U C C S M A T H D E P A R T M E N T

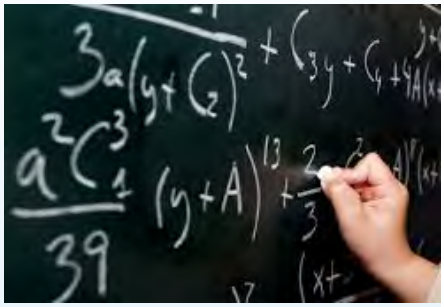
All the v's that's Fit to Print

UCCS Mathematics

2015

Volume 19 Number 1

FALL 2015



In this issue

LAS Outstanding Student Awards

During the "end of year awards ceremony" on May 4, 2015, the following mathematics students were honored for their academic achievements during the Academic Year 2014/2015 by the College of Letters, Arts & Sciences:

- Outstanding BA in Mathematics
  -DeEon Warner
  -Douglas Jones
- Outstanding BS in Mathematics
  -Matthew Gonzales
  -Michelle Osborne
- Outstanding Graduate Student
  -Reece Adragna
- Lorch Scholarship
  -Rachel Drawbond
  -Brandyn Ness

Math Kangaroo Competition

Radu Cascaval with some of the state and nationally ranked winners in the Math Kangaroo USA competition.

Math Kangaroo is an annual international competition for grades 1-12, attended by over 7 million students worldwide; for some eye-popping statistics, see the Kangourou Sans Frontiers website http://aksf.org.
It is a 75 minute challenge held on the third Thursday of March. The problems are geared towards logical reasoning, critical thinking and are in the form of fun puzzles and spatial riddles.

Math Kangaroo USA (http://mathkangaroo.org) was hosted again this year at UCCS. About 30 school grade students from the Colorado Springs community participated. New this year, in addition to the UCCS center, 100+ kids were able to participate at three local schools, thanks to the generous sponsorship of the Keysight Technologies and the Pikes Peak Section of the IEEE.

Lorch Scholarship Recipients

The family of former 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, for more than 30 years. Bob and Barbara's son John earned a B.A. degree in mathematics at UCCS in 1988, went on to earn his Ph.D. in mathematics, and is now Department Chairperson and Professor of Mathematics at Ball State University in Indiana. (John's mathematical interests lie in combinatorics, and history of mathematics.) The funding provides for merit-based scholarships for junior or senior math majors.

In this, the seventh year of its existence, the department awarded Lorch scholarships to **Rachel Drawbond**, and to **Brandyn Ness**. Rachel notes: "With so many scholarships out there focusing on Engineering and Health Sciences, I was excited to hear about a scholarship that focused on the achievement of Math majors and even more so, I am honored to receive such an award. Math has always been a passion of mine and with this award I am able to spend more time focusing on my coursework and working toward my goal of attending graduate school here at UCCS." Brandyn notes: "I feel both privileged and honored to have received the Lorch Scholarship. Thanks to the generosity of Lorch family and the hard work of the Math Department I have been able to spend less time worrying about finances and more time focused on and enjoying my studies. Receiving the Lorch scholarship has been a wonderful experience during my final undergrad semester at UCCS.

Congratulations, Rachel and Brandyn!

UCCS Putnam Competition

This year UCCS's Putnam team consisted of four students: **Katrina Eidolon**, **Clark Mourning**, **Shane Richmond**, and **Benjamin Griffith.** Information about the Putnam Exam can be found at http://www.maa.org/awards/putnam. Any reader interested in the Putnam Competition, or other math department undergraduate activities should contact Dr. Radu Cascaval (rcascava@uccs.edu).

The UCCS 2015 Putnam Team: (L to R) Benjamin Griffith, Clark Mourning, Katrina Eidolon, and Shane Richmond

PUTNAM TEAM 2015

MAA
MATHEMATICAL ASSOCIATION OF AMERICA

Deep in Putnam Thought …

Congratulations 2015 Math Graduates!

Here is the list of the graduates from each of the department's degree programs in 2015.

Undergraduate Degrees

B.A. Mathematics

- **Bryanna Aker**
- **Kasie Ewing**
- **Allan Edward Gardner**
- **Anneliese Gatlin**
- **David Harris**
- **Leah McFann**
- **Keri Ornelas**
- **John Parcha**
- **DeEon Warner**

B.S. Mathematics

- **Paul David Archibald**
- **Nicole Conway**
- **Macey Fegler**
- **Matthew Wayne Gonzales**
- **Elizabeth Hall**
- **Dale A. Hartley**
- **Paulette Iszler**
- **Kristen Marie Lemack**
- **Brandyn Edwin Ness**
- **Michelle Christine Osborne**
- **Sara Grace Welton**

