UNIVERSITY OF COLORADO COLORADO SPRINGS

Mathematics

Department

WHERE SHIFT HAPPENS CONSTANTLY

Logo created by Jazzmyn Boykins

2019

In this issue:

LAS Outstanding Student Awards

During the "end of year awards ceremony," the following mathematics students were honored for their academic achievements during the Academic Year 2018/2019 by the College of Letters, Arts & Sciences:

Outstanding B.S. Math Student

- Tristan Neighbors
- Caitlin Randall

Outstanding Graduate Student

- Alyssa Ortiz

Lorch Family Scholarship

- Troy Johnson
- Benjamin Schwartz

Robert S. and Barbara R. Lorch Scholarship

Professors Robert and Barbara Lorch, circa 1995

The family of UCCS Professors Bob and Barbara Lorch established the **Robert S. and Barbara R. Lorch Department of Mathematics Endowed Scholarship** in 2009. The late Drs. Lorch taught political science and sociology, respectively, at UCCS for more than 30 years. Bob and Barbara's son John earned a B.A. degree in math at UCCS in 1988, went on to earn his Ph.D. in mathematics, and is now a Professor of Mathematics at Ball State University in Indiana. (See accompanying article about a lecture John gave at UCCS in April.) The funding provides for merit-based scholarships for junior or senior math majors.

In this, the eleventh year of its existence, the department awarded the Lorch Scholarship to **Troy Johnson** and **Benjamin Schwartz**.

*"I am immensely honored and appreciative to be presented with the Lorch Scholarship.
Receiving this award has allowed me to reflect on how much help my family, professors, and peers at UCCS have given me. They have challenged me to become the best version of myself. I cannot adequately express my gratitude to them and to the Lorch family.
The Lorch Scholarship will give me more time to focus on my goals so I can worry less about paying my bills. I am passionate about mathematics because I believe it is the purest form of truth, and it is a privilege to be recognized for doing something I love. After graduating, I intend to pursue an MS in mathematics with the dream of one day becoming a professor. Understanding math and helping others do the same brings me great joy."
--Benjamin Schwartz*

Ben Schwartz

"I am extremely appreciative and feel immensely honored to receive the Lorch Scholarship. As an avid student and fan of mathematics the Lorch Scholarship has aided me in both the pursuit of a degree and my passion. Receiving the Lorch Scholarship has helped alleviate many financial constraints that would have influenced my senior year and has unambiguously left a positive impact on my life and education."

A very grateful **Troy Johnson**

Troy Johnson

John Lorch Colloquium

On April 18, 2019 **Dr. John Lorch** of Ball State University presented a talk in the UCCS Math Department Colloquium Series. His presentation, titled Enlarging Franklin's Magic Squares, was an engaging look at a type of Magic Square (a square grid of non-negative integers in which all row sums and column sums are equal to some fixed integer) that Benjamin Franklin amused himself with during various tedious gatherings of America's Founders.

      John spent the first 15 minutes of his talk reminiscing about being a kid growing up on the 'Cragmor Campus' (John's folks were both on faculty here). He shared photos of both Barbara and Bob Lorch, as well as some pictures of the UCCS campus from back in the early 1970's. It was a sweet trip down memory lane for John, and for some of the faculty who have been at UCCS long enough to have known Barbara and Bob. (ed's note: what wonderful people they both were!)

      More info about the talk can be found at:

https://www.uccs.edu/math/sites/math/files/inline-files/Colloquium_Lorch_0.pdf

John's talk was extremely well-attended; the nature of the material was very well-suited to both students and faculty alike, and the Math Club helped encourage many students to come and hear what John had to say.

(ed's note: AND have a nice lunch to boot.)

Students lined up in front of Cragmor Hall, waiting to sign up for classes, early 1970's.
(ed's note: College students did indeed wear bellbottoms in the day. Hey, that was MY day …)

Congratulations Math Graduates!

Here is the list of the graduates from each of the department's degree programs in 2019.

Undergraduate Degrees

B.A. Mathematics
- Jimmy Costa
- Dylan Nordstrom

B.S. Mathematics

- Nicole Algire
- Michael Aragon
- Ashley Benson
- William Clark
- Christopher DeLaHunt
- Jordan Ericksen
- Ashantie Mitchell
- Tristan Neighbors
- Hallie Neil
- Andrea Ordahl
- Logan Orbinson
- Zachary Randall
- Martin Ruben
- Jonathan Sakoi
- Katherine Sheafe
- John Stroud
- Cindy Venturin-Salber
- Shanae Weber

Graduate Degrees

MS Applied Mathematics
- Katerina Gkogkou
- Veronica Marth
- Clark Mourning

MSc Mathematics
- Abbey Bowman
- Rachel Drawbond
- Colin Merrin

M.S. Applied Math graduates (from right) Clark Mourning, Rachel Drawbond, and Katerina Gkogkou, along with Dr. Gene Abrams, participated in the Spring 2019 UCCS Commencement Exercises at the Colorado Springs World Arena

