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An Update from Math Club

Statement on Active Learning
April is always an exciting month in Sonoma County and in the Math and Stats Department at SSU. Outside, nature is exploding into colors of green, orange, purple and yellow, and in the department we are getting ready for our annual Math Festival, students work on semester projects and graduation is in the air. Personally, this will be my last “Greetings from the Department Chair” column. After serving six years in the role of chair, I will be stepping down at the end of this semester and Susan Herring will be taking over the leadership of the department.

This is a natural time to think back over the last six years, and so much has happened! Five of our long-term faculty members retired – Bill Barnier, Edie Mendez, Rick Luttmann, Sharon Cabaniss and Jean Chan. We celebrated their long careers at SSU and their many contributions to the SSU Math and Stats community. We are happy that most of them continue to stay in touch while they are enjoying the next stages of their lives! And while no one can replace them, we have hired five dynamic new mathematicians and statisticians in Martha Shott, Martha Byrne, Natalie Hobson, Rodrigo Gaitan, and Omayra Ortega, who bring new expertise and enthusiasm to our community.

Not only did our department see a change in composition, so did our campus leadership team. Over the last three years, SSU has had a complete make over in administration at the highest level, including the arrival of President Judy Sakaki, Provost Lisa Vollendorf, and Vice President for Administration and Finance Joyce Lopes. As a campus, we have gone through strategic planning and renewed our focus on serving our local population. Just as one example, recently SSU received the designation of Hispanic Serving Institution with 31.2% Latinx population in 2018. I am excited that the Math and Stats Department is now starting an initiative to explore how we can truly embrace the term “serving” in this new campus designation, and transform our department into a program where all students feel like they belong and thrive in their human and academic endeavors.

One of our biggest efforts over the last three years has been to transform the remedial math program into GE stretch courses where all students start in college level math classes and are on a path to finish their required general education math courses within their first year at SSU. We strongly believe that all students can succeed in math and our new courses incorporate active student pedagogy and learning experiences to help students develop a mathematical growth mindset and strong collaboration skills.

I am particularly happy that we continue to foster a strong community in our department among faculty, staff, and students. A colleague asked me a few weeks ago what I thought made the “magic” of our department. I agree that it is a magical place and emphasis on community has a lot to do with it. I am grateful for all the support I have received from the department, the school and the university during my time as chair, and I am grateful that I’ll continue to contribute to the magic as I transition to a renewed focus on teaching and working closely with our students.

Alumnus Tyler Evans, SSU President Judy Sakaki, and Department Chair Brigitte Lahme

By Dr. Brigitte Lahme
The 79th annual William Lowell Putnam Mathematical Competition was held on December 1, 2018. There were a total of 4,623 participants from 568 institutions across the United States and Canada. Sonoma State's Mathematics & Statistics Department fielded a team, as usual. Anthony Aboumrad, Ryan de Leuze, Emil Guzman, Braedon Hawkins, Steve Hernandez, Drew Horton, Joseph McGuire, Keith Rhodewalt, Jorge Ruiz Gonzalez, and Howie Tomson participated. Keith received the highest score among SSU participants. All participants will be awarded a silk-screened T-shirt at the annual Awards Ceremony -- with the Hindu "behold" proof of the Pythagorean Theorem stenciled on the front.

The William Lowell Putnam Mathematical Competition has been held every year since 1937 (except for a few World War II years) under the auspices of the Mathematical Association of America. William Lowell Putnam, a member of an old established family from Boston, studied mathematics at Harvard. The Competition was established by his heirs to honor him by furthering intellectual competition among universities in North America. The Competition stresses creativity in problem-solving rather than rote knowledge of mathematics.

by Dr. Sam Brannen
Alumni News

Jessica Wilcox, Spring 2015: Currently in my 3rd year of teaching. I’m now at Pivot Charter School. But also I’m enrolled at Chico State working on my masters in math education! Right now I’m taking graph theory and learning so many new exciting concepts!

Travis Hayes, Spring 2017: Currently finishing up my last semester of my masters degree at Cal State LA. Teaching two sections of calculus. Recently was accepted into Oregon State University’s Math Education PhD program. Still waiting to hear back from a handful of UC’s and other PhD programs.

Martine Miller E, Spring 2014: Finished my masters in statistics last year. I’ve started working for NFP Insurance Brokerage as a Data Analyst for their Data Conversion Team.

Jessica Kelb: In my 12th year of teaching special education. Third year at Antioch High School. Started a modified Geometry class last year and it is going really well!

Sarah Kay Brady, Spring 2016: I accepted an offer as clinic supervisor at The Bird Rescue Center in Santa Rosa last October and am gearing up for my first baby bird season as such.

Haley Othart (formerly Kavanaugh), Spring 2014: After I graduated from SSU in 2014 I went to Cal and graduated in 2016 with my teaching credential and Masters in mathematics education. I taught in Oakley for a year and then moved to Fresno. I’m finishing up my second year teaching at Clovis West HS and my first year taking over the AP statistics course.