Graduate Degrees

MS Applied Mathematics

- **Reece Adragna**
- **Kathryn George Arthur**
- **Luke Everett Harmon**

MSc Mathematics

- **Sarah Ruether**
- **Rachel Lynn Wood**
- **Caroline Joy Kellackey**

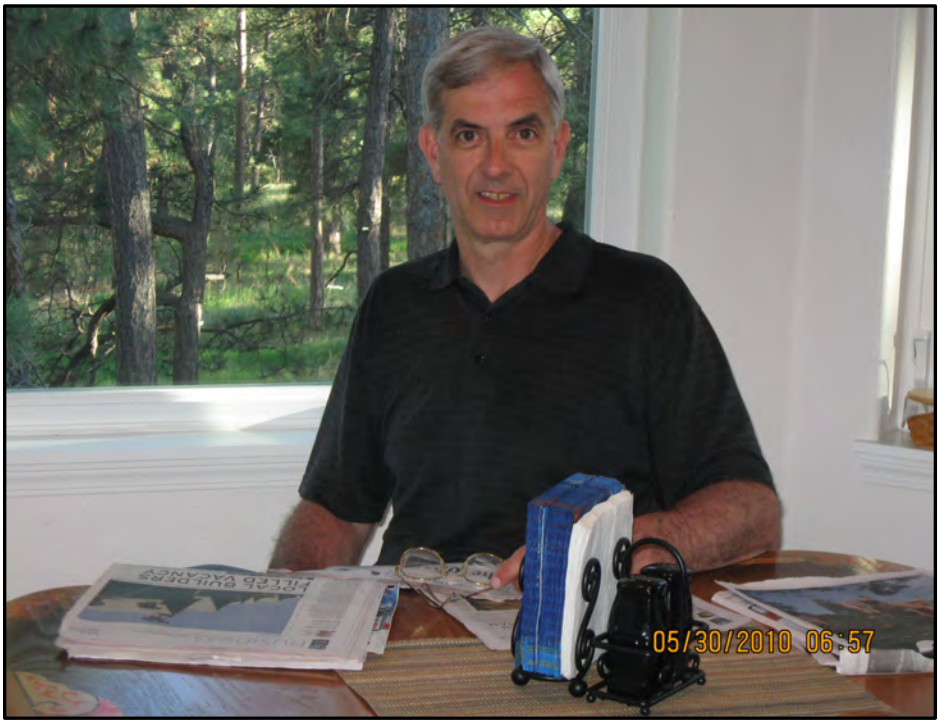
L to R: Rachel Wood, Luke Harmon and Nicole Torrence

Honors Track in Mathematics

Students with a high Math GPA are encouraged to consider the Honors Track within the BS and BA Math Degrees, preferably in their sophomore or junior year. This track's main purpose is to help identify and encourage qualified students to take on challenges beyond the standard math curriculum. A Math GPA of 3.5 and a general GPA of 3.0 are part of the requirements by the time of graduation. The highlight of the track is a written report on some undergraduate research project, a senior thesis or a senior project in an advanced course, under the supervision of a faculty advisor.

For a detailed description and application form, visit http://www.uccs.edu/math/undergraduate-programs/math-honors-track.html

Mathematics Department Lecturer honored for outstanding teaching.



Each year the College of Letters Arts and Sciences honors a small subset of the instructors in the college by designating them as a recipient of an Outstanding Teaching Award (Lecturer). The department was quite proud when Mr. **Ron Haeckel** was recognized as one of the awardees during Spring 2015. From LAS Dean Peter Braza's congratulatory letter: "After a thoughtful and thorough review and an in-depth discussion of your impressive materials, FCQs, and letters of support, the LAS Teaching Committee unanimously voted you one our most deserving and innovative educators, and praises your contributions to teaching". Ron received a stipend as part of the award, as well as recognition at the annual LAS Awards ceremonies in May.

Ron started teaching math at Pikes Peak Community College (PPCC) in January 2011, and at UCCS in January 2012. His 2012 UCCS courses were developmental math classes (MAT 090 and MAT 099) through the Extended Studies program. (He was officially a PPCC employee in this capacity.) In Fall 2012 Ron was hired by UCCS to teach College Algebra MATH 1040 while he continued to teach MATH 090 and 099 classes for PPCC. He's continued to teach for PPCC up to the present, but has moved on to also teach the MATH 1050 (Precalculus) and MATH 1120 (Business Calculus) courses. All told he's taught more than a dozen UCCS classes, as well as a dozen more PPCC classes held on the UCCS campus. "I figure I've taught more than 800 students at UCCS." (*ed's note: i.e., more than 800 students who are enthusiastic about math!*)

Congratulations to Ron Haeckel for this well-deserved recognition.

Thank You to all the UCCS Math Department Lecturers in 2015

Reece Adragna*, Angela Andrews, David Bakalyan, Thomas Braund, Katherine Cliff*, Calli Coppus, Gaetan Delavignette, Andrea Essler, Ron Haeckel, Luke Harmon*, Jewell Anne Hartman, Matt Jones, Ben Kinyanjui, Vinay Kodipelly*, Vira Kravets, Roger Maddox, Elena Murariu, Krista Parnell, April Pierce, Mike Popovic*, Virginia Ramos, Ikko Saito*, Wendy Spratte, and Rachel Wood.

*Graduate Teaching Fellow

Seventh Annual UCCS Department of Mathematics Distinguished Lecture

The 2015 UCCS Special Lecture in Mathematics was delivered by **Dr. James Keiser**. Dr. Keiser is the Technical Director of the Laboratory for Analytic Sciences at North Carolina State University, Raleigh, NC. He is also an Applied Research Mathematician at the National Security Agency (NSA).