PhD Applied Science- Mathematics • Alyssa Ortiz

Alyssa Ortiz earns PhD in Mathematics
First such PhD ever awarded at UCCS

Alyssa Ortiz is 'hooded' at UCCS graduation ceremonies in May by her thesis advisor Dr. Barbara Prinari

The UCCS Department of Mathematics is proud to have achieved an important milestone: the graduation of its first PhD student! **Dr. Alyssa Ortiz,** Ph.D., was awarded the degree in Spring 2019. Dr. Ortiz is now an assistant professor in the mathematics department at the United States Air Force Academy.   For an interesting and inspiring bio about Alyssa, please see the UCCS Communique from May 2019, linked here:

https://communique.uccs.edu/?p=114075

For more information about UCCS Commencement please visit: **http://www.uccs.edu/~commencement/**

Profile of a Recent Graduate:

Cindy Venturin-Salber

(ed's note: for the third year in a row we've asked a recent graduate of one of the department's undergraduate programs for a reflection on their experience at UCCS, along with an update of what they are up to now, to share with Newsletter readers.)

Cindy Venturin-Salber shared these thoughts with the Newsletter. Cindy began her studies at UCCS in Spring 2016. "I was originally an Electrical Engineer major who was terrified of Math. I then took Calculus 1 with Dr. Abrams [Summer 2016]; this is when everything changed for me. I quickly became fascinated by the material and by Dr. Abrams' explanations. I didn't mind the long days of just learning math (it was an intensive summer course), I looked forward to them! I finally felt as though I understood it. I excelled in the course and that is when I really started thinking about a degree in Mathematics. I didn't switch majors that semester though, I was afraid. I then took Calculus 2 with Mrs. Michaux and Calculus 3 with Dr. Rus. These two courses weren't as easy as Calculus 1, I had many health problems arise during this time, and I was feeling defeated. I remember walking into Dr. Rus's office many times feeling like everything was falling apart, and I wasn't going to be able to make it in College, but he helped me understand the lessons and he motivated me to continue working hard; he said that was the key. At this point I realized that I shouldn't get a different degree just because I was scared of not being able to complete the degree I really wanted: Math.

There were many challenges along the way, but I enjoyed them. I enjoyed having to work hard to solve a problem, I enjoyed the feeling of a proof coming to me in the middle of my sleep, and most of all I enjoyed all the support and help I had from my professors. I have to say that the best part of the program was always the availability of the professors. They were always open to truly helping you learn and be successful. There were also some non-schoolwork related challenges. My family (except my extremely supportive husband, Jake) and friends didn't believe a math degree would be useful and told me time and time again that I was only going to be able to teach with a math degree.

Dr. Abrams, Dr. Rus, and my husband Jake are the only reason why I am where I am today. I graduated May 2019 with a Bachelor's of Science in Pure Mathematics and I currently work as a Systems Engineer / Software Integration – Test Associate for Lockheed Martin Space. It's difficult to explain what I do on a day-to-day basis because it changes so often. Overall, I use the problem-solving and attention to detail skills that are crucial to a mathematician to test new software. It's imperative that this new software functions properly as it is software that will be used to fly and operate the GPS satellites that we have in orbit. Not only do I get to work on something as important to the world as GPS, I get to work on side projects that support this program, and I am currently Test Lead for one of them. In this project, my knowledge in math played a huge role here as I had to use the MatLab that I learned in Numerical Analysis and Math Modeling (all with Dr. Rus) as well as the importance of nested polynomials to develop a test plan. I was chosen to be Test Lead of this project after only about 3 months of employment because I was the only one in the team who had the math knowledge (highly mathematically technical documentation had to be read and followed) and MatLab skills to prevail in the position.

In my free time, I LOVE to play video games. I own a PlayStation 3 and 4, a Nintendo Wii U, a Nintendo Switch, a Nintendo 3DS, an XBOX 360, and a gaming PC. When I need more of a mental break I like to read non-fiction such as biographies of famous scientists or books on Chaos Theory (thanks, Dr. Abrams!). I also like to volunteer and I am currently a CASA (Court-Appointed Special Advocate) for some teens in out-of-home placement."

[ed's note: Congratulations on all of this, Cindy!]

Math Kangaroo 2019 Competition

The Math Kangaroo Challenge was hosted again this year by the UCCS Math Department for the 8th year in a row! Math Kangaroo is part of a worldwide annual event held on each third Thursday of March. More than 6 million grade school students (grades 1-12) participate in this 75-minute no-stakes challenge, which engages students in age-appropriate math, fun problems, which in many parts of the world constitute the type of math thought in the school system. During this year's Math Kangaroo we had a group of 70 passionate students from grades 1-12 from the local community.