Sarah Mucha, Spring 2014: I am currently in my 4th year of teaching! I teach Accelerated Integrated Math 2 and Integrated Math 3 at Central Valley High School in Ceres, CA. I am the Math 3 PLC lead and love my job! I feel that getting my undergrad degree and credential from SSU fully prepared me! Couldn’t have asked for a better place to get my education!

Elizabeth Schleth, Spring 2014: Teaching 7th and 8th grade math at West County Middle School.

Samuel Ureña Jiménez, Spring 2015: I am in my 3rd year teaching Math 1 and 2 at Napa High School along with being an AVID elective teacher which has been one of the best things I have done as a teacher. I also just earned a masters degree in education from Touro University.

Dan Simonson, Spring 2012: I’m in year 4 of the UCI PHD program. ZOT! My area is in applied probability and I’m hoping to graduate spring 2020.

Brittney Geddes (formerly Haro), Fall 2014: I am in my third year teaching at Maria Carrillo high school in Santa Rosa! I am currently teaching Math 1 and survey Geometry. I got to create the curriculum for the survey geometry course my first year and the class is truly my passion. I am also the Math 1 PLC lead. I love the school I teach at and my colleagues.

Phoebe Roddewig (formerly Marco), Spring 2015: I’m in my last semester for my masters degree at SJSU. My degree is in pure math, but my thesis/writing project is on math education. While at SJSU I’ve also been teaching remedial math and college algebra. I’m applying to teach high school in Livermore in the fall. And I got married last year!
**Alumni News**

**Jacob Holman, Spring 2015:** I finished the masters in stats and I’m working for a mortgage company in accounts payable doing some reporting and R programming intermixed throughout.

**Morgan Fjord, Spring 2014:** Program Coordinator for Piedmont Boy Scouts. Great to see everyone's updates!

**Lissa Baysinger, Fall 2015:** I’m in my second year of teaching at Rancho Cotate High School (algebra 1 and geometry). I also teach Freshman Foundations (personal health) and I am the freshman class council co-advisor.

**Hunter Mills, Spring 2014:** I finished my Master's in Computational and Mathematical Engineering from Stanford, and am working as a data scientist at UCSF at the Bakar Institute for Computational Health Science. I collaborate on projects with Urology, Radiology, Orthopedic Surgery and the ICU. I am also a volunteer firefighter in Sebastopol.

In addition to the Facebook updates above, **Bethany Johnson (2017)** gave our M*A*T*H Colloquium talk on March 27 and is in her second year in the Applied Math graduate program at UC Santa Cruz. **aBa Mbirika (2003)** is a math professor at the University of Wisconsin Eau Claire. **Matea Alvarado (2015)** and **Fabian Santiago (2015)** are both students in the Applied Math graduate program at the University of California, Merced—and they were married on March 30!

Photographed are **Tyler Evans**, and his son, Andrew. Tyler is one of our alums and now a professor at Humboldt State. Andrew will be starting as a physics major at SSU in the fall.
Enjoying his fifth year of retirement, \textbf{Bill Barnier (Professor Emeritus)} visits SSU several times a semester to attend the M*A*T*H Colloquium & the Jazz Forum and to see old friends in the department. He also continues to find books of interest in the Q and QA sections of the SSU Library. Bill enjoys walking with friends, photography, theater, classical & jazz concerts, reading, good food & wine, and travel. For example, he will be in New York City & Washington D. C. in April and Paris, Rome, & Sicily in May. Bill plans to attend the Math Festival on April 24 and hopes to see some former students.

\textbf{Susan Murany}: “I am teaching two classes at SRJC, still enjoying teaching Statistics with the Lock text, 2nd Edition. Perhaps the best thing about being “partially retired” is that I now have the time to put in to my classes in a way that makes me feel like I am doing the best job I can for my students. Otherwise, I am grateful for this beautiful county I live in, my friends, and my opportunities to visit with my family and adorable grandsons in Minneapolis, Minnesota. When it stops raining (which, of course, I am also grateful for!) I can't wait to get out in my garden.”

\textbf{Steve Wilson} retired in Fall 2018 and reports “I'm hoping to get some action with my patent application, and I am hoping to get my website posted back up. There is some significant mathematics on the website, and I had gotten some positive responses. I am working on resurrecting my piano repertoire, and reading. I enjoy sleeping in.”

\textbf{Clem Falbo} reports: “As far as the adventures of the retired Falbos, Jean (formerly Jean Merriman of the Department of Environmental Studies and Planning) and I have been traveling again this year; we went to Yellowstone, Costa Rica and Panama. I play golf, chess and solve math problems brought to me by local residents. Somehow, I always seem to be the (only) mathematician in the room. Jean takes photographs and sometimes sells them, giving the proceeds to the local Buddhist Temple. She also writes poetry and prose, mostly non-fiction. Right now, one of her projects is a history of the Rotary Club in Wallowa County, previously it was a compendium of the Weeds of the Zumwalt Prairie which is being used by a local office of the nature conservancy.” (Clem didn't even mention his new book, Equations: The Power and Beauty of Mathematics, currently under review by potential publishers.)

