Oberlin College Mathematics Department Newsletter
Spring 2016

Faculty News

We are excited to welcome three new department members in the fall: Kevin Gerstle, Benjamin Linowitz, and Nicolas Petit.

Kevin Gerstle is finishing up his Ph.D. at the University of Iowa. His research is in algebra and representation theory. Kevin earned his Bachelor's Degree at Kenyon College in nearby Gambier, Ohio. Originally from Kentucky, Kevin is an avid hiker and reader.

Benjamin Linowitz is a new Assistant Professor of Mathematics. He earned his Ph.D. from Dartmouth College in 2012 and then spent the last several years at the University of Michigan as an NSF postdoctoral fellow. His research is in spectral geometry and algebraic number theory. In his free time, Ben enjoys traveling and running – he recently ran the Cleveland Marathon!

Nicolas Petit is finishing up his Ph.D. at Dartmouth College. His research is in knot theory (a branch of topology). Originally from Italy, Nicolas enjoys movies, operas and live music, and cooking.

We also welcomed one new department member during the 2015-2016 academic year: **Colin Dawson** came to Oberlin from the University of Arizona, where he earned Ph.D.s (plural!) in Statistics and Cognitive Psychology. He attended Yale University as an undergraduate, where he majored in Cognitive Science and sang with the Whiffenpoofs.

Faculty Updates

Bob Bosch's highlights included hosting Dr. Laura Albert McLay of University of Wisconsin as Oberlin's 2015-16 Distinguished Visitor and Fuzzy Vance Lecturer; supervising the honors projects of Julia Olivieri (who is headed to Stanford) and Zhifu Xiao (who is headed to Columbia); giving a Math Encounters lecture entitled "Life is Beautiful: The Startling Consequences of Three Simple Rules" at the National Museum of Mathematics (MoMath) in New York; and being involved in the design of a numerically balanced 120-sided die with The Dice Lab's Robert Fathauer and Henry Segerman, a project that received considerable attention in the press, including a New Yorker article titled "The Dice You Never Knew You Needed."

Jack Calcut is supervising an honors student (David Myers, '17) on category theory. He had three papers appear: a joint paper on 3-manifolds, a paper on polygons in hyperbolic space, and a paper with his previous honors student (Jules Metcalf-Burton, '15) on knot theory. Jack was the recipient of an Excellence in Teaching Award from Oberlin College. He organized and ran the mathematics table for a STEM night for elementary school students. He also enjoyed coaching two fifth grade teams (four girls and four boys) for a math competition held by the Greater Cleveland Council of Teachers in Mathematics.

Susan Colley had a busy summer in 2015. For three weeks, she attended the Undergraduate Faculty Program portion of the Institute for Advanced Study/Park City Mathematics Institute in Utah, followed immediately by a week at the American Mathematical Society's Summer Research Institute in Algebraic Geometry at the University of Utah in Salt Lake City. Otherwise, her big news is that she is now Editor-Elect (and, beginning in 2017, will be Editor-in-Chief) of *The American Mathematical Monthly*. During her terms as Editor-Elect an Editor, she is and will be teaching less. Susan reports that she has already learned many new skills, including speed reading and diplomacy, and much new mathematics.

Colin Dawson published a paper, "Bayesian Inference of Recursive Sequences of Group Activities from Tracks" in the proceedings of the Association for the Advancement of Artificial Intelligence (AAAI), which he presented at the annual AAAI conference in Phoenix. He will continue work on this project this summer with rising junior Chaofan (Bill) Huang. He is working with researchers at the Universities of Arizona and Illinois to develop a computer system that will learn from data to do jazz improvisation with a human performer, as part of a DARPA grant. Informally known to the PIs as "Weaponized Jazz," the project has the distinction of being on Sen. John McCain's list of wasteful government spending programs. As a member of the "Red '15" cohort of Project NExT, Colin attended Math Fest and JMM, where he learned a lot about active learning methods, several of which he incorporated in his statistics courses at Oberlin. He has obtained a curriculum development grant from the Howard Hughes Medical Institute to design a new course in Machine Learning, which will be offered for the first time in Spring 2017.

Kay Knight is a proud grandmother to grandson Liam Knight!