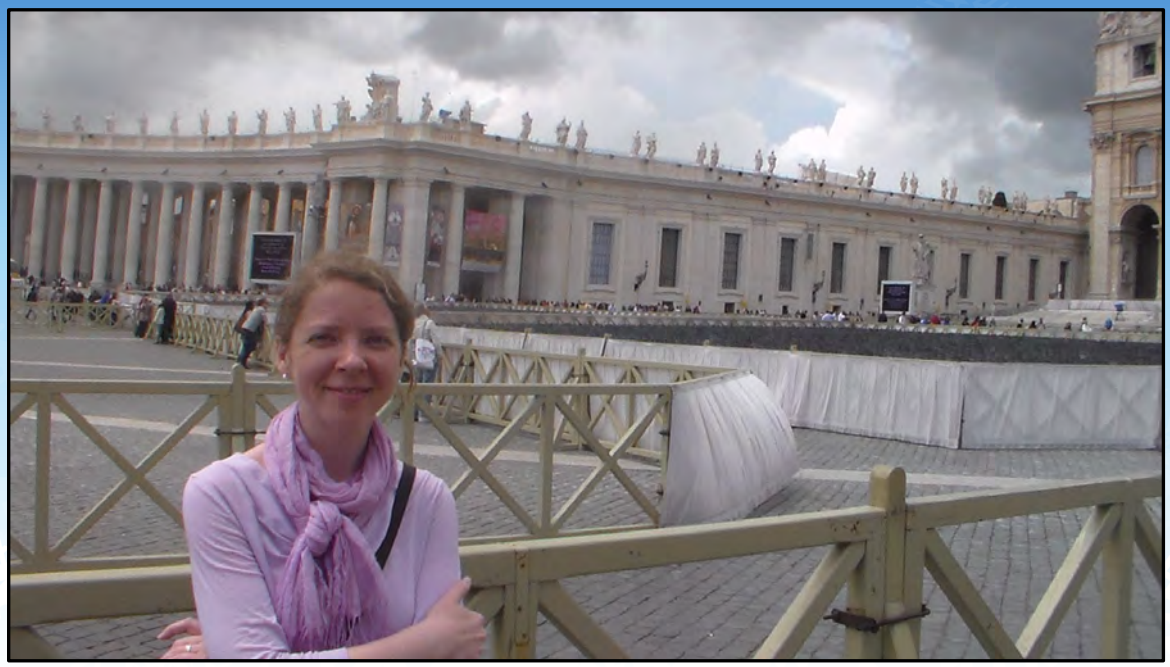
James got his PhD in Applied Mathematics from CU Boulder in 1995, and subsequently joined NSA in 1996. He also worked in the private sector at Science Applications International, Corp. (SAIC) in San Diego (starting in 2004), before returning to NSA in 2011. Dr. Keiser's research interests lie in a number of topics at the interface of Applied Math and Computer Science, including signal, image and data processing, wavelets and graph analytics.

James talked about the application of mathematics to the science of analysis. In particular, one such emerging discipline is that of making sense of Big Data in the age of the Internet of Things. The goal of these analyses will enable decision makers to be quantitatively accurate and more effective in their jobs, thus creating Decision Advantage. These developments require the development of new mathematical analysis, modeling and simulation techniques for the dual purposes of building Global Awareness and Strategic Foresight, and creating scientific frameworks for sense making through storytelling.

The talk was held the Kraemer Family Library Apse on Thursday, October 8; nearly 50 people were in attendance. Dr. Keiser also interacted with the Math undergraduate and graduate students at an informal session in the Math Center on the following afternoon.

The video of Dr. Keiser's presentation is available at:
uccs-classcapture.colorado.edu/Mediasite/Play/24600976512a405e8210f66ca2ca73931d

Our New Faculty Member- Dr. Oksana Bihun



Oksana Bihun at the Vatican during one of her recent research visits to Italy.

The department is extremely happy to welcome our newest member, **Dr. Oksana Bihun**. Oksana is an Assistant Professor of Mathematics. She joined the department this past August. The Newsletter had a chance to sit and chat with Oksana about a few things mathematical, and about a few things not so much.

Newsletter: **Welcome to UCCS in particular, and Colorado Springs more generally. How has the transition to your new surroundings been going?**

Oksana Bihun: Thank you so much for the welcome. My first day after moving here, I was just stunned by how beautiful this place is. Even though I had seen plenty of pictures of Colorado Springs, I was still unprepared. (It was somewhat overcast when I came for my interview in February; everyone kept telling me how intensely blue the sky usually is.) I am so glad to be here, so the transition has been wonderful. I have enjoyed exploring the city and the area. I am very grateful for all the support that my colleagues offer, it makes me feel comfortable. And the students, I love the students, it's a joy to interact with them in my

v's: **Tell us a little bit about your background.**

OB: I was born and raised in Ukraine, in the city of Lviv. Lviv is in the far western part of Ukraine; the population is about twice that of Colorado Springs. My parents were physicists. My brother, who still lives in Lviv, is one as well.

In my pre-teenage years I was interested both in music and in math. After the usual class day was finished I would go to a special music school to study piano. I was told I have "perfect pitch", maybe that is why I enjoyed the music so much. I also felt this pull toward mathematics. I think it was while taking geometry class (I was in 8th or 9th grade at the time) that I reached a point of no return, saying "yes" to mathematics, perhaps without fully realizing it. It must have been the way my teacher showed us some of the proofs.

I was fascinated by the beauty with which mathematics reveals truth. I liked how we derived new results from the axioms in a purely logical way. It was like building a beautiful castle. This is why I decided not to apply to a music college (high school really) when I was 14, which would have been a step toward entering a conservatory. I wanted to see a beautiful mathematical city, beyond the castle, built in my high school math courses.

v's: And then university?

