## SUNY OSWEGO MATHEMATICS DEPARTMENT

# Snygglet

VOLUME 5 • ISSUE 1 • SPRING 2019

## Letter From the Chair



Hello!

Richard S. Shineman Center, Photo by James Kearns

Enough of that. It's time for goodbyes.

Most on my mind as I write this is the impending retirement of Chris Baltus, who inherited the editing reins of the Snygglet from Jim Burling in 1997. Do I dare to even get started listing all the roles Chris has played in our department? The range of courses he has taught is astonishing. Chris has worked diligently supporting students majoring in education with concentration in math. He has also been responsible for getting the bulk of our program assessment work completed and reported. He was our department chair from 2011 - 2016. Chris is a committed, thoughtful and caring instructor, a strong representative for math and our department, and a solid researcher and historian of math. On many winter days he's Oswego's lone bicyclist! I have no idea how we will fill all his roles. Chris and Banna will relocate to Poughkeepsie later this year. I wish them the best.

Linda Lefevre also leaves us at the end of the semester. Since 1997 Linda has provided strong instruction and leadership in MAT 102 and MAT 106, as well as taking on a huge role on campus in student life. Since 2012, she has been the coordinator of the First-Year Residential Experience Program in Johnson Hall. This program supports firstyear students in their transition from high school to college. Since 2013, she has also coordinated a "Conversation Partner" program that pairs international students with native English speakers so the internationals can get practice with their conversational English. Her immediate plans include helping daughter Joanna plan for her

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mid-August wedding and getting her house ready to sell. Linda will eventually move to Washington state to be near her dad. I wish her the best.

Since the prior Snygglet there have been other departures: three retirements following the 2017 – 18 year.

- Zohra Manseur returned to Algeria to assist with family there. She regularly visits her children and grandchildren in the U.S.
- Terry Tiballi followed Maggie's retirement by a year; they now reside in Rochester and spend a considerable amount of time helping daughter Mary out with two grandchildren. The Tiballis are still seen frequently in Oswego.
- Mark Elmer continues to reside in Fair Haven, spending time with his son Jeffrey as well as indulging in his new passion, bird watching. After some surgery he is back on a bicycle, and reading more than ever.

(More details are found elsewhere in this newsletter.) These are significant losses for the department. I urge you to read further into this newsletter, where you will learn about some of the terrific replacements we now have on staff. After a long period of very limited turnover, my term as chair has been dominated by hiring. Working with a number of colleagues to recruit new faculty has been especially rewarding. This year we hired two more people to the tenure track, raising our count from 15 to 16: Jeff Slye (emphasis in Math Education), and Zoë Misciewicz (Math History; Zoë will also run our gateway-to-calculus courses).

I encourage you to visit. (Why not make it Quest Day? This year's math talks were exceptional.) Even fairly recent graduates are struck by the rapid change in personnel. Our department is bursting with energy and new ideas. The future looks bright. Soon there will be a Statistics major!

And if you cannot make it to Oswego soon, please drop me a line. Let us know what you are up to; feel free to share some stories about your time here. I look forward to hearing from you.

(If anyone has Vol I No 4 of the Snygglet - please get me a copy. Xerox or scan or snap it with your phone - whatever. I believe I have the rest of the collection intact, with aims to get it all online soon.)

# Meet Our New Faculty 2017–2019



New Faculty 2017 - 2019. Left to Right: Dr. Dan Kraus, Jessalyn Bolkema, Zheng Hao.

# Meet New Faculty: Dr. Dan Kraus

In fall 2018, Dr. Dan Kraus became an Assistant Professor at SUNY Oswego, after earning his doctorate at the University at Buffalo (SUNY) in 2014. Dr. Kraus studies nonlinear waves, an area the combines his interests in linear algebra and complex analysis with differential equation expertise while allowing him to tackle analogues of Fourier transforms for nonlinear equations.

Dr. Kraus started to realize his appreciation for and ability in mathematics in middle school. In fifth grade, his school decided to cancel advanced mathematics classes so young Dr. Kraus transferred to a new school that would offer more challenging coursework. The result was that he had to catch up with classmates in the new school but this challenging situation drove Dr. Kraus to work hard and earn success in his classes, and then realize the enjoyment and satisfaction in doing mathematics well.