More information about Math Kangaroo can be found on their website at:
http://www.mathkangaroo.org
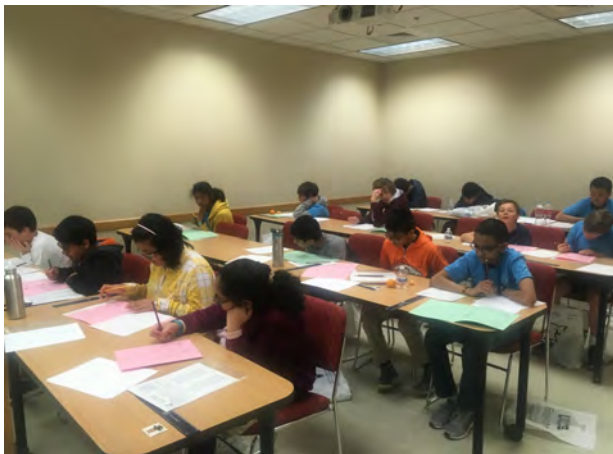
Math Kangaroo Crew (L to R): Tareq Dalgamoni, George Rus, Emanuelita Martinez and Radu Cascaval

Association for Women in Mathematics
New Chapter formed at UCCS

The Association for Women in Mathematics (AWM) is a non-profit organization founded in 1971. The AWM currently has more than 3500 members (women and men) representing a broad spectrum of the mathematical community — from the United States and around the world! Since its founding in 1971 by a small but passionate group of women mathematicians, the Association for Women in Mathematics (AWM) has grown into a leading society for women in the mathematical sciences, and is one of the societies comprising the Conference Board of the Mathematical Sciences. AWM's programs not only support those who participate in them directly, but also help influence the mathematics culture more generally, so that young women entering the field today encounter an environment that is more nurturing than that of the 1970's and 1980's. AWM has played a critical role in increasing the presence and visibility of women in the mathematical sciences in the nearly 50 year History of the AWM. (from the AWM website, https://awm-math.org/)

The UCCS Student Chapter of AWM was formed this past year, spearheaded by **Dr. Bihun**. The current officers of UCCS-AWM are students **Cammie Newmyer**, **Emily Randono**, and **Danielle Belter**. If you are interested in joining the UCCS Student Chapter of the Association of Women in Mathematics (open to all genders), feel free to contact any one of the officers (chapter president Cammie Newmyer can be reached at cnewmyer@uccs.edu). Each new member will receive a complementary membership in the national Association for Women in Mathematics. Starting in January 2020, look on the official UCCS Club website for announcements of upcoming meetings and activities. Members are currently planning to attend the January 2020 Joint Math Meetings in Denver.

On November 1, UCCS-AWM along with the UCCS Mathematics Department conducted the Women in Mathematics Panel, held in University Center. The panel members consisted of Assistant Professor Attendant (and director of the UCCS Math Center) **Dr. Jenny Dorrington**, Ph.D.; Instructor (UCCS Math Department) **Theresa Killebrew**, M.A., M.A.S.; and Professor (Colorado College Department of Math) **Dr. Jane McDougall**, Ph.D. The panel was moderated by UCCS Associate Vice Chancellor for Research **Dr. Jessi Smith**, Ph.D.

According to AWM - UCCS student chapter president Cammie Newmyer, "The focus of the panel revolved around one idea: how to succeed as women in the field of mathematics." Cammie, together with Emily and Danielle, have written a compelling and detailed account of the panel, which was attended by 23 people. Please see the full text at:

**https://www.uccs.edu/math/sites/math/files/inline-files/
Women_In_Mathematics_Panel_Summary%20Edits%20%282%29%5B2%5D.pdf**

The full article, titled "Women in Math Strategize Success," will be included within the student chapter section on the national AWM website in an upcoming posting. The article contains not only a summary of the panel discussion, but also some information about the professional biographies of Dr. Bihun, Dr. Smith, and the three panelists.

MATH CLUB

Roswell: An Evening with Math

Math Tea

    The UCCS Math Club had an extremely event-full year! On April 26 the club co-hosted (with the Physics Club) "Roswell: An Evening with Math". Roswell was both an Integration Bee and Trivia Night. The event had a DJ, food, and prizes for the winners.

There are many ways to approximate π.   One way is to … throw frozen hot dogs. (ed's note: there's stuff about math you just can't make up!) The Math Club sponsored Hot Dog Approximation on April 12. Using the number of tosses that landed on the lines and the total number of tosses, a decent approximation of π was achieved.

Other Math Club activities included:

- **Math Teas** (in which students get together and discuss math and math-adjacent topics they're currently learning about). "It's an (very relaxed) opportunity for students to be excited about math among their peers and hear what their friends are learning about," according to Math Club president Kris Gearhart.
- **Math Talks** (in which a math faculty makes a presentation about some aspect of their research)
- **Math Convergence** (see article below)
- **Math Department logo contest** (see masthead of the Newsletter, and article below).