OB: Yes, I went to the Ivan Franko University in Lviv. It has a rich mathematical tradition: Stefan Banach lived in Lviv for most of his life (it was called Lwow then); he received his habilitation and was a faculty member at the University for over 20 years. The university system in Ukraine (*ed's note*: and in much of Europe) requires a student to declare on entrance her/his intended major. This declaration pretty much determines a fixed sequence of the courses the student will take, up to some minor deviations due to a concentration within the major. I decided to study applied math. There were about 70 other applied math students who started with me. The group was split with about half women and half men. Some of the classes, like the lectures in analysis, algebra or discrete math during the first semester, we took all together, while the others, like the recitations in all the subjects or lectures in optimization, I took with a smaller group of about 20 students. So these 20 students, we knew each other very well since we spent five years together at the University, attending all the same courses. The program was intense, I worked hard, it was exciting. My two junior and one senior theses, as well as a few follow up papers were in numerical methods for solving differential equations that stem from methods of mathematical physics.

v's: You then went to a PhD program in math at the University of Missouri. How did you make that connection?

OB: This is a story which shows that ads posted on bulletin boards can actually have a powerful effect on people's lives! The University of Missouri math department had sent out a poster to math departments at universities throughout the world, advertising the fields in which MU specializes, and publicizing the fact that fellowships and scholarships are available for qualified students. So, I applied, and I was accepted! My first trip to Missouri to start graduate school (in 2003) was also my first trip on an airplane.

v's: Tell us about graduate school.

OB: The University of Missouri was a very good fit for me. I liked the fact that I could still take (graduate level) courses, which was not the case for equivalent programs in Ukraine. There were faculty members who did a lot of work in fields which are in the interface between math and physics, my interest back from Lviv. I also entered the field of geometric analysis along the way, while working on optimization problems for cost functionals that measure the distortion of the geometry produced by diffeomorphisms between two manifolds. I liked teaching classes as a graduate student, my favorite one was proof based analysis. The town of Columbia, which is mostly just a university town, felt pretty small to me, after Lviv, but I learned to appreciate it over the six years I spent there.

v's: Then on to a faculty position …

OB: Right, I taught for a few years at Concordia College in Minnesota prior to coming to UCCS. The school was nice, I enjoyed the students and it offered some stability to my research career. I also got some really good teaching mentorship from other faculty members there. If I thought Columbia, Missouri was small, well, Moorhead, Minnesota was still smaller by a long way. Colorado Springs seems just the right size for me.

v's: Tell us a little bit about your research interests.

OB: I am very pleased with the direction that my research has taken: mathematical physics, since I like to think about these kind of problems. The famous "n-body problem" of mathematical physics basically asks for an explicit description of how a collection of objects will behave under the gravitational influence that each exerts on the other. While the problem has been solved for 2 bodies, and in some restricted cases for 3 bodies, it has been proved that for $n \geq 3$ the system is not integrable, for several interpretations of the term "integrable". In general, integrable dynamical systems are rare. I have been looking in the past few years at various specific types of n-body problems that are integrable or solvable. I also study properties of special functions using the methods of mathematical physics. It has been quite fun and exciting, in part because I have had the opportunity to work with a collaborator in Italy on these problems for each of the past four summers.

v's: And outside of the university? Hobbies? Interests?

OB: I am still very much interested in music. I listen to a classical music radio, KCME, and go to concerts. I have a piano in my apartment, which I brought with me from Minnesota and play somewhat regularly. I also play a traditional Ukrainian stringed instrument called the bandura. I learned to play bandura while I was a student at the music school, it was essentially my "minor" instrument (piano being my "major"). (*Ed's note*: check out https://www.youtube.com/watch?v=4gqgXutQbS4 . Beautiful!)

While still in Ukraine, I finished a collection of poetry called "The Anticipation of Christmas", then another one, "The Distance to the Border", while in Minnesota (both in Ukrainian, maybe I will translate some of them one day…). I still write occasionally. I hike regularly (although not on demanding routes) and enjoy the great outdoors of Colorado.

Please join us in welcoming Dr. Oksana Bihun to the UCCS Math Department family.

Around the Department

(In alphabetical order by FIRST name this year;
it's good to mix things up once in awhile. Sorry Zak …)

Barbara Prinari

Barbara Prinari had an extremely productive and noteworthy 2015. Among the five coauthored papers she had published, one was selected as featured article for the July 2015 issue of the highly regarded *Journal of Mathematical Physics*. (The cover of the issue in which her article appeared consisted of a full page of one of the graphics from that article.) Barbara was very busy traveling: she gave an invited colloquium talk at the College of Charleston, an invited talk at the Dispersive Hydrodynamics workshop in Banff, Alberta, Canada, and several other talks at conferences. In addition, Dr. Prinari was a co-organizer of the NEEDS [Nonlinear Evolution Equations and Dynamical Systems] conference, held in Cagliari, Italy, in May.

Closer to home, **the department is very proud to learn that Barbara was selected as the recipient of the 2015 UCCS College of Letters Arts and Sciences Outstanding Research and Creative Works Award.** At the same time, the department wishes Barbara good luck as she begins her three year stint as the UCCS Faculty Assembly President-Elect (Year 1), President (Year 2), and Past-President (Year 3). This is very important work for our campus, we know that Barbara will do a great job at it.

