build our departmental community.

*2024 Senior Celebration from left: **John Lê** and **Dani Santillan**.*

New Technical Director

Bob Hendrich

The start of the new school year was also the start of our new Technical Director **Bob Hendrich**. Bob came to us with over 25 years of experience in the software industry. He has already become an invaluable member of our department, making crucial updates to our website and helping us with critical IT infrastructure initiatives. An example of these was working with ITS to set up a database server so that our software design students can have a shared database rather than working locally on their own machines, something we've been wanting for years. We're all really excited about what we'll be able to do with technology in our classes and research with Bob's help.

Sabbatical Plans (cont.)

Dr. Cory Scott will be continuing his research in geometric machine learning. The main project he plans to work on is research on the properties of families of very large graphs, as how to make machine learning models work with very large graphs as input. This is an important step in getting his research to scale to real-world data like proteins and social networks. He hopes to visit at least one of his collaborators at UC Irvine, Los Alamos National Labs, and Occidental College. He is also hoping to work on a robot-human interaction project with **Dr. Blake Jackson**.

2024-2025 Paraprofs

We are incredibly happy to welcome our new paraprofs for the 2024-2025 academic year: **Lizzie Blaschke** (CS '24) and **Obie Kahne** (Math '24).

*From left: **Lizzie Blaschke** and **Obie Kahne**.*

Forging New Paths: Math Major Redesign

After two years of careful planning, we have finally completed the redesign of the mathematics major. The changes include a revision of the calculus sequence and the creation of three new courses: a two course linear algebra sequence, and a course in sequences and series. Last year we introduced a "gateway" course in mathematics MA120 "Applied Linear Algebra." MA120 provides a new portal to the further study of mathematical subjects and prepares students for a broad range of tracks. Next year we will offer for the first time our new MA221 "Advanced Linear Algebra" which builds on the foundation provided by MA120 and engages students with deeper theory and broader applications. Students planning to pursue a graduate degree in mathematics or a career in any type of quantitative analysis (including CS, physics, and economics majors) will greatly benefit from this two-course sequence in linear algebra.

A main goal of the new design is to allow students to select paths within our math major that better fit their interests. In addition to the traditional well-rounded plan, students can now choose concentrations in statistics, applied math, analysis, and algebra that go beyond selecting a few topics courses. In addition, our four distinct introduction-to-proof courses (discrete math; number theory; advanced linear algebra; and sequences and series) aim to provide a solid foundation for students to succeed in all our upper-level courses regardless of their chosen track.

Alumni News

Darryl Filmore is a member of the class of 2020 at Colorado College with a B.A. in Computer Science and a minor in Performance Design. Currently located in Colorado Springs, Colorado, Darryl works as a Robotic Process Automation Developer with ANM as a part of the Digital Transformations team. ANM is one of the fastest-growing IT consultancies in the U.S.

Darryl's hometown is Littleton , CO and she originally applied to CC convinced she would choose a different major. Regarding her eventual interests in computer science at CC, Darryl says: "I decided to take my first Computer Science course to fulfill one of the general education requirements and fell in love with the problem-solving that came with the course material."

Darryl Filmore

Darryl also says: "As a developer, I am lucky to use the problem-solving strategies I fell in love with each day at work. The tools I use tend to be low-code/no-code, but understanding the challenges that come with each project is a fundamental part of my job. Learning to effectively break down a problem and build a solution is an important skill in my role. Interpersonally, I owe my confidence in asking questions and sharing ideas to my time at CC."

Where are they Now? 2023 Alumni

Here is where some of our 2023 graduates are working/studying. **Will Barber** (Snowflake); **Olivia Bouthot** (Armatage Elementary); **Lily Brazil** (Colorado College Master of Art in Teaching); **Edie Brazil** (Le Cordon Bleu Paris); **Cooper Doe** (Applied Math PhD at University of Colorado Boulder); **James Dollard** (Amazon Web Services); **Jessica Hannebert** (Epic Systems); **William Holtz** (Epic Systems); **Miranda Hunter** (Enterprise Mobility); **Henry Jones** (Lawrence Berkeley National Lab); **Joshua Kalenga** (Microsoft); **Daniel Lewinsohn** (Computational Biology PhD at UC Berkeley); **Casmali Lopez** (Mathematics PhD at University of Washington); **Tony Mastromarino** (cPaket); **Pralad Mishra** (Fast Enterprises, LLC); **Benjamin Modlin** (Amazon); **Eliana Neurohr** (Scale AI – Freelance); **Na'ama Nevo** (Mathematics PhD Student at Northeastern University); **Max Perozek** (WHOOP); **Giang Pham** (Windfall); **Michael Romer** (Haziot | Fischer); **Elizabeth Seero** (Sema); **Tim Somerset** (Computational Biology MPhil Student at University of Cambridge); **Emerson Worrell** (Mathematics PhD at Oregon State University).

Are you a 2023 graduate missing from our list? Please contact us, we would love to hear from you!

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Academic Year 2023-24

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