\textbf{Ai-Chu Wu} gives an update: “On the community service side, I started volunteering at Tzu Chi since 2007. After retiring from SSU in 2012, I have volunteered full time and from 2016 to 2019, as director of Santa Rosa Office (www.tzuchisantarosa.org). After the Tubbs Fire in 2017, I have volunteered at Rebuilding Our Community (ROC) Sonoma County on the Steering Committee and Emotional, Spiritual, Physical Committee, as well as Disaster Case Manager. My younger daughter was married in 2018 and is expecting a girl the end of April. I look forward to helping her taking care of the baby. I offer free Tai-Chi Qi-Gong classes, and hike with friends in regional and state parks. To celebrate our 40th anniversary this year, my husband and I hiked in Chile, Argentina, and Brazil. The longest trip was 15 miles hiking at Patagonia. We are very grateful for the opportunity to take this trip before he reaches 70 in November.”
Mary Anne Sobieraj: “I’ve been keeping busy with Spanish classes, Art class, Book Club, babysitting my 5 year old grandson and am currently on 3 tennis teams....(tho play has been “not so much” with all this weather.....Our rain gauge is nearing 70”.)

Rick Marks (Rico in retirement!): “All that Joyce and I are doing is having fun. Right now we’re in San Miguel de Allende and environs with our Cabo compadres for three weeks, just one of numerous trips recently. Good times.” Rick will also be at Math Festival.

In 2019, Jean Bee Chan will travel to her 6-sister (+ husband Ken Ross) reunion in Hawaii in late April and will cruise through Eastern Europe in May. Drs. Chan and Ross will visit Ashland’s Shakespeare Festival with the UCLA Alumni Association in June; attend the MAA MathFest July 30 - August 4; pick blueberries with their children at their relative’s organic farm August 10-13; and visit Israel and Jordan in November. In her time at home, Chan is busy rehearsing with the 40-member Dragon Singers for their upcoming concert on September 21; and she is in the midst of publishing her story of her childhood years during the Japanese invasion of China.

On May 1, Prof. Chan will give a M*A*T*H colloquium talk on “Ellipses, Matrices, and More.” She recalls the long history of the M*A*T*H Colloquium series: Dr. Clem Falbo exerted his executive power as department chair to “order” the new faculty member Chan to start the series in 1974 after she whimpered that there was no math colloquium on campus!
MATH 495 student Ryan Smith has passed Exam P and is currently scheduled to take Exam FM. If you have questions or need some exam advice regarding Exam P or Exam FM, Ryan can be reached at smithrya@sonoma.edu.

Upon graduating, there are many job opportunities available for both mathematics and statistics majors. However, US News and World Report, the Jobs Rated Almanac, CNN Money, and many more, has consistently rated Actuary as one of the top jobs in the United States. Currently, the SSU Mathematics and Statistics department does not offer an actuarial program, and we want to change that. Dr. Rodrigo Gaitan and a group five students (Ivanna, Jason, Joseph, Michael, and Ryan) have been learning Individual Risk Theory and Short-Term Insurances Theory in the form of a Special Studies in Actuarial Mathematics (MATH 495) class.

Dr. Rodrigo Gaitan intends to achieve the Associate of the Society of Actuaries (ASA) credential so that the SSU Mathematics and Statistics department can soon offer an Actuarial Certificate program.

The ASA credential is the first of three actuarial credentials offered by the Society of Actuaries (SOA), including the Fellow of the Society of Actuaries (FSA) and the Charted Enterprise Risk Analyst (CERA) credentials. Until we offer a credential program, Dr. Rodrigo Gaitan is planning to offer Special Studies in Actuarial Mathematics (MATH 495) again during the Spring 2020 semester.

MATH 495 student Ivanna Perez-Santos working on an actuarial problem with Dr. Rodrigo Gaitan.

MATH 495 student Michael Pearson demonstrating how to compute the convolution of a pair of probability mass functions.

By Dr. Rodrigo Gaitan
We are nearing the end of the second year of our Stretch program and all indicators point towards successful outcomes. In 2016 the SSU math faculty reimagined developmental math. In the past, incoming students with low placement scores had been required to complete up to two semesters of remedial algebra before being eligible to take a general education (GE) level math course. Historically, these remedial courses had a non-passing rate of over 21%.

Based on a plethora of results gleaned from research over the last 4 decades, we moved to what has been referred to as a Stretch model. In a Stretch class, a student who in the past would have been required to take one or two semesters of remedial algebra instead enters a GE level math class with content stretched over two semesters. The class covers the same content as a one semester course, but at a pace that allows students more time to wrestle with concepts and gives instructors the time to give mini lessons on any content that may be missing in the students’ background.

More significantly, each Stretch class is taught in an active learning style which is tailored by each instructor to meet the needs of the class. In general this means the classes are taught in a small group format with problem-posing pedagogy, which fits well with the Department’s focus on active learning. We use the Stretch model with four GE math courses; Finite Math for Business, Geometry, Statistics, and Calculus I.

In 2017-18 we only offered one class in each of the above categories of GE classes as this was a beta test. This year, 2018-19, we offered 10 sections of Stretch courses. We have already seen a significant drop in the non-pass rate in semester one and we anticipate a similar result in the final semester. Next year, 2019-20, we will offer 18-20 Stretch course sections which will serve the over 550 students who historically would have been required to take remedial algebra.