Throughout high school, college, and graduate school, Dr. Kraus also found enjoyment in tutoring mathematics and teaching others. It was moments like finding himself tutoring complex analysis as an undergraduate, while being a student in complex analysis, that led Dr. Kraus to realize his potential as a teacher. And according to his students at SUNY Oswego, Dr. Kraus is a quietly enthusiastic, detail-oriented, and welcoming instructor who works tirelessly to reach all of his students.

# Meet New Faculty: Zheng Hao

Zheng comes to Oswego after teaching two years at South Dakota State. His undergraduate work was at the prestigious Peking University. He claims he was admitted to Peking University because he earned third prize in the China Mathematics Olympiad, for high school students. At Peking University, he earned bachelor degrees in both Statistics and in Economics. When he came to the US for his doctorate in mathematics, at Kansas State University, he chose to work in partial differential equations, without abandoning his interest in statistics. Thus, in Fall 2018, he taught courses in both differential equations and introductory statistics, and his most recent paper is a statistical study of the effectiveness of health awareness events. Outside of the college, he and his wife care for their two-year old son, and he has a serious interest in archery and table tennis.

Written by C. Baltus

# Meet New Faculty: John Myers and Jessalyn Bolkema

A photo of John Myers can be found on page 4, "The December 2018 Oswego Putnam team."

John Myers joined us in August of 2017; Jessalyn Bolkema a year later. John and Jess both earned PhDs at the University of Nebraska – Lincoln. Their research interests are mutually exclusive! John: applications of homological algebra to ring theory, with emphasis on free and projective resolutions, Ext-algebras, Poincaré-Betti series, and Koszul algebras. Jess: coding theory, applied combinatorics and graph theory, applied algebraic geometry, and undergraduate math education.

There are hundreds of universities offering PhDs in mathematics; perhaps it's not too unusual for a department the size of ours to have a pair of people out of the same program - but five? Yes: we have five such pairs among the tenure stream faculty. After the Nebraska duo we have: Penn State (Halpin and Preston); Kansas State (Mosbo and Hao); Buffalo (Baker and Kraus); and Kentucky (Nanthakumar and Slye). What's the probability of that?

John grew up in Rapid City, North Dakota. He attended Steve Reyner's alma mater, the South Dakota School of Mines and Technology, majoring in Math with a minor in Physics. He then moved to Lincoln, Nebraska to attend graduate school, where we fell in love with commutative algebra and teaching . John has taught a good deal of calculus for us already - his favorite is Calc III - as well as abstract algebra and (currently) a course in ring theory.

## **Meet New Faculty:** Indu Rasika Churchill

Indu Rasika Churchill joined the mathematics department at Oswego in Fall 2017. She moved to SUNY Oswego from the University of South Florida in Tampa, Florida, where she obtained her Master's and Ph. D. degrees. Her Ph. D. thesis is about Quandles, a subfield of Knot Theory and Topology.

Rasika is originally from Sri Lanka, and came to Florida in 2012. She completed her Bachelor's degree, and taught at University of Kelaniya, Sri Lanka, before moving to the US. In 2016, she married a fellow graduate student in mathematics, Gregory Churchill. Fortunately for us, the Churchills love Oswego, particularly its weather! We hope the youngest member of the family, 11-month old Joel Churchill will endorse his parents' views on this matter! The Churchills love to cook, and have people get together over food. We expect the entire math department will benefit from this hobby. Jess is from Flushing MI (near Flint) and did her undergraduate work at another lake (Michigan) effect school – Hope College – majoring in Math and minoring in French. After attending a summer REU (Research Experience for Undergraduates), Jess presented at the Nebraska Conference for Undergraduate Women in Mathematics (our Juliann Geraci – under John's advisement – took part this year). She enjoyed NCUWM so much, she decided to go to graduate school at Nebraska, where she was introduced to coding theory. In this, Jess's first year, she has taught Calcs I & II. Jess's diversification will begin next year, starting with an assignment in Discrete Math.