Barbara has been on sabbatical assignment during Fall 2015. She has spent her time in three places: Colorado Springs (see previous paragraph); Buffalo, NY (working with research collaborator Gino Biondini); and Italy (working with research collaborators at various universities, and visiting family).

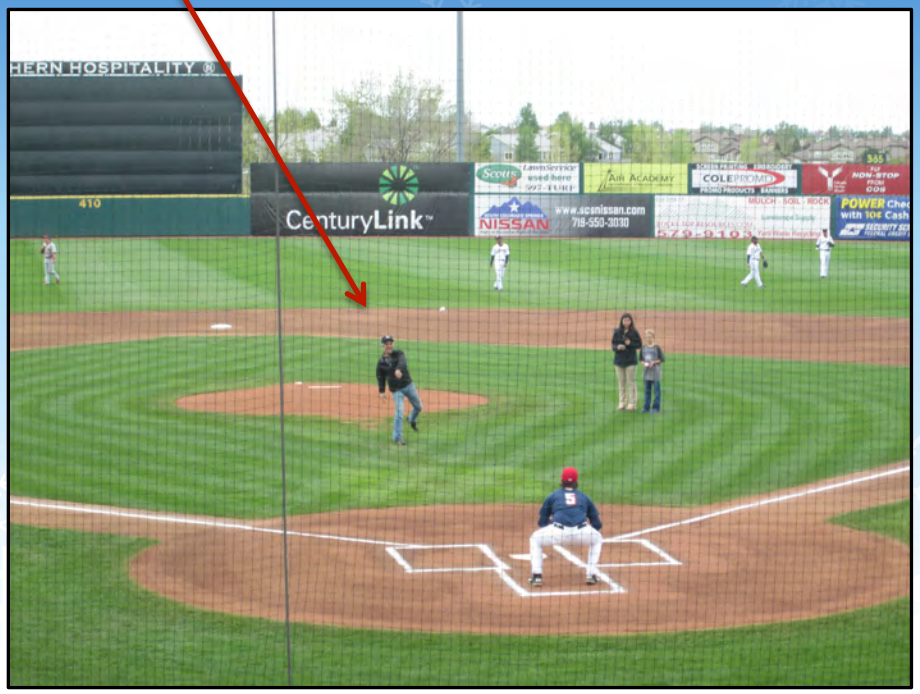
Bob Carlson

Bob Carlson is now into Year Two as Mathematics Department chair, a position he held for a couple of years almost a decade ago. Administrative work seems to have grown in proportion to the student body. Struggles for office space, classroom space, and faculty positions have become both challenging and time consuming. Early in his tenure as chair Bob joked that his job training included watching *Game of Thrones* and rereading Machiavelli's *The Prince*; there was more truth in this humor than one might expect.

One of Bob's major goals as department chair is to encourage the integration of more computing into the mathematics curriculum. Except for teaching (and that is changing too), jobs with significant mathematical content almost always involve computer programming. As part of this project the Mathematics Department was allocated classroom Osborne B213 to be developed into a computer lab. After successfully negotiating with the IT staff about computing equipment, and getting the room rewired for the needed power and communications equipment, the high-tech classroom transformation stumbled over acquisition of mundanely low-tech desks. (But now that a new vendor has been identified, the room transformation is expected to be completed in time for Spring 2016 classes.)

Although Bob spends most of his time on administrative functions and teaching, he is trying to keep his research activities alive. This past summer he submitted a paper which blends three seemingly disparate mathematical topics: groups, graphs, and differential equations. He is also supervising PhD student **Mike Popovich** who is working on a mix of differential equations, complex analysis, and functional analysis.

Gene Abrams



Gene Abrams had a busy and enjoyable 2015. In addition to teaching Math 3130 Linear Algebra and Math 3110 Number Theory (through MathOnline) in Spring, he also taught two sections of Math 1350 Calculus 1 in the Fall. ("I enjoy teaching in general, but I really enjoy teaching Calc 1. I think I've taught about a dozen sections over the last five years.") On the research front, Gene played host to a number of international research visitors, including Gonzalo Aranda Pino and Cristobal Gil Canto (from Spain), and Francesca Mantese and Alberto Tonolo (from Italy). He was one of the instructors at the CIMPA Research School in Turkey at the end of June (as was Ranga; see info in Ranga's profile). It was fun for him to have both his wife and his daughter at that school as well.

One of the highlights of 2015 for Gene happened May, in the context of Sky Sox Math Youth Days. This is a program in which (literally) thousands of 4th through 8th graders get to attend a Sky Sox baseball game on a field trip from school; students are asked math questions related to baseball both in classroom activities prior to the game, and at the game itself. Gene has written the questions for SSMYD for the past ten years. This year he was honored to be asked to throw out a ceremonial first pitch before one of the games. Gene noted: "It was over the plate, and would have been a strike if Andre the Giant had been the batter." Dean Peter Braza attended the game (as a parent chaperone for his daughter's class), and noted that as a lefthander who can throw strikes, Gene might still have a future in the sport, even though he's lost some speed off his fastball.