This is a program that we are very excited about not only because of the early positive results, but also because of the student feedback which indicates that participants are finding these classes to be welcoming and at times even fun!

131 A & B
Finite Math for Business
150 A & B
Transformational Geometry
161 A & B
Functions and Rates of Change
165 A & B
Data Visualization and Analysis

By Nick Dowdall
FOR IMMEDIATE RELEASE
PRESS CONTACTS: Francisco Carbajal
Communications Specialist
carbajaf@sonoma.edu | 707.664.3189
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SSU math professor receives national advocate award

(Sonoma County) – In recognition of her exemplary work on behalf of first-year students, the National Resource Center and Cengage Learning has selected Dr. Brigitte Lahme, professor and chair of the Department of Mathematics and Statistics at Sonoma State University, to receive a 2018-19 ‘Outstanding First-Year Student Advocate’ Award.

The national award recognizes educators who are doing exceptional work in the areas of student learning, development and success, according to the National Resource Center. Lahme was one of 10 recipients of the award but one of only two chosen from four-year colleges and universities between 7,000 and 15,000 students in size.

Lahme said she was honored just to be considered let alone to receive the award. “It’s all due to having so much support from the math department,” said Lahme. “It’s a great collaborative environment with so much positive energy to help students think about math differently.”

A professor at SSU since 2002, Lahme is nationally recognized for her contributions to mathematics education. She has spearheaded a number of initiatives including a complete transformation of Sonoma State’s curriculum for first-year mathematics students and has served as a faculty lead on a multi-year STEM Talent Expansion grant from the National Science Foundation.

In nominating her for the distinction, Lisa Vollendorf, Provost and Executive Vice President of Academic Affairs at Sonoma State University, described Lahme as “a dedicated educator and student success advocate” and a “highly respected change-leader for the entire California State University system.”

Vollendorf added, “Throughout her career, Dr. Lahme has made an extraordinary difference in what we know about teaching mathematics, the way K-16 teachers engage all students in meaningful learning about mathematics, how college students of all backgrounds see themselves as part of the future of STEM, and how one faculty leader can inspire and advance the mission of many.”

Lahme said she has a passion for helping first-year students start off on the right foot, especially in math. “It’s not easy, but math is powerful because it opens so many doors for students,” she said. “Even if they decide to not go into mathematics later, empowering students to have the option to follow that route and being math literate is an amazing goal for us. It makes our students lives better and it makes our society better.”

The award was presented to Lahme at the 38th Annual Conference on The First-Year Experience’ in Las Vegas from Feb. 16 to Feb. 19, 2019.
SSU Affordable Learning Hero Award

In Spring 2019, the Math and Stats Department was recognized with the first “SSU Affordable Learning Hero Award” for its efforts to reduce the cost of education for our students.

In Fall 2018, all sections of Calculus 1 and 2 transitioned to the use of the open online calculus textbook “Active Calculus” supported by the locally hosted open online homework system WeBWorK. This effort was supported by two grants from the SSU Faculty Center that allowed us to create additional resources for instructors and students. Over the summer, Jerry Morris created student activity workbooks with instructor solution versions for Calculus 1 and Calculus 2 to accompany the new textbook. He also wrote a large collection of homework problems to supplement the limited problem selection from the text. The grants also supported a student assistant who worked through the materials and gave feedback about clarity and correctness.

Omayra Ortega featured on Lathisms.org

Lathisms.org is a website that features the contributions of Latinx and Hispanics in the Mathematical Sciences. In 2018 during Hispanic Heritage Month, which is celebrated from September 15 until October 15 in the United States, each day a different mathematician was introduced on the website. On Friday, October 12 the featured mathematician was SSU’s assistant professor Dr. Omayra Ortega. Check out Dr. Ortega’s story and work at http://lathisms.org/friday-october-12th-2018.html and learn about 29 more Latinx and Hispanic graduate students, postdoctoral fellows and early career mathematicians.

“For me, Hispanic Heritage Month is a time to remember the cultures that have sustained and nourished us along our way. I look forward to this time of year to give thanks to my Panamanian heritage, full of reggeaton, sancocho (soup), tortillas and tamales (every country has a different way of making these), molas, and family! I am especially thankful for my grandmother, Carmen Duesbury, the matriarch of my family. We all inherited her legacy of stubborn determination, fiscal responsibility, and family celebrations!”

-Omayra Y. Ortega
On Saturday March 2, over 90 high school students, teachers, and parents from the six counties closest to Sonoma State University came to campus to celebrate the participation of women in mathematics, and more generally the STEM fields. Despite the rain on Saturday there was a fantastic turnout with just about everyone who registered attending!

The name of the 2019 event, The Sonia Kovalevsky High School Mathematics Day (SK Day) honors Sonia Kovalevsky, a Russian woman born in the middle of the nineteenth century who, despite social standards that barred women from the university, went on to become a prominent and influential mathematician and one of the first women to receive a doctoral degree in mathematics.

Participants at the first SK Day were treated to a keynote lecture by Santa Rosa native Dr. Anastasia Chavez who is currently a post-doctoral researcher at UC Davis. Dr. Chavez spoke about the challenges she faced as a student while she progressed towards her PhD in Pure Mathematics at UC Berkeley and the importance of perseverance and connecting with great mentors.