John's wife Megan (a Penn Stater!) works in development at Syracuse University. She also coaches the Oswego Laker (age group) swimming team; Megan competed in the 2004 U.S. Olympic Trials. Jess's husband (Kyle) is an Organic Materials Chemist (PhD, UC Irvine). Jess and Kyle enjoy traveling, hiking, touring New York, and have visited a number of national parks.

I am pleased to have Jess and John join an already exceptional faculty. Along with our other new faculty, their new ideas, enthusiasm and energy has certainly inspired me to try new things in the classroom. Their work here has already been noted across the campus, and – I hope – will continue to be for some years.



New Faculty 2017 - 2019. Indu Rasika Churchill and her family.

# Student Activity 2018-2019



The students sat for the William Lowell Putnam Mathematical Competition sponsored by the Mathematical Association of America. The competition consists of 12 mathematical problems; working individually the students spend two 3-hour sessions solving these problems. The problems are challenging; most years the median score is a 0, meaning more than 50% of the students who participate in the competition score no points. Our five students scored a total of 18 points this year, with four of the five earning positive scores. All five students deserve recognition for the time they spent preparing for the exam in the problem-solving club and the time they dedicated to taking the exam.

The December 2018 Oswego Putnam team. Left to Right: Kyler Anderson, Ryan Gelnett, Benjamin Groman, Juliann Geraci, Sarah Hanusch (faculty coach), John Meyers (faculty coach), Hyunjin Yi.



Students at the Fall 2018 meeting of the Seaway Section of the Mathematical Association of America. Left to right: Marquia Williams, Professor Elizabeth Wilcox, Ryan Gelnett, Juliann Geraci, Kyler Anderson, Leilani Leslie, Instructor Amy Hannahan (class of 2016)



Kenny Roffo '17 Information from B. Rae Perryman, Pall Times

2017 grad Kenny Roffo, from Phoenix, NY. His work as a software engineer at NASA's JPL (Jet Propulsion Lab) landed on Mars in November 2018, on the Insight Mars Lander. In an interview with Perryman, of the Pall Times, he cited his work with physics Professor Shashi Kanbur. He said he had great memories of his time at SUNY Oswego. "If I had to pick just one thing, though, it would have to be Math Club."



Professor Ampalavanar Nanthakumar

Professor Ampalavanar Nanthakumar received a 2018 President's Award for Scholarly and Creative Activity. He works in applied statistics, mentoring many students over more than 20 years at SUNY Oswego, collaborating with colleagues throughout the world in building an impressive resume of papers and presentations. His students have gone on to graduate programs around the US. Former student Erika Wilson, a doctoral candidate in biostatistics at the University of Rochester, wrote, "I owe the majority of the accomplishments listed on my resume to Dr. Nanthakumar."

## **Retirees** 2018



Zohra Manseur. She wrote, "I am very busy changing Algeria and protesting for a total change of government."



Terry Tiballi, on the trail of his beloved Beatles.



Mark Elmer, photo from summer Lunch Club.

# New Snyglett Problems 2019

- 1. Split the grid into regions, including empty squares, so that:
- (a) All regions have the same number of squares.
- (b) All regions have the same sum of numbers inside. A Region is a connected set of squares, where two square are connected if they share a side.

Submitted by student Marquia Williams

2	3			1	
			2	5	4
	5	2			
4			4		2
	1		3		
	1				
1	2		3		4

2. See if you can find a solution to each of these Ken-Ken puzzles and show that your answer is the only answer? *Submitted by student Marquia Williams* 

Rules for Ken-Ken

- (a) For an n-by-n Ken-Ken grid, each row and each column is to have the numbers 1, 2, ... , n, without repetition.
- (b) The heavily outlined areas are called cages. The top left corner has the target number and the operation.
- (c) The numbers placed in the cells of a cage must combine, in some order, to produce the target number using the given operation.
- (d) A cage with one square is to be filled with the given number.

7+		12x	
	6x		
4+	7÷		1-

12+	1-		24x	
		2-	1	
2x			11+	
3-	60x			3
		10x		

3. In this game, two players take turns removing stones from a pile that begins with *n* stones. The player who takes the last stone wins. A player removes either one stone or *p* stones, where *p* is a prime dividing the number of stones in the pile at the start of the turn. For which n does the First Player have a winning strategy? *Created by Robert Exner* 

[A winning strategy for the First Player means a plan whereby the First Player is guaranteed to win no matter how wisely the Second Player plays.]