George Rus

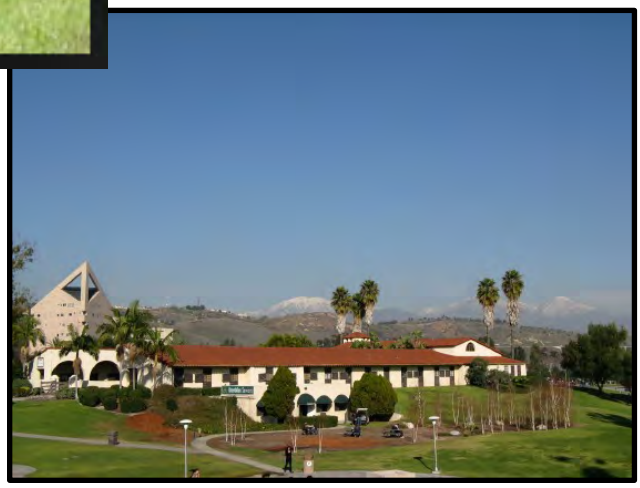
George Rus had a relatively quiet 2015. He taught a wide variety of courses (five, to be exact) over three semesters. Additionally, George continued his work with the Extended Studies Program, teaching courses through *MathOnline*. George also continued collaborating with undergraduate and graduate students.

Greg Morrow

Greg Morrow was on sabbatical assignment during Spring Semester 2015. During this time, he collaborated with our UCCS colleague Greg Oman and Adam Salminen (University of Evansville) on a paper which presents a new take, from the point of view of mathematical logic, of the now-classical *Monty Hall Problem*. Greg M. notes that ".. this project was the brainchild of Greg Oman." (Greg O. notes that "… now I have a G^2 number equal to 1.")

Also during his sabbatical, Morrow wrote a paper extending his recent work on the gambler's ruin problem; this work has some application to lattice path combinatorics. This new paper involves a lot of computation (mainly with *Mathematica*) to make exact algebraic calculations for a mathematically explicit theory of limiting distributions for certain linear combinations of path statistics. He presented this work in August at the 8th International conference on Lattice Path Combinatorics & Applications, held at Cal Poly Pomona (east of Los Angeles; nice place! see photo below). This conference has a long history; its first incarnation was organized by Sri Gopal Mohanty at McMaster U. in 1984. The organizers welcome new contributors like Morrow (a probabilist), even if somewhat mathematically afar (probability is a kind of distant cousin to enumerative combinatorics). However a couple days before his talk there, "… I learned that my old office mate at Texas A&M, who is also a probabilist, had in fact co-organized the 6th incarnation of this conference almost a decade ago, so indeed probability had already come to play a role in this conference series!"

During Summer 2015 Greg taught a new rendition of Chaotic Dynamical Systems, MATH 4250/5250. He extensively employed the *Mathematica* software package in this course to involve students in writing short programs to create graphics, and in making algebraic computations for exercises on the theory. In the fall, Greg took on the role of Math Colloquium chair. He enjoys the stimulating flow of ideas stemming from the talks and the many interesting local, regional, and special invited mathematicians presenting the colloquia. Please drop by the UCCS Math Colloquium! -- http://www.uccs.edu/math/math-events/current-colloquium-series.html



Cal Poly Pomona Campus

Greg Oman

Greg Oman had a very active 2015. On the math front, Greg gave three invited talks: at Ohio State University, the University of South Alabama, and the University of Evansville (Indiana). He had four articles accepted for publication, as well as two "posed problems". Greg also had four of his previously accepted posed problems appear in print during 2015. Try your hand at those! (They are given at the end of the Newsletter, in the *Oman's Offerings* section.) One of the accepted articles was coauthored with at-the-time UCCS undergraduate student Tori Slattum. (Tori is now a graduate student in applied math at CU Boulder.) Another of the accepted articles was co-written with departmental colleague Greg Morrow ("… so my Greg^2 number is 1".)

Greg enjoyed serving as advisor for Luke Harmon on his master's thesis "A set-theoretic foundation of mathematical induction" (M.S. awarded Summer 2015); Luke is now a student in our Ph.D. program, still under Dr. Oman's advisorship. Greg also is advising undergraduate student Ben Griffith on a research project.

Outside of mathematics, in November Greg had a chance to go flying around the Pikes Peak region in a four-seater airplane with frequent-visitor-mathematician-also-licensed-pilot Gonzalo Aranda Pino. Greg also embarked on a new exercise regimen: "Park at Four Diamonds, and walk up the hill to Main Campus". (*Ed's note: Could there be a new wardrobe in Greg's immediate future? Perhaps even a new hairstyle?*)

James Parmenter

James Parmenter continued on much the same trajectory in 2015 as he had in previous academic years, including teaching Calc 1, Calc 2 and the two-semester Calculus with Refresher Precalculus Math 1310/1320 sequence. "My wife and I have been enjoying living downtown." [ed's note: James and Katy moved into a house just north of downtown about 18 months ago.]

Jenny Dorrington

"This has been another busy year for the Math Center," according to Center Director **Jenny Dorrington**. The number of students visiting the center continues to increase, and more sessions have been added to the PASS (formerly SI) schedule. (*ed's note*: PASS = Peer Assisted Study Sessions.) With the growing number of students attending UCCS, there is a growing number of tutors and PASS leaders, which keeps Jenny busy. This October, the Math Center in conjunction with the Math Department hosted its third annual "Math Isn't Scary" Halloween party, drawing over 100 students, faculty, and staff into the center to share food, hot chocolate, and conversation on a Friday afternoon. In April, the center hosted its first Casino Night where students could parlay their Center and PASS attendance into "math bucks," and use them to play various casino games. In addition to fun and games, the Math Center hosted two events for math majors this fall. In September, the first (of hopefully many) "Convergence of Mathematicians" was held, in which faculty and students mingled and shared information about the department and the major. More than 50 people attended. In October, after giving the UCCS Fall Semester Special Lecture in Mathematics, Dr. James Keiser met with math majors in the Center, sharing information on careers in mathematics in general, and his own career path in particular. (See related article below about Dr. Keiser's lecture.) Both major events were very well attended, and were the first in what is planned to be a series of events for math majors hosted jointly by the department and the center.