Towards the afternoon there were several hands-on sessions led by Kandis Gilmore of the Biology Department, Drs. Natalie Hobson and Martha Shott from Mathematics and Statistics, and Dr. Shubbhi Taneja from Computer Science. These hands-on sessions let the participants get a taste of college mathematics and what it means to DO MATH.
The Math Club at SSU organized a Scavenger Hunt that forced everyone to both network with each other and use their mathematical skills to solve the challenges and win prizes! After lunch Gina Geck, the Director of Student Recruitment and Outreach, led a session introducing the CSU system and giving some tips for applying to college.

The event ended with a Career Path Panel where undergraduate, graduate, and professional female mathematicians shared their experiences along their own path and advice for the high school students in attendance, followed by an awards ceremony for the winners of the scavenger hunt.

The day was full of joy for both participants and volunteers alike. Planning has already begun, and everyone is looking forward to doing this all again next year!

by Dr. Omayra Ortega
A Math Teachers’ Circle is a professional development group for K-12 teachers where local teachers and faculty members gather to explore interesting mathematics. We’ve explored Penrose tilings and pentominoes, discussed Set and Spot It! and finite geometry, played with rubber bands and Pick’s Theorem, and more. For more information about Math Teachers’ Circle in general, visit mathteacherscircle.org.

The Wine Country Math Teachers’ Circle was founded in the summer of 2017 and has continued to meet through the 2018-19 school year with a high participation from the department’s faculty members. Ben Ford, Martha Byrne, Natalie Hobson, and Brigitte Lahme have all led sessions this year, and School of Education Emeritus Faculty Kathy Morris led the pentominoes exploration in February.

We have had many new faces among the attendees and are hoping to finish the year strong with meetings on Thursday, 4/18 and Thursday 5/16 from 4:30-6:30 at the Sonoma County Office of Education. If you are interested in learning more about the circle, attending a session, or joining our mailing list please email Martha Byrne (byrnema@sonoma.edu).

The Math and Stats department is continuing its efforts to create an inclusive community where all students feel that they belong. In May 2018, 14 faculty participated in a 2-day workshop on inclusiveness at SSU facilitated by Aris Winger from Georgia Gwinnett College. The goal of the workshop was to help us increase our knowledge of strategies for overcoming the historical injustices that have kept women, black, Latinx, and other underrepresented students from being equal players in our math/stats communities. Throughout the two days, we examined our own biases and discussed strategies for making our classrooms spaces where all students believe that they belong.
Unveiling "Beyond Curie"

If you have walked through Darwin recently, you probably noticed the newly-installed series of prints on the lobby wall. The prints are part of the STEM design project Beyond Curie (www.beyondcurie.com) by Amanda Phingbodhipakkiya, a multidisciplinary artist, scientist, professor and STEM advocate. The project recognizes numerous women scientists whose incredible advances in their fields have often been overlooked and under-acknowledged. The series is a celebration of 35 of these women, which include 16 winners of the Nobel Prize in Physics, Chemistry and Medicine/Physiology.

The installation was made possible by a School of Science and Technology Innovation and Strategic Priorities funding proposal, brought forward by Professors Brigitte Lahme (Math & Stats), Suzanne Rivoire (Computer Science), Laura Waters (Geology), and Carmen Works (Chemistry). Math Administrative Coordinators’s Sarah Tucker and Robbin Cortez worked hard behind the scenes to make the committee’s vision a reality. We would also like to give a special thank you to our own Drew Horton, Spring 2019 Math Grad and PhD candidate (and artist), who designed the center-piece title print!

The next time you’re in the Darwin lobby, we encourage you to look at the prints from a different perspective by downloading the app Beyond Curie. Follow the easy instructions and watch and the prints come to life using *Augmented Reality*.

By Cory Oates
Sonoma State Math Faculty and students participated in over eight conferences this year traveling as far as Hawaii, Baltimore and lands in between! The department itself even hosted some of it’s own conference events such as BAD Math day (see below) and Math Under the Stars (see the Student Activities Section). Below are some snapshots from the various conferences.

**MAA MathFest, Denver, CO**

Drs. Rodrigo Gaitan and Natalie Hobson attended MathFest, an annual MAA conference, in August. This year’s conference was in Denver, CO. Both Rodrigo (‘18 cohort) and Natalie (‘17 cohort) participated in events with Project NExT this year, a community of new faculty from around the nation that support each other to develop productive and active learning strategies. Below, Rodrigo accounts his experience with this program:

“TheyThroughout graduate school, I learned a lot of mathematics and statistics; however, I was never taught how to teach mathematics or statistics. Professionally, it has been a blessing to be a Project NExT Fellow. Project NExT has provided me with hands-on training on various teaching styles and methods of evaluating students mathematical understanding. I now feel confident to try new teaching styles in the classroom. I am particularly looking forward to implementing what I learned at Project NExT in MATH 165A-B.”