Chris Marx wrote a paper with two former students capturing delocalization effects in crystals induced by the presence of magnetic fields; the work is to appear in the Journal of Spectral theory. He also submitted a paper jointly with Artur Avila and Svetlana Jitomirskaya, which proves a problem posed in 1950 by Erdős and Szekers. Chris had the pleasure of working with his first honors student, Omar Hurtado, who graduated in 2016 with high honors. Together with May Mei of Denison University, Chris received a grant from the Great Lakes Colleges Association (GLCA) and the Oberlin teaching grant; the grants will help fund a summer workshop on Analysis at the Liberal Arts taking place in July 2016. One goal of the workshop is to launch an Analysis webinar for students which will be run in 2016-17 with participants from six GLCA schools. The webinar intends to enhance the existing introductory course to Analysis (at Oberlin Math 301) by engaging students in interesting Analysis problems and demonstrating the area's rich connections to other fields of mathematics and the sciences.

Lola Thompson recently co-authored a paper, "On integers n for which $x^n - 1$ has a divisor of every degree," with Carl Pomerance and Andreas Weingartner. She also published two papers related to the famous twin prime conjecture. On the teaching side, Lola has continued to develop inquiry-based courses in mathematics, including a new inquiry-based Discrete Mathematics course. She had a blast designing and facilitating a cryptography scavenger hunt in her Number Theory course this spring! Lola received grants from the Max Planck Institute for Mathematics and the Mathematical Sciences Research Institute to support her research during her upcoming sabbatical year.

Jim Walsh continues to thoroughly enjoy working on problems lying in the intersection of mathematics and climate modeling. He had three publications appear this academic year, two on research and one on incorporating climate modeling in a differential equations course. One of the aforementioned research papers was co-authored with former student Chris Rackauckas ('13). Jim gave four talks outside of Oberlin during this academic year, including an invited talk at the MPE 2013+ Workshop, and another talk at the Joint Mathematics Meetings. He has been awarded Research Status for the 2016-17 academic year to continue research in the mathematical modeling of climate.

Elizabeth Wilmer has had a busy year as the Mathematics Department Chair!

Jeff Witmer joined Colin Dawson in developing a new version of STAT 113 (intro stat) that was built on randomization methods (permutation tests and bootstrap confidence intervals). His paper "Concept maps in introductory statistics" appeared in Teaching Statistics and his paper "How much do minority lives matter?" which uses racial data from the justice system to illustrate Simpson's Paradox appeared in the Journal of Statistics Education.

Kevin Woods traveled to Bogotá, Colombia to visit Tristram Bogart ('01) and another colleague at the Universidad de los Andes. They are currently collaborating on a research project. Kevin published the paper "The parametric Frobenius problem" (with Bjarke Hammersholt Roune) in the Electronic Journal of Combinatorics. He has also enjoyed developing an inquiry-based version of the upper-level Probability course.

Robert Young continues to do research for a textbook on "Infinity." By the end of the first year he reached the number 2; by the end of the second year he was at 4; and, at the end of the third year, 6. Dismayed by what appeared to be an obvious progression, he decided to start afresh and begin at the other end. On a lighter note, "Boxing Day: A Problem for all Seasons," will appear right before Xmas in The Mathematical Gazette.

Student News

Honors Students. This year, four Oberlin students wrote Honors theses in mathematics:

- **Omar Hurtado** worked under the direction of Chris Marx. His thesis is titled "The spectral theory of bounded operators."
- **Julia Olivieri** worked under the direction of Bob Bosch. Her thesis is titled "Drawing DNA sequence networks."
- **Moeez Syed** worked under the direction of Elizabeth Wilmer. His thesis is titled "Fundamentals of computability theory."
- **Zhifu Xiao** worked under the direction of Bob Bosch. His thesis is titled "The world of optimization."

Student Awards. Several of our mathematics majors were recognized for their outstanding academic achievements. Julia Olivieri was this year's Rebecca C. Orr Memorial Prize winner. Omar Hurtado and Alex Sutherland were awarded the Edward T. Wong Prize. The John D. Baum prize was awarded to Canran Ji ("Polo") in recognition of his strong performance on the 2015 Putnam Exam.

Department Activities

The Math Department hosted three high-profile speakers who delivered our annual named lectures:

Laura Albert McLay (University of Wisconsin) was this year's Distinguished Visitor. She gave a series of guest lectures in Bob Bosch's Optimization class and gave the Fuzzy Vance public lecture on "Locating and Dispatching Ambulances Using Discrete Optimization Methodologies."