Along with event planning and tutor-wrangling, Jenny spent her time teaching, working with students in the Center, and working on retention initiatives. The most interesting of these was working with Shannon Michaux as she developed the new College Algebra Math 1040 course under the auspices of the SIP (Strengthening Institutions) grant. At the end of its first semester, Jenny is gathering data for assessment of the new course and looking ahead to the next steps of this initiative to strengthen our College Algebra and Precalculus courses. Personally, Jenny traveled to Alaska over the summer, and finally traveled above the Arctic Circle (having gotten close but not close enough in Iceland last year).

* *Picture above shows Casino Night in the Math Center, April 2015*

Kulumani Rangaswamy

Professor Emeritus **Kulumani Rangaswamy** started the 2015 New Year by watching the amazing fireworks at the Sydney Harbor Bridge in Sydney, Australia. Ranga was in Sydney for a month to do joint research with Professor Roozbeh Hazrat at the Western Sydney University. While in Australia, he took time to tour the Great Barrier Reef. He was enchanted by its beauty, but "also saddened by its gradual degradation due to climate change and pollution". During his Southern Hemisphere trip he also spent two weeks visiting nearby New Zealand. In May, he was invited to give a talk at a conference on graph C*-algebras and Leavitt path algebras held at the University of Southern Louisiana, Lafayette. In July, he gave a course of lectures at the CIMPA Research School on Leavitt path algebras and C*-algebras which was held at the Nesin Mathematics Village in Sirince, Turkey. On the whole, 2015 was academically satisfying for Ranga, especially with the completion of a number of planned research projects.

Meredith Casey

Over the summer **Meredith Casey** earned an Online Teaching Certificate through the UCCS Faculty Resource Center. Meredith also spent a week helping with the in-house training program for our Graduate Teaching Fellows. She is now the course coordinator for Math 1120 (Calculus for Business and Economics), and is in the process of developing a fully online section of that course (it will run for the first time in Spring 2016). Along with Radu Cascaval and Jenny Dorrington, Meredith developed the newly created Introduction to Higher Geometry course Math 3210 for UCCSTeach math students (the course will be offered for the first time next Academic Year). Meredith has been informally chatting with a number of students who are considering adding a math major (roughly once a week she'll have a student who wants to come in and talk about what courses to take, what they can do with a math major, what internships are available, etc.

(*Ed's note: Meredith encourages her students to attend her office hours, and the message gets through in a big way! She will often have upwards of 20 students come to see her; when the numbers swell like that, she moves to her West Wing Office in the EAS Student Lounge.)*

Peter Braza

Letters Arts and Sciences College Dean **Peter Braza** has plenty of administrative tasks on his plate, but still carves out time to teach courses. "My one mathematical raison-d'être now is that I really like teaching Calculus III. The material goes by somewhat fast for the students though, I fear, but there is some neat mathematics and physics applications in there." Peter and Bob Carlson together (with groundwork laid by former chair Greg Morrow) were instrumental in securing a classroom (OSB B213), which is currently being outfitted and will be dedicated to mathematics computation-oriented courses starting in Spring 2016. Peter was also the driving force behind securing a new office for our math instructors.

The University of Iasi, Romania.

Radu Cascaval

Radu Cascaval can't believe another year went by… likely because of all the things that kept him busy in 2015! These included: completing work on a UCCS BioFrontiers Grant; participating in the 8th Congress of Romanian Mathematicians (held at his Alma Mater in Iasi, Romania); giving research talks (at CSU Applied Math); continuing to work with international collaborators; and attending the 32nd Annual Space Symposium (held each year in Colorado Springs; it was Radu's first time to attend). Radu does not recall any dull moments in teaching courses including: Intro to Analysis, Math Modeling, Scientific Computation, "Modern" Analysis. He continues to be very passionate about developing online opportunities for UCCS students, and just completed overseeing a major overhaul of the *MathOnline* lecture capture system.

In Spring 2015 Radu volunteered at three local schools to help bring math "to life" for students, through problem solving challenges such as the Math Kangaroo Challenge (see article, Pg.2). He intends to become a Teacher Liaison for the Space Foundation, in part to bring even more opportunities to the attention of UCCS Math students.

Sarbarish Chakravarty

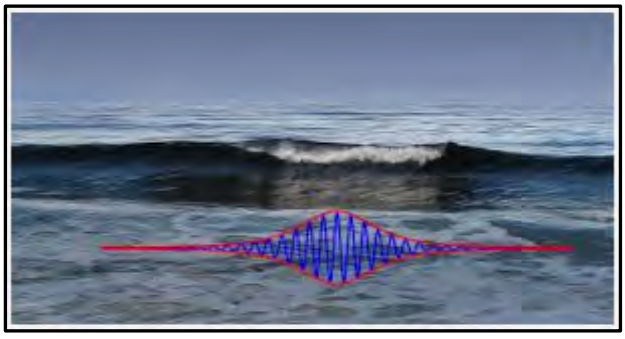
Sarbarish Chakravarty continues to serve as chair of the graduate committee of the math department, as well as conduct research work on nonlinear waves and completely integrable systems. Since summer of 2014 he has been advising undergraduate student **Michelle Osborne** and graduate student **Tommy McDowell.** Michelle and Tommy are working supported in part by Sarby's current National Science Foundation project on the solitary waves of the KP equation and their physical applications.