**Bay Area Discrete Math Day**

In October, Sonoma State hosted The Bay Area Discrete (BAD) Math Day! This was the first time this event was hosted at Sonoma State. The event included a day filled talks on discrete math topics, informal networking, and catered dinner at the Korean BBQ. Over 80 researchers and students from around the Bay attended the event.

SSU’s own Nick Dowdall gave a talk on the abundance function. Other talks were given on Gerrymandering, partial triangulation, and the arithmetic of graph labeling. SSU’s Dr. Natalie Hobson was the lead on the event, but she had a great team of SSU students (and Sarah!) who really made the event possible.

**Northern California Math Conference, Chico State**

The NCMC will be taking place at Chico State this year. Both Dr. Shott’s and Dr. Hobson's students will be presenting their work. See the “Undergraduate Research” section for more on these teams and their projects.
AMS and MAA Joint Mathematics Meetings, Baltimore, Maryland

SSU’s Drew Horton attended this conference and was able to reunite with her cohort from her REU last summer. Drew shares more about her experience with us.

“The most important part of the JMM experience for me was the grad school fair. I met a ton of people and learned a lot about different programs at different schools. I was able to get application fee waivers for programs, and a lot of free swag. I ended up applying to a school I never would have considered before because after meeting the professors and students I realized the program was a great fit for me. This really gave me an advantage when it came time to apply to these programs because the schools had already heard my name and they all gave me an idea of what they were looking for in applicants.

“I attended numerous talks of all different flavours. Most talks were 10-15 minutes, and it was an excellent opportunity to expose yourself to different branches of mathematics that you won’t see at an undergraduate level. Obviously most of the information is above my head, but it still provided a peek into the things one might learn in grad school.

SSU Professors Omayra Ortega and Ben Ford attended the event as well. As a Board member and newsletter editor for the National Association of Mathematicians (www.nam-math.org), Dr. Ortega was in NAM meetings, panels, and presentations for most of the four days. Dr. Ford focused on sessions about expanding participation in the mathematical sciences among groups traditionally underrepresented.

MAA Golden Section meeting, American Institute of Mathematics, San Jose

SSU students Keith Rhodewalt, Joe McGuire, Jorge Ruiz Gonzalez attended and presented at this annual conference. Of his experience, Keith reflects:

“The talk that was most interesting to me was given by Jordan Schettler who is an Professor from San Jose State. In his research, he was trying to design a guitar with non-linear frets to preserve frequency ratios in common/important chords. Though the motivation behind this ideal is musical, Schettler had to use physics to analyze the string lengths that would produce very specific frequencies and even used group theory to derive the optimal tuning for a desired style of music. Fascinating!

“It is valuable for our research to be able to stand face-to-face and answer questions that other math people might have, since it really shows us where our understanding needs to be strengthened or where our poster does not do an adequate job of explaining our work.”

The SIAM (Society of Industrial and Applied Mathematics) Math Education Conference, Portland, Oregon

At this even, Dr. Martha Shott co-organized a mini-symposium called "Best Practices in Promoting Diversity and Inclusiveness in and Outside the Applied Mathematics Classroom" with Malena Espanol of University of Akron.

The Annual Conference on the First-Year Experience, Las Vegas, Nevada

Drs. Brigitte Lahme, Karen Moranski, and Martha Shott attended from SSU. At this conference, Brigitte was presented with an award for being an Outstanding First-Year Student Advocate. She was one of only 10 winners from across the nation, and was featured as a panelist during a special conference session as a result.
This summer I was lucky enough to participate in the experience of a lifetime. I was one of ten students chosen to participate in an international research experience for undergraduate students in Uzbekistan. We spent the first ten days traveling as a cohort along the silk road. After returning to Tashkent from our travel, we began research at the Institute of Mathematics of the Uzbekistan Academy of Sciences.

I was chosen to work with two graduate students from Uzbekistan, Uktamjon Mamadaliyev and Qobiljon Abdurasulov. Uktam and Qobil spoke very little English, just as I spoke very little Russian or Uzbek, and I learned just how universal of a language math is. Together we spent eight weeks researching an open problem in the area of Leibniz Algebra, and by the end of that time we had written a paper. We submitted our paper to the Uzbek Mathematical Journal.

Research wasn’t the only thing I spent my summer doing in Uzbekistan. On the weekends the family we lived with would take us out to see different places in Tashkent. We visited museums, bazaars, restaurants, amusement parks, and more.

Additionally, at home, most of us picked up some of the Uzbek language. We also learned how to cook many of the national dishes such as manti, tukhum barak, and borscht. I will never forget the summer I spent in Uzbekistan, nor will I forget all the people I met there. I have since kept in touch with not just the students who came with me to Uzbekistan, but all the other people I reluctantly had to say goodbye to at the end of the summer.

by Drew Horton
Do I feel happier after taking a brisk walk? Does yoga help me to relax? How does the type of tree impact how much shade it provides, and how does tree shade relate to how damp the ground is? These are just a few of the questions that incoming Sonoma State students investigated during the Summer Bridge program last June.