    This year's Math Club officers are: **Kris Gearhart** (president), **Kendra Engstrom** (secretary), and **Dale Fenton** (treasurer). For more info about Math Club and various events, contact Kris (kgearhar@uccs.edu) or Math Center Assistant Director **Sean Dean** (255-3148).

Thank You to all the UCCS Math Department Lecturers in 2019!

- *Brent Bloyd*
- *Deric Davenport*
- *Gaetan Delavignette*
- *Cynthia Doorack*
- *Rachel Drawbond*
- *Andrea Essler*
- *Joseph Gasteiger*
- *Lucas Goad**
- *Luke Harmon**
- *Jewell Anne Hartman*
- *Deep Karki**
- *Veronica Marth*

- *Taylor McMillan**
- *Tristan Neighbors**
- *Cammie Newmyer**
- *Elizabeth Peterson**
- *Virgina Ramos*
- *Shane Richmond*
- *Stephen Sivetts*
- *Rachel Wood*
- *Michael Zowada**

*Designates Graduate Teaching Fellow

Math Convergence 2019

On September 27, 2019 the Math Department, in partnership with the Excel Math Center, hosted the Fifth Annual Math Convergence. Several faculty members and more than 40 students attended the event for exciting games, great conversation, and fun prizes. It was a wonderful night of mingling and math.

Math Center Assistant Director Sean Dean says a few words at this year's Math Convergence

Around the Department... (in random order)

Tareq Dalgamoni

Tareq Dalgamoni taught Calculus III for the first time in Fall 2018, and subsequently taught it in each of the three semesters of calendar 2019. "It is always rewarding and challenging to teach a new course!" Calculus III was the sixth different course that Tareq has taught at UCCS (in just two years). He is looking forward to teaching Discrete Math for the first time in Spring 2020. As well, Tareq enjoyed teaching a MathOnline-supported course. He has also been using more student-collaborative approaches in his teaching, and has been incorporating technologies in the classroom to give the students multiple ways to visualize material.

On a personal level, Tareq and his wife Nermeen were blessed by the arrival of a very beautiful baby (Omar) the day after Christmas last year. Omar is keeping everyone busy, including big brother Mohammed who has been a big helper. Mohammed was selected by his teachers to represent his school at the Rich Morrow Math Challenge this year.

Sarbarish Chakravarty

Sarbarish Chakravarty continued his research work on solitons and integrable systems, in part supported by a continuing grant from the National Science Foundation. He visited SN Bose Center of Basic Sciences (in Kolkata, India) in January, in order to continue his collaborative research with his colleagues. He also gave a colloquium, titled "Projective connection and Chazy equations", during his visit. In October he gave a talk at the Nonlinear Waves seminar at the CU Boulder Applied Math department. He is currently the advisor for Ph.D. student Michael Zowada. Dr. Chakravarty continues to serve as the chair of the graduate committee of the department.

Jacob Karn

Jacob Karn has been working diligently to keep the chaos of life in order. Related to this, he has been rereading some of his favorite books. Namely, Spanking the Maid by Robert Coover was a quick read and reminder that control and rules will nearly always be overtaken by chaos. Jacob has also discovered Haruki Murakami, a very prolific author whose writing has grabbed Jacob enough to read four of Murakami's books this year. (Hard Boiled Wonderland and the End of the World, After Dark, Colorless Tsukuru Tazaki, and The Elephant Vanishes - all of which he recommends, in the order listed).

In the professional world, he is attempting to learn more about and improve his teaching. In particular, Jacob is trying to find ways to encourage more engagement with writing proofs and thinking about how writing proofs influences dialect and conversation. "Let's talk about how proofs change our non-Mathematical lives!"

Kulumani Rangaswamy

Professor Emeritus **Kulumani M. Rangaswamy** continued his work on the ideal theory of Leavitt path algebras. These efforts resulted in the completion of a few research papers, either singly or jointly with his UCCS colleagues Gene and Zak, as well as with other researchers from the University of Saint Louis and from Turkey. Ranga was asked to be an Editor of a special volume of the Rendicondi del Seminario Matematico della Universita di Padova to be issued in honor of the 95th birthday of Professor Laszlo Fuchs.

Oksana Bihun

In 2019, **Oksana Bihun** was able to describe the evolution of the zeros of a monic polynomial that depends on time for the case where one of these zeros is multiple. Based on that description, she constructed wide classes of solvable N-body problems. Even before this result was published in the J. Math. Phys., Calogero and Payandeh referred to the method she developed as "path-breaking" in their paper. "My students in the graduate Complex Analysis II were a blessing to work with. I am so very proud of their accomplishments, in particular that both students who took a comprehensive exam on the subject passed it." She expanded her technological aptitude by using a tablet when teaching and posting notes and videos of her lectures on Canvas. She enjoyed giving a talk for a Summer seminar in the Engineering department. She facilitated the creation of the UCCS Student Chapter of the Association for Women in Mathematics, for which she is the faculty advisor.