- 4. We work in radians. For positive integer *n*, we set *x* to be the complex number  $x = cos(\frac{2\Pi}{n}) + i sin(\frac{2\Pi}{n})$ . It may help to recall DeMoivre's Theorem:  $x^k = cos(\frac{2k\Pi}{n}) + i sin(\frac{2k\Pi}{n})$ .
- (a) Show  $x + x^2 + x^3 + x^4 + ... + x^{n-1} = -1$ .
- (b) For odd positive *n* greater than 2, show  $\cos\left(\frac{2\Pi}{n}\right) + \cos\left(3 \cdot \frac{2\Pi}{n}\right) + \cos\left(5 \cdot \frac{2\Pi}{n}\right) + \dots + \cos\left(n-2\right)\frac{2\Pi}{n} = -\frac{1}{2}.$

# Student Activity 2018–2019













- 1. May 2019 Graduates Amelia DeJarnette (left) and Kasey Fuller (right)
- 2. Jon Backus At his capstone presentation, May 2018
- **3. Erin Green** At her capstone presentation, May 2018. With Professor Christopher Baltus.
- 4. Students Jill Burns, Kyler Anderson, Vaughn Coleman, and Lisa laccarino, Pictured after their capstone presentations, December 2018.
- 5. Game Night Organized by the Math Club, 2018. Clockwise: Rachel Lee, Darryl Webber, Andrew Smith, Omari Fabor, Jacob Conklin.



- 6. Student Marquia Williams, with Casey Towne (2002), Director of the Math and Science Learning Center, and Scott Preston, Chair of the Mathematics Department.
- 7. Students working toward actuarial exams, in a session with Dr. Ampalavanar Nanthakumar. Responding to numerous requests from students for a class to prepare them for the actuarial exams, Professor Nanthakumar worked with a group of ten students, on an Independent Study basis, in Spring 2019. Clockwise order for those sitting around the table: Victoria Nguyen, Ashler Herrick, Olivia Peel, Karl Mosbo, Jonathan Edwards, Kamani Marchant, and Kevon Cambridge. In the foreground facing camera: Darryl Gomez-Lewis.

## 2017 Snygglet Problem Solutions

**Problem 1.** A casino invents a new game that works like this: The casino draws random numbers between 0 and 1, from a uniform distribution (all values between 0 and 1 are equally "likely"). It adds them together until their sum is greater than 1, at which time it stops drawing new numbers. You get a payout of \$100 each time a new number is drawn.

For example, suppose the casino draws 0.4 and then 0.7. Since the sum is greater than 1, it will stop after these two draws, and

you receive \$200. If instead it draws 0.2, 0.3, 0.3, and then 0.6, it will stop after the fourth draw and you will receive \$400. How much would you pay to play this game (repeatedly)? Should you play for a \$250 entrance fee? Specifically: what is the expected value of your winnings?

[The elegant, pencil-and-paper solution is preferred over a brutal, cold, silicon ones. Try to keep your computers holstered for this one.]

ANSWER: The expected value of winnings is e times \$100, about \$272. So paying \$250 is wise.

Why? For  $0 \le k \le 1$ , the probability that the first two numbers are, in total, less than k is  $\int_0^k (k-x) dx = k^2 - \frac{k^2}{2} = \frac{k^2}{2}$ . This is because for x values in an interval of length  $\Delta x$ , centered at x, the chance that the next number is < k - x is k - x. By the integral, we sum over all x values in interval [0, k]. This mean that the probability that the first two numbers exceed 1, in total, is  $1 - \frac{1}{2} = \frac{1}{2}$ , and the probability of winning exactly \$200 is  $\frac{1}{2}$ .