The 2018 Summer Bridge program was the first in many years to include academic meetings in addition to the extensive advising and transitional support that students experience through their participation in the program. Seven of our math faculty joined forces with the EOP and PUERTA staff to integrate quantitative reasoning into the program’s one-week curriculum for nearly 200 students. The result of this collaboration was a series of interactive explorations that showcased the power of data analysis, led by Jeong-Lim Chae, Nick Dowdall, Natalie Hobson, Elaine Newman, Martha Shott, Jeff Silverman, and Sunil Tiwari.

Students began their week outside of the classroom, collecting data across the SSU campus. They measured soil moisture using a digital sensor and tree canopy coverage using a smartphone app. In addition to these environmental data, the students also collected personal data: they took their baseline heart rates and assessed their moods (anxious, happy, lively, etc.) both before and after ten minutes of either brisk walking or meditative yoga.

The data collected on the first day would eventually be the basis of student analysis, but not before learning the fundamentals of summary statistics and data visualization. This task was accomplished with the help of America’s favorite candy – M&M’s! Students used samples of candies from individual packs of M&M’s to explore central tendency and variability in the distribution of candy colors.

The following day, the Summer Bridge students were ready to return to the data they had obtained at the start of the week. With the combined data from all participants, the students created box plots, histograms, and scatterplots using online statistical software. These graphs allowed them to explore relationships between different variables, which then motivated their choice of a research question that they would analyze more deeply. Teams of three created a poster that described their chosen question and the process by which they collected and analyzed the data. The students also provided an interpretation of the patterns or trends that were elucidated by the graphs they had created.

The Summer Bridge students proudly displayed their finalized poster for a program-wide gallery walk on the final day. Each class group rotated to other rooms to see their peers’ work and to provide feedback on other posters using sticky notes. Upon returning to their original classroom, each group discussed the remarks left on their posters and reflected on how to incorporate the feedback to improve upon their work.

The Summer Bridge participants provided positive evaluations of their experiences with the mathematical component of their program. Many remarked that the activities showed them that “math can be fun and interactive,” and they appreciated that data analysis could be used to better understand their surrounding world. One student wrote simply yet cogently, “What I realized [from Summer Bridge] was that college math can be doable. I can do it.”

By Dr. Martha Shott
This year several Sonoma State Students and Faculty are active in collaborative math and math education research projects. Most of these groups will be presenting their work in the poster session in the department’s Math Festival and in the SSU Science Symposium. Some have even shared their work in conferences and colloquia. Below are highlights from some of these projects.

**Faculty: Natalie Hobson**  
**Student: Serina Cabrera**  
**Project Title: Students’ motivation and persistence in Math 165A/B**  
**Project Description:** In this project, Dr. Hobson and Serina are interested in exploring underrepresented and first-generation students’ persist in STEM degrees. In particular, Serina will be collecting one-on-one interviews with current students enrolled in Math 165B and asking them about their experience in this course. Serina will be reporting her finding in the Math Festival Poster Session and the SST Science Symposium. Serina is funded through the Koret Scholars program and LSAMP.

**Faculty: Martha Shott**  
**Students: Thomas Mitchum**  
**Project Title: Impact of Ramp Meters on Traffic**  
**Project Description:** This project seeks to analyze the impact that ramp meters have had on traffic in Sonoma County, particularly along US-101. These ramp meters were activated in 2014, and so we can make a comparison between measures of traffic efficiency before and after the meters went into use. This project started this semester and is still in analysis.

**Faculty: Sam Brannen**  
**Student: Steve Hernandez**  
**Project Title: Three-Dimensional Geodesics**

**Faculty: Natalie Hobson**  
**Students: Drew Horton, Ry Ulmer-Strack, Keith Rhodewalt**  
**Project Title: Pseudo-Ramsey Theory**  
**Project Description:** The goal of this project was to investigate a generalization of arithmetic progressions. Arithmetic progressions are simply sequences of numbers in which each consecutive term differs by the same constant. If we allow for more than one common difference between consecutive terms then the progression is called a pseudo-progression. The students in this project determined a combinatorial formula to count the number of possible pseudo-progressions in certain sets of integers.

The group has presented their work at the Sacramento State Colloquium, the AMS Spring Sectional in Hawaii, the North California Math Conference in Chico, and the SSU Colloquium. They will also be showcasing their work in the SSU Math Festival poster session and the SST Science Symposium. They were awarded financial support and travel funding from an NSF funded grant, Center for Undergraduate Research in Math (CURM) and through the SSU Koret Scholars program.
Faculty: Omayra Ortega  
Students: Therese Acevedo, Kelsey Centurino, Christina Lynch, Monica Morales, and Ana Tongilava  
Project title: Mathematical Epidemiology Research Group (MERG)  
Project description: The students have been exploring the effects of climate change on infectious disease, as well as, deterministic infectious disease modeling techniques throughout the spring semester. Climate change has profound effects on nature's cycles, including the spread, growth, and transmission of infectious disease, in particular vector-borne diseases. Each student in MERG is working on their own individual project, however the overarching goal of their work is to create population-level mathematical models of infectious disease that incorporate the most influential aspects of climate change. All members of MERG will present the early results of their work at the Science Symposium at the end of the spring semester. MERG members are also planning to attend and present their work at the 2019 MAA MathFest and the 2019 SACNAS Conference. The students' research is supported by the Koret Scholarship, the McNair Scholars Program, and the Louis Stokes Alliance for Minority Participation (LS-AMP).