   Oksana moved to a new office, into which she put a nice rug and a print of a painting by Renoir (which she saw in original in Boston). She spent some time in Ukraine in the summer. The National Society of Writers of Ukraine and the International Academy of Literature and Art in Ukraine accepted her as a member.

Yu Zhang

Yu Zhang, kayaking on Catamount Reservoir

Yu Zhang continued his research in percolation this past year. In particular, he did work on the height of optimal paths in first passage percolation; Yu was able to give a non-trivial upper bound for this height. He was invited to present these results at two different prestigious universities: Academia Sinica (Taiwan), and the University of Chicago. His May 24 presentation at UC was titled: "A geometric property for optimal paths and its applications in first passage percolation." On a different note, Yu and his wife Fanny have been enjoying the Colorado outdoors over the past 3 1/2 years, from their kayaks!

Radu Cascaval

   Radu Cascaval continued research in the area of meshless methods for solving PDEs, while incorporating some related topics into the Ph.D. course on Scientific Computation taught during the Spring semester. He also initiated a research project in the area of control of self-driving vehicles, by first attending a workshop at IPAM UCLA in February 2019, then giving lectures at Colorado School of Mines and during the Analysis and Applications seminar at UCCS. Mid-year he was able to reach a major milestone: that of cleaning his office, and, in the process, recycling roughly one ton of old paper that was sitting in his office (in the form of old preprints/research articles). This was triggered by moving to a different office in preparation for his sabbatical leave.

   Indeed, during the second part of 2019 Radu has been on sabbatical leave, as a visiting scholar, at Ecole Polytechnique Federal de Lausanne (EPFL), in Switzerland. "It's fantastic! You can hear math spoken everywhere on the EPFL campus, in the cafeteria, in the hallways, on the campus streets." To further prove this point, half of the entire EPFL book collection consists of math books. The experience has been extremely rich for Radu, as it has placed him in the middle of a vibrant academic atmosphere, and, a bit surprisingly, also entrepreneurial atmosphere. [A little known fact: EPFL is aiming to become a serious competitor to Silicon Valley, encouraging all students to become entrepreneurs and hosting a very large industrial park on campus]. Radu is looking forward to another fruitful semester (Spring 2020) at EPFL before returning home.

Peter Braza

Peter Braza joined the Math Department full time in Fall 2019, after a stint as Dean of the LAS College. Peter thoroughly enjoys being in the department: "I'm fortunate to have such great colleagues!" Peter has found his return to the classroom to be a very nice experience, especially in being able to help students more directly. For instance, in his linear algebra class he's having fun introducing his students to Fourier series and showing their connection to linear algebra concepts like basis and orthogonality. (Peter jokes: "Warning, whenever a professor thinks something is fun or cool, beware students!") Peter wrote and submitted a research article in 2019, titled "The interplay of damping and amplitude in the nonlinear pendulum."

After going through almost a full semester of having bare walls, he finally put up some decorations in his office (he's clearly a fan of Magritte, trains, Lewis and Clark, and Colorado).

New artwork in Peter Braza's office

Greg Morrow

Greg Morrow taught Intro to Analysis (Math 3410) during Spring 2019 as a MathOnline-supported course for the first time; he enjoyed the challenge of a new way of course delivery. He prepared lectures in LaTeX, with space left in the .pdf format in order to write proofs and expand on Classroom Exercises in handwriting, by using a tablet and surface pen. Since that experience, in the Fall he developed a similar style of lectures for both Modern Analysis I (Math 4310) and Applied Functional Analysis (Math 5350/6350). He is still improving on the method thanks to students who have made suggestions for added space and better organization in the final presentation. Over the summer, Greg wrote and submitted a paper on "Probabilistic aspects of r-Stirling numbers" to the Australasian Journal of Combinatorics. Greg served as Advisor for Abbey Bowman's MSc paper "Nash's Equilibrium and Backward Induction as Applied to the Centipede Game". He continues to serve on the mathematics graduate committee and chair the colloquium committee. The colloquium is open to all; see

https://www.uccs.edu/math/events/current-colloquiua

Greg thanks the many people who play roles in supporting these talks!

Katherine Cliff

Katherine Cliff continued to expand her teaching portfolio by this year adding Math 3810 Probability and Statistics to the mix. "I've had a lot of fun teaching that class and warning students about the dangers of misrepresenting statistical conclusions." During Fall semester she organized an informal teaching seminar, which was well-attended by both full-time faculty and the department's new Graduate Teaching Fellows. ("It's difficult to say whether the good attendance is due to the content of the seminars, or the homemade pumpkin bars!".)

Over the summer, Katherine and her husband took a European river cruise along the Danube. They traveled trough Germany, Austria, and Hungary. "It seems there was a castle around every bend on the river, and a plaque to a famous musician or mathematician on every street corner!"