Michelle was the recipient of a Student-Faculty research award (College of LAS) in 2014-15. She presented her work at the UCCS annual CSURF meeting (April 2015) as well as in several local student conferences including the Rocky Mountain Sectional Meeting of the MAA (Colorado College, April 2015) and the Pikes Peak Regional Undergraduate Mathematics Conference (US Air Force Academy, March 2015).

Tommy presented his work at the SIAM Front Range Student Conference (Denver, Feb 2015), and received a UCCS Graduate Travel Award to the Ninth IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory, University of Georgia, Athens, GA in April, 2015. Michelle also attended the same conference with funding from her LAS research award. Both students presented posters at the Georgia conference.

Shannon Michaux

The Math Department has been fortunate to become one of the participants of a Strengthening Institutions Program grant (through the U.S. Department of Education) that the campus received last year. As part of this grant, **Shannon Michaux** has been investigating methods to help students succeed in College Algebra (Math 1040). Shannon spent part of the summer learning about how to teach to encourage students to develop a growth mindset. After learning about some of these educational theories, she's redesigned a pilot section of College Algebra to test out the new ideas. On another front, in response to campus demand, Shannon has developed an online section of College Algebra that will make its debut in Spring 2016.



Yu Zhang

Yu Zhang continued his research work on the theory of percolation. Specifically, Yu studies the *incipient infinite cluster*. The incipient infinite cluster is used to describe the infinite cluster at the critical temperature. It is well known that the size of this infinite cluster has a fractal dimension 91/48 for the two dimensional percolation. Yu has computed the variance of the cluster, and that the variance is 55/24 for the two dimensional percolation. He gave a talk on this topic to his research colleagues in Beijing this past summer. In addition, Yu is also working on the random walks with a drift on the incipient infinite cluster. Specifically, he has shown that the walks are recurrent. This phenomenon is quite different from the random walks on the two dimensional lattice.

Yu taught the Math 4850/5850 Stochastic Modeling course this past Spring. He enjoyed showing his students the queuing process. He gave them a few real world problems to consider: "they really enjoyed working with those problems".

Zak Mesyan

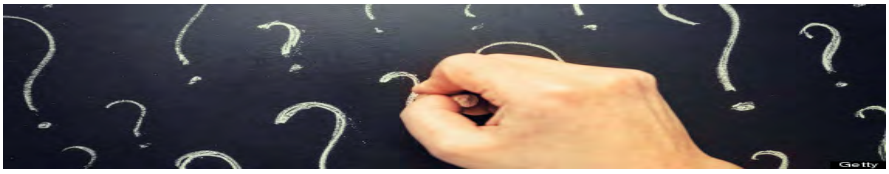
During 2015 **Zak Mesyan** gave invited talks at the University of Dayton (Ohio) and the University of Málaga (Spain). He also started a new research project with Gene Abrams, Gonzalo Aranda Pino, and Chris Smith, which will be completed by the end of the year, and had three other papers accepted for publication. These projects span ring theory, semigroup theory, and linear algebra.

In August Zak became chair of the department's Undergraduate Committee, which has been working on a revision of the math bachelor's degrees. Also, this year, for the first time, Zak supervised a master's thesis (**Ikko Saito**), taught the newly-created Senior Math Seminar (MATH 4040), submitted a grant proposal to the NSF (to fund a conference), and taught a course for the department's *MathOnline* program.

Zak and his wife Maria continued exploring Colorado in 2015, by visiting Durango and Mesa Verde. There they hiked around the amazing cliff dwellings and went horseback riding. This summer Zak also traveled to Africa for the first time. While visiting the University of Málaga, he and Gonzalo Aranda Pino took a (long) weekend off from math to catch a ferry to Morocco. There they drove to Chefchaouene, Fes, Volubilis, and Rabat, before returning to Spain. The border crossing from Spain to Morocco was the longest one Zak has ever experienced, because the border agent could find neither "USA" nor "America" on the list of countries in his computer.

Oman's Offerings

(Here are the Problems, written by Greg Oman, which appeared in various national refereed publications during 2015)



Try your hand at these!!

(1) (Problem #11813, American Mathematical Monthly **122**) Prove or disprove: there exists an uncountable set S and a binary operation * on S such that for any subsets X and Y of S closed under *: either X is a subset of Y or Y is a subset of X.

(2) (Problem #318, Math Horizons **22**) Find all positive integers n and k for which

$$1+3+\ldots+(2n-1) = (2n+1)+\ldots+(2n+(2k-1))$$

(3) (Problem #326, Math Horizons **23**) Find all positive integers n such that the base 10 representation of $1+2+\ldots+n$ consists of all ones.

(4) (Problem #1054, College Mathematics Journal **46**) Let R be the ring of all integer-valued sequences which are ultimately constant, and let S be the ring of all bi-infinite integer-valued sequences which are ultimately constant on both the left and the right (R and S are rings under coordinate-wise addition and multiplication). Are R and S isomorphic?