Compiled by  
Dr. Natalie Hobson
Math Club had quite the active year. We began our year by tye-dying t-shirts. We also started a brand new Prime Pizza Thursday tradition, where we all feast on pizza every Thursday that falls on a prime number. Our big event of the fall was funding a trip for the math club to the annual State of Jefferson Math Conference. This is a camping conference that takes place every fall. We also helped with the Ragnar Relay, and earned our club some money for future fun. We held a movie night, and a bowling night too! We also hosted a series of talks during math club, featuring talks by students and a professor.

Geek week this year was somewhat unorganized, but even after missing the first two events, we ended up in third place.

We also have a few upcoming events during the last of the semester: customizing our sweet new Nerd Herd math club t-shirts in the maker's space, finishing the centerpieces for Math Fest, and Pizza and Parkour party at Adventure Recreation.
Filled with hikes, tents, campfires, lectures and a lot of rain, the first annual Math Under The Stars camping trip was a, “I guess you just had to be there!” experience. Battling the elements and the tents, Math Club and Pi Mu Epsilon made it up to Sugarloaf Ridge for a weekend of camping. Joined by professors Ford, Newman, Hobson, Luttmann, and Carol Keig. Students from SSU and SRJC alike enjoyed lectures, games, and beautiful surroundings despite torrential down pour. The clubs’ first attempt at hosting a math conference went well, but taught its executive boards a lesson in planning seasonally. Club Meteorologist Christopher Gibson might have an easier time predicting the weather next year as the clubs plan to host the event in a slightly more climactic month.

Make sure to check out our memory board from the trip, hanging outside of the Math Lab, Darwin 108.
The Department of Mathematics and Statistics at Sonoma State is committed to active learning in all its classes. Active learning engages students in the process of learning during class—through writing, talking, problem-solving, and reflecting—in contrast to passively "receiving" knowledge from an expert. It emphasizes higher-order thinking and often involves group work. The research evidence is overwhelming that "active learning increases student performance in science, engineering, and mathematics". From a risk perspective, “on average, students in traditional lecture courses are 1.5 times more likely to fail than students in courses with active learning”. (Freeman et. al., Proceedings of the National Academy of Sciences, 2014; http://www.pnas.org/content/111/23/8410).

Active learning pedagogies provide greater opportunities for success in learning by students from all backgrounds, particularly students historically shut out of mathematically-based majors and careers (including Native American, Latinx and African-American students, and women). This conclusion is endorsed by a 2016 joint statement of all major mathematics, statistics, and mathematics education professional organizations in the United States (http://www.cbmsweb.org/Statements/Active_Learning_Statement.pdf), which calls on the mathematical sciences community to a community-wide effort to transform teaching at the post-secondary level.

The Freeman study explains the significance of the difference made by active learning pedagogy: “If the experiments analyzed here had been conducted as randomized controlled trials of medical interventions, they may have been stopped for benefit—meaning that enrolling patients in the control condition might be discontinued because the treatment being tested was clearly more beneficial.”

The Department recognizes that changing teaching practice is difficult work, and is committed to supporting new and continuing faculty in this change. Such support will include access to books and materials, professional development opportunities, and co-teaching opportunities.

Active learning methods span a wide range of pedagogical approaches, all designed for students to engage in the practice of mathematics in and out of the classroom; and for students to try difficult things, receive feedback, and improve their practice. Examples include:

- **Think-Pair-Share (TPS)**, which can be implemented many times in every class. The instructor poses a brief task (conceptual question, calculation, explanation), asks students to try to complete the task on their own (perhaps writing down their solution for themselves), then discuss it with a partner, then share some solutions with nearby groups or with the class. This classic technique was recently shown to have high efficacy in a randomized experiment, see Bern-stein et al.

- **Collaborative learning** in which learners engage in a common task where each individual depends on and is accountable to each other. This is often done in small groups with a shared end product. For a fuller description see the department resources on Small Group Instruction.

- **One-minute paper or exit ticket**: Strategically-placed brief reflective writing exercises, which help students reflect on significant concepts and instructors gain quick insight into their students' current understanding.

- **Paired board work**: In pairs, students solve problems or explore patterns on the board. One student is assigned to scribe; the other is quality controller.

Many more pedagogical tools and more detail are in the Mathematical Association of America’s Instructional Practices Guide, including more intensive active learning pedagogies such as Flipped classrooms and Inquiry-based learning.

The Department maintains a collection of active learning resources.
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This year, your donations;

- Made it possible for our student teams to participate in the Math Modeling Competitions
- Provided lunch for our Putnam exam takers
- Paid for the department’s MAA membership that now includes students memberships for more than 150 math & stats majors
- Funded travel for our faculty members to attend the Inquiry Based Learning workshop at Cal Poly San Luis Obispo and bring back innovative teaching ideas to the department, and much more.

If you would like to support our faculty and students in important extra curricular activities, please make your tax deductible donation by going to the department website www.sonoma.edu/math. Any amount would be greatly appreciated.

Does your employer match charitable donations? Check it out and possibly double your impact!