Greg Oman

Greg Oman had an extremely busy 2019. On the research front, he had 3 papers appear this past year (one with undergraduates Caitlin Randall and Logan Robinson) as well a paper accepted. Moreover, his Ph.D. student Luke Harmon has finished his thesis work and should graduate in either Spring or Summer 2020. He continues to advise Ph.D. student Veronica Marth and undergraduate John Stroud on independent research. He recently became an editor for the "Problem Book Series" of the Mathematical Association of America, and has assisted with the reviewing of two books. He is also chair of the Section Nominating Committee of the Rocky Mountain Section of the MAA and is continuing as Problem Editor at the College Math Journal. Greg gave a talk at Cedarville University in Ohio in September 2019. A great bit further from home, in early December Greg submitted this annual biographic update from Sydney, Australia, where he hopes to exchange some mathematical ideas with Professor Roozbeh Hazrat, a frequent UCCS visitor.
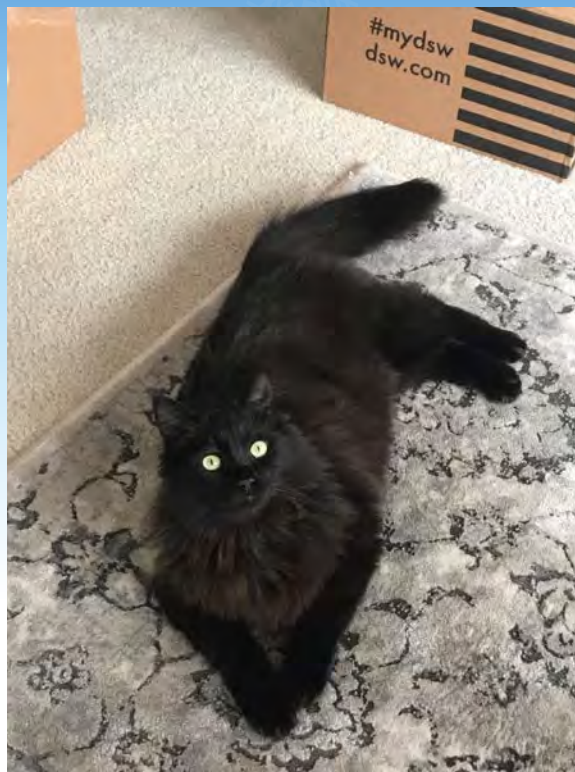
Greg Oman's roommate Purrsey Pawkins

Zak Mesyan

This past year **Zak Mesyan** published two articles, and submitted another two. He also started a new collaboration, with Roozbeh Hazrat (Western Sydney University, Australia), when Roozbeh visited Colorado this summer. The project involves a fair amount of category theory, which is relatively new territory for Zak. He also gave a talk in April at the Southern Regional Algebra Conference, in Lafayette, LA.

In July Zak began his three-year term as department chair. He is still learning the ropes, but the experience has been challenging and also very interesting.

Continuing a longstanding tradition, here is a list of the concerts attended by Zak and his wife Maria this year, arranged in order of increasing loudness: Yefim Bronfman, Bill Frisell & Julian Lage, Al Di Meola, James Carter, Herbie Hancock & Kamasi Washington, the Rolling Stones, and Korn & Alice in Chains.

Gene Abrams

The year 2019 was a Tale of Two Halves for **Gene Abrams.** [First half:] Gene completed his 18 month stint as department chair on June 30. [Second half:] Immediately thereafter, on July 1, he started his sabbatical assignment. As part of his sabbatical, Gene and his wife Mickey spent 7 weeks in the fall in Padova, Italy. Gene is continuing his work with Francesca Mantese and Alberto Tonolo; the Abrams/Mantese/Tonolo team has already published three articles, and this recent stint in Italy provided the basis for a fourth (and hopefully fifth) paper.

Mickey and Gene enjoyed their visit overseas: in addition to the math, the food, the pace of life, the cycling, and the people were fantastic! Also in 2019, Gene was fortunate to be a coauthor on an article (joint with Zak and Ranga) which was accepted for publication.

Shannon Michaux

2019 was an exciting year for **Shannon Michaux.** Her daughter graduated from high school and her son started his senior year! During her time at work she spent a lot of time leading a project to implement a new placement program for the Department's 1000-level classes. While it's still too early for official data on how this program has improved success rates, many teachers of these courses have reported that their students are significantly better prepared for their classes than they were in the past.

Theresa Killebrew

Theresa Killebrew's enthusiasm for helping students learn is clear. "I truly enjoy teaching at UCCS. In 2019 I was able to work with a great group of students across many different majors. It's exciting to help students see glimpses of the ways math is used in their specific disciplines."   Among other courses, in Spring 2019 Theresa taught Business Calculus for the first time at UCCS; similarly for Linear Algebra in Fall 2019. "Having new courses to prepare for keeps me on my toes and helps me sharpen my teaching skills and consider new ways of explain concepts that I've taught before." Professionally, Theresa participated in a Teaching Circle sponsored by the Faculty Resource Center which focused on small changes in teaching practices that yield major dividends for student success. She picked up a lot of great ideas and was able to start implementing them right away.