Next, the probability that the first three numbers are, in total, < k is  $\int_{0}^{k} \frac{(k-x)^{2}}{2} dx = \frac{(k-x)^{3}}{6} \Big|_{x=0}^{x=k} = \frac{k^{3}}{6}$ . Why? Again, for x values in an interval of length  $\Delta x$ , centered at x, the chance that the next two numbers, in total, are <k-x is  $\frac{(k-x)^{2}}{2}$ . By the integral, we sum over all x values in interval [0, k]. So the probability of winning exactly \$300 is  $\frac{1}{2} - \frac{1}{6} = \frac{1}{3}$ . Continuing in this way, the chance that the first four numbers are, in total, < 1 is  $\int_{0}^{k} \frac{(k-x)^{3}}{6} dx = \frac{(k-x)^{4}}{24}$ . So the probability of winning at least \$500 is 1/24, and the probability of winning exactly \$400 is  $\frac{1}{6} - \frac{1}{24} = \frac{1}{8}$ . The pattern that emerges is that the expected winnings are \$100 ( $\frac{1}{2} \cdot 2 + \frac{1}{3} \cdot 3 + \frac{1}{8} \cdot 4 + \frac{1}{30} \cdot 5 + \cdots$ ) = \$100 e.

**Problem 2.** In 101 Snygg there were 100 seats. (Despite appeals made to Buildings & Grounds, no one ever labeled them. But ...) Let's suppose the seats are numbered 1, 2, ..., 100. A nasty stats professor insists on a seating chart for his 100 enrolled students. Students line up at the entrance in random order. However, the first person to enter is preoccupied with Facebook and a Twitter feed, and just sits in a random seat, without even looking at the seat assignment. Each subsequent student sits in his or her own assigned seat if it's empty, but sits in a random open seat if the assigned seat is occupied. What is the probability that you, the last = 100th\* student to enter, find your seat unoccupied?

## **ANSWER:** $\frac{1}{2}$

Why? Let there be n students – student #1, student #2, etc. with corresponding assigned seats 1, 2, ..., n. Let  $P_n$  be the probability that for n students with n assigned seats, the last student will take the correct seat. We see that  $P_2 = \frac{1}{2}$ .

Let's look at the case n = 7. If student #1, the distracted student, picks seat 1, that all students, including the last one, take their correct seats. Now suppose student #1 picks seat 4. Then students #2 and #3 take their correct seats. Student #4 is to choose at random from seats 1, 5, 6, 7. If student #4 selects seat 1, then all remaining students, including the last one, take their correct seats. And if student #4 selects another seat, we see we are in the same situation as that facing student #1. We find  $P_7$ , then, by adding probabilities in the six cases: student #1 selects seat 1, student #1 selects seat 2, ..., student #1 selects seat 6 where each case occurs with probability  $\frac{1}{7}$ . This means  $P_7 = \frac{1}{7} (1 + P_2 + P_3 + P_4 + ... + P_6)$ . In general,  $P_n = \frac{1}{7} (1 + P_2 + P_3 + ... + P_{n-1})$ . With  $P_2 = \frac{1}{2}$ , we see that  $P_3 = \frac{1}{3} (1 + P_2) = \frac{1}{2}$ .

## **Problem 3.** Find the value of $(\cos 1^\circ)^2 + (\cos 2^\circ)^2 + (\cos 3^\circ)^2 + ... + (\cos 90^\circ)^2$ ? **ANSWER:** 44.5.

**Note:** that  $\sin(90-k) = \cos k$ . So our sum is  $(\cos 1^{\circ})^2 + (\cos 2^{\circ})^2 + (\cos 3^{\circ})^2 + (\cos 4^{\circ})^2 + ... + (\sin 4^{\circ})^2 + (\sin 3^{\circ})^2 + (\sin 2^{\circ})^2 + (\sin 1^{\circ})^2 + (\sin 2^{\circ})^2 + (\sin 2^{$ 



# Math Graduates 2017-2019

#### August 2017

Emily Rose Popple, Eden, NY, Adolescence Education 7-12 Math BS, Mathematics BA

Nicholas Roy, Rutland, VT, Applied Math Economics BS

## December 2017

Stephanie Arnold, Mexico, NY, Mathematics BA Alena Ruth Frasch, Oswego, NY, Childhood Education 1-6 Math BS Austin Haskins, Fulton, NY, Mathematics BA Niklas Hesse, Stonybrook, NY, Applied Math Economics BS Hye Jin Hwang, Busan, South Korea, Applied Mathematics BS Seth Matthews, Liverpool, NY, Applied Mathematics BS Tila Neopane, Liverpool, NY, Adolescence Education 7-12 Math BS, Mathematics BA