On a personal note, Summer 2019 was spent traveling with her family road tripping through several National Parks. They were able to visit Bryce, Zion, Yosemite, Redwoods, and Crater Lake. "In my opinion Crater Lake is one of the most beautiful places with dazzling blue water. I would highly recommend visiting if you have never been."   (ed's note: agreed.)

Reece Adragna

Reece Adragna spent most of his time during 2019 attempting to improve his curriculum and teaching for the courses that he had taught previously; namely Calculus for Business & Economics, and Calculus 1, 2, and 3. In Fall 2019 he taught an overload schedule, "… so I was introduced to the concept of being truly busy during exam season!" One big change for Reece that occurred for the Fall 2019 semester was that he had the opportunity to move into an office in the Engineering Building. "I believe this has had a huge positive effect on my teaching, due to a newfound ability to discuss teaching strategies and ideas with colleagues in person." As part of this, he has had the opportunity to work much more closely with those of his colleagues who are teaching the same courses, which has led to a much higher degree of coordination with regard to teaching methods, curriculum schedules, etc. Throughout this past year Reece made a concerted effort to continue to improve his use of technology in the classroom by using tools such as Mathematica more effectively for the purpose of visualizing challenging mathematical content (especially in Calc. 3) as well as attempting to use the tools available within Canvas more effectively to make it more accessible to students. He is very much looking forward to Spring 2020, as he will be teaching Intro to Linear Algebra (Math 3130) for the first time. Outside of teaching, Reece continued to serve as Course Mentor for Math 1120 and Math 3010/3020. "As always, I am humbled to watch some of our newer lecturers teach because I usually find myself learning something new from them!"

Outside of work, he spent much of his time this last year with family, and riding his bike. He purchased a new mountain bike and consequently spent more of his time on single-track trails than on the road. In September, Reece did a ride known as the "Pikes Peak Plummet," which consists of a 7000-foot descent from near the summit of Pikes Peak down to North Cheyenne Canyon Park. "While I normally consider myself more of a 'climber,' this ride was quite the experience!"   (ed's note: ah, to be young again …)

George Rus

George Rus, with daughter Zara and wife Gina (along with a number of George's 3D-printed toys),
at the UCCS Campus Awards Ceremony in May.

George Rus receives the UCCS Outstanding Instructor Award from Associate Vice Chancellor Susan Taylor, as Chancellor Venkat Reddy looks on.

George Rus had a very eventful 2019. He spent the Spring semester teaching three courses, while trying to enjoy life outdoors. He and his family spent the winter and spring months skiing, snowshoeing, and hiking. They skied more than 15 days and snowshoed at least 5 times. To top off Spring semester, George received the UCCS campuswide Outstanding Instructor Award. (ed's note: well-deserved, George!)

During the summer, George taught two courses, with more than 60 students. As such, he and his family spent the year locally, but still tried to be active. Over the summer, they went on more than 15 different hikes, challenged themselves by competing in obstacle course races, and soaked in several hot springs. In July, George and his wife took their 8-year-old daughter, Zara, to Mount Quandary, where they hiked their second 14er.

Starting with the Fall semester, George's responsibilities increased dramatically. Over the next year, he will be the MathOnline Director, serve in several committees, and be in charge of the Math Kangaroo challenge. George was very excited to learn that in November he received a Teaching Enhancement Grant, allowing him to purchase a new 3D printer. This will allow him to print new and improved 3D shapes for his students.

What are they up to now??

A number of UCCS Math Department faculty moved on to pursue other opportunities / directions during 2019.   Here's an update on all four of them.

Wojciech Kossek

Instructor **Wojciech Kossek** is currently "keeping busy" on the faculty of the University of Denver, in his position as a Visiting Assistant Teaching Professor.

Bob Carlson

Professor (now Professor Emeritus) Bob Carlson officially retired from UCCS at the end of Spring 2019, after devoting almost thirty years of teaching, service and research to the department and campus since his arrival at UCCS in Fall 1990. "Retirement is nice. There are very few deadlines, and sleeping in is an option."

Currently Bob is splitting his time among three activities: math research, chess, and exercise. His math research is focused on a mix of differential equations and network analysis. "There seems to be forward progress, but it is slow at the moment." He's also refereed a handful of publications. "Someone must have leaked the news of my retirement, since editors are contacting me more often now!" (ed's note: no good retirement goes unpunished.)

Bob now has time to play more chess, participating in some standard tournaments as well as a lot of online speed chess. In his three most recent tournament games, he played to a draw against a scary 10 year old ("sometimes I think there are space aliens among us!"), lost to a visiting chess master, and had a valiant but ultimately unsuccessful battle with a chess expert. Chess does teach humility.

Bob spends a significant amount of time working out at the UCCS Recreation Center, which he recommends highly: it's not too crowded, has nice equipment, and offers a great view of Colorado Springs and Pikes Peak from the exercise bikes.

Barbara Prinari

Professor **Barbara Prinari** moved to Buffalo, New York in January, on leave from UCCS in the spring semester. Barbara then officially resigned from UCCS in August, and began her full time duties as a professor in the Department of Mathematics at the University of Buffalo. "It has been quite a change, but so far things seem to be going well." She's been kept very busy with new courses to teach (though so far only one per semester), service in the math department executive committee, the hiring committee, the APT committee (the analog of the UCCS Dean's Review Committee), and the faculty senate. (ed's note: even with the change in location, Barbara's plate remains full...) Barbara also was part of an ad-hoc 'coffee committee', which recently completed the purchase of a super fancy espresso/cappuccino machine.

"Buffalo has treated me well, with milder weather than usual. But I do miss the 300 sunny days/year, the mountains (hard to believe, for someone who spent most of her life at sea level!), and all of you (colleagues, students, Emanuelita and all the guys in the math department office) very very much! I hope to come visit soon."

As for research and other activities, the highlight of Barbara's 2019 was Alyssa Ortiz's graduation with her PhD. (See story elsewhere in Newsletter.) Katerina Gkogkou graduated with an MS in mathematics from UCCS in Spring 2019, and subsequently transferred to U. Buffalo to continue her studies with Barbara.   During 2019 Barbara published three articles, and has two more in the works. She spoke at numerous conferences throughout the world, and is one of the organizers of a 6-month program "Dispersive Hydrodynamics: Mathematics, Simulation and Experiments, with Applications in Nonlinear Waves" which will be held at the Isaac Newton Institute, Cambridge, UK in July 6-Dec 18, 2020.

James Parmenter

After leaving UCCS at the end of 2018, Senior Instructor **James Parmenter** and his wife Katy moved to Woodland, CA, just a few miles from the UC Davis campus where James works as a Math Specialist at the Academic Assistance & Tutoring Centers. Life is good for James and Katy, living close to family and longtime friends who they enjoy spending time with frequently. James is really enjoying his job as a Math Specialist, where he mostly teaches supplementary Co-Math classes that students take to improve their calculus skills and understanding. "It's a really great job where almost all my time is spent just helping students understand math. That said, working at UCCS was wonderful, the students and members of the math department will always hold a place in my heart. Thank you for the many years of employment and education."

Oman's Offerings

(Here are some of the Problems, written by Greg Oman, which appeared
in various national refereed publications during 2019)

Associate Professor **Greg Oman** is a PRODIGIOUS writer of math problems. Each year the Newsletter includes problems that Dr. Oman has written (or co-written, often with UCCS students) which has appeared in a national-level journal during that year. Greg's 2019 offerings do NOT disappoint. (ed's note: we have included some of the .tex symbols; this should not cause any issues in understanding what the question is asking for …)

(1) (College Math Journal). Let F be a field and suppose that K is a field extension of F. If $\alpha \in K$ is transcendental over F, then it is well-known that $F(\alpha)$ is isomorphic to $F(x)$, the field of rational functions in x with coefficients in F (here, $F(\alpha)$ denotes the subfield of K generated by F and α). Thus, for example, $Q(\pi)$ is isomorphic to its proper subfield $Q(\pi^2)$. Does there exist a field K, which is algebraic over Q and a proper subfield F of K such that K is isomorphic to F?

(2) (College Math Journal) Let R be the set of all infinite convergent sequences of real numbers, and let S be the set of all infinite sequences of real numbers, convergent or not. Then S becomes a ring via componentwise addition and multiplication of sequences. Further, R is a subring of S. Are R and S isomorphic as rings? Prove or disprove.

(3) (Mathematics Magazine) (with Luke Harmon) A binary operation $*$ on a set S is injective if for all $a,b,c,d \in S$, the equality $a*b=c*d$ implies $a=c$ and $b=d$. Is there an infinite set with an associative and injective binary operation?

(4) (American Mathematical Monthly) All rings are assumed to be commutative with nonzero identity. Consider the following properties of a ring R:

(1) For every proper ideal I of R, there is an injective homomorphism φ: R/I-->R.

(2) For every proper ideal I of R, there is an injective homomorphism φ: R-->R/I.

(a) Must a ring that enjoys property (1) be a field?

(b) Must a ring that enjoys property (2) be a field?

(c) Must a ring that enjoys properties (1) and (2) be a field?

(5) (College Math Journal)

(a) Does there exist a nontrivial group G such that for all groups H and nonempty finite index sets I: $\prod_I G \cong \prod_I H$ implies $G \cong H$? Give an example of such a G or prove that no such group exists.

(b) Does there exist a nontrivial group G such that for all groups H and infinite index sets I: $\prod_I G \cong \prod_I H$ implies $G \cong H$? Give an example of such a G or prove that no such group exists.