Samantha Scott, Parksville, NY, Childhood Education 1-6 Math BS

## May 2018

Jonathan Backus, Fulton, NY, Mathematics BA Daisie Jane Bancroft, Buffalo, NY, Applied Math Economics BS James Boise, Sodus, NY, Mathematics BA Patrick Caracci, Smallwood, NY, Mathematics BA Erin Green, East Syracuse, NY, Adolescence Education 7-12 Math BS, Mathematics BA Salman Kabir, Jamaica, NY, Mathematics BA Joshua Leonard, Syracuse, NY, Applied Mathematics BS Rachel Piazza, Buffalo, NY, Childhood Education 1-6 Math BS

Bernadette Rice, Red Creek, NY, Mathematics BA Kaylee Spack, Camillus, NY, Childhood Education 1-6 Math BS Sabrina Tomassetti, Massapequa Park, NY, Mathematics BA Teresa Tsang, Brooklyn, NY, Adolescence Education 7-12 Math BS Austin Votypka, Wayland, NY, Mathematics BA

### August 2018

Brianna Muncy, Copenhagen, NY, Applied Math Economics BS Joseph Toomey, Ballston Spa, NY, Applied Mathematics BS

#### December 2018

Jill Burns, Johnson City, NY, Adolescence Education 7-12 Math BS, Mathematics BA

Lisa laccarino, Monroe, NY, Adolescence Education 7-12 Math BS, Mathematics BA

Min Koo, Flushing , NY, Applied Math Economics BS Kerry Kosiur, Schenectady, NY, Applied Math Economics BS Kevin Mahon, Warwick, NY, Childhood Education 1-6 Math BS Brian McCabe, Port Washington, NY, Adolescence Education 7-12 Math BS, Mathematics BA

Jake Sauter, Hopewell Junction, NY, Applied Mathematics BS John Zalewski, Mexico, NY, Mathematics BA

## May 2019

Kyler Anderson, Poughkeepsie, NY, Mathematics BA Elizabeth Andrews, Staten Island, NY, Mathematics BA Ashly Arbizu, South Huntington, NY, Applied Math Economics BS and Applied Statistics minor Kaylee Baldwin, Oswego, NY, Adolescence Education 7-12 Math BS, Mathematics BA Maria Barinova, Brooklyn, NY, Mathematics BA Bernard Brighton, Evans Mills, NY, Applied Statistics minor Ivana Citera, Poughkeepsie, NY, Applied Mathematics BS and Applied Statistics minor Jonathan De Freitas, East Syracuse, NY, Mathematics BA Amelia DeJarnette, Valatie, NY, Childhood Education 1-6 Math BS Ellyse Ducayne, Seneca Falls, NY, Applied Statistics minor Olivia Fitzwater, Bath, NY, Applied Statistics minor Alaura Francis, Baldwinsville, NY, Adolescence Education 7-12 Math BS, Mathematics BA Kasey Fuller, Calcium, NY, Childhood Education 1-6 Math BS Meghan Galuppi, Liverpool, NY, Adolescence Education 7-12 Math BS, Mathematics BA Darryl Gomez-Lewis, Brooklyn, NY, Mathematics BA Rachel Lee, North Haledon, NJ, Adolescence Education 7-12 Math BS, Mathematics BA Junwei Lu, Yunnan, China, Applied Mathematics BS Joseph McGee, Valley Stream, NY, Adolescence Education 7-12 Math BS, Mathematics BA Victoria Nguyen, Syracuse, NY, Mathematics BA and Applied Statistics minor Kevin Schluter, New York, NY, Applied Statistics minor Andrew Sommer, Whitestone, NY, Applied Statistics minor Anna Stephens, Liverpool, NY, Applied Statistics minor Nicole de Beaumont, Saugerties, NY, Adolescence Education 7-12 Math BS



The Department of Mathematics 398 Shineman Center • Oswego, NY 13126 315.312.3030 • oswego.edu/mathematics