Mihai Stoiciu (Williams College) gave the Lenora Young Lecture on "Zeros and Eigenvalues on the Unit Circle: An Investigation of Random Orthogonal Polynomials and Their Associated Random Unitary Matrices."

Daniel Krashen (University of Georgia) was this year's Honors Examiner. In addition to probing the depths of our honors students' mathematical knowledge, he gave a talk entitled "The many lives of Quaternion algebras."

Alumni Updates

Joyce Palmer, '44 I am using my mathematical analysis in playing decent level duplicate bridge. Its great fun! Also, it is available for the handicapped, which I am by now.

Margaret Maxfield, '47 I turned 90 in February, and I am not so prolific as stronger mathematicians, but I try to make use of what I do know: for instance, an idea to help Kindergartners and First graders learn our counting system. The idea is to use the excellent one in Chinese, which is really in 10s, nothing dumb like French "4 twenties" for 80. Using our own 10 digits, get to 8, 9, then 10 [or "ten"]. Then, 10-1, 10-2, 10-3, . . . 10-9, two-10 [for our 20]. Then two-10 1, two-10 2, . . . two-10 9, three-10, etc. , to nine-10 9 , ten 10, or one hundred. Let students connect this with kindergarten sets of small cubes for units, strips of 10 cubes for tens, "floors" [areas] of 10 strips side-by-side for hundreds. A great many adults cannot read any graphs! Give young children some of the excellent maps for our national parks, showing symbols for rest rooms, water fountains, etc. for hikers. Children [and parents] quickly learn the symbols for the various conveniences, so that they are not at first stuck worrying about numbers. Hikers can also read the amount of walking from one place to another, fitting in nicely to practical values of arithmetic in graphing. From arithmetic textbooks from the early 18-hundreds [from my grandmother's collection] I have recorded some of the early terms of measurement used for various commodities. In the early days, as we were just turning into a country, storekeepers had to work with such foreign currencies as "pieces of eight," "shillings and pence," etc., so making change was no easy matter. I do quite a lot of proofreading. Somehow, those of the computer generation [including adults] are careless about singular-vs-plural, and write mis-matched subjects and predicates. I am happy that I do not receive notes from Oberlin offices beginning, "As a loyal payer toward our cause, we . . . hope you will kick in again." Not all other college offices are free from this kind of error, and try reading the advice on the side-mount mirror in your car. What a mess! Translated from Japanese badly? I wish my output showed some real math from time to time, but I rejoice in what I CAN enjoy. I'd be interested in your [or maybe your grandchildren's] reactions.

David Kraines, '62 After 45 years at Duke, I will become emeritus (finally exposed as out of merit) this summer. Although I will have a major reduction in teaching and a total reduction in salary, I expect to continue to Segway regularly to my office and act as faculty advisor of our math club, director of the undergrad math research program, and coordinator of undergraduate math competitions for the indefinite future.

Charles Wells, '62 My wife Jane Ely Wells '60 and I have lived in the twin cities since 2008, since that is where the grandchildren are. We are both active in our church and in shape note singing. I retired from Case Western Reserve University in 1999 but have continued to work in math at a speed suitable to someone who is 79 years old! I maintain a blog http://www.abstractmath.org/Word%20Press/ and a website http://www.abstractmath.org/MM//MMIntro.htm both centered around the language of math and the difficulties students have when they first encounter abstraction. My background is miscellaneous (finite fields, group cohomology, and mostly category theory) and lately I have become interested in homotopy type theory, which brings a refreshingly different view of abstract mathematics.

Bill Wally, '63 We're enjoying our annual 4-month stay in Deauvelle our favorite part of France. My (Oberlin schooled) math, physics and econonmics education (50+ years ago) has allowed a very interesting and rewarding career as well as a comfortable retirement... I'd like a bit higher oil prices for many reasons (too many to cover here)... Go Obie!

Ken Weiss, '63 I graduated in '63 and am now retired, though still active (for no pay!) as a geneticist in an anthropological academic context. While I am nothing of a mathematician, my incalculable debt to my math major at Oberlin was that it did not teach me much math! What I mean is that it was not about applied math, but about the theoretical concepts, proofs, reasoning, and underlying structure. It was in a sense philosophical. The result, as I view my own experience in a successful academic career, is that I was prepared for thinking about the logic of complex things, rather than their technical details. That led to interesting approaches to scientific

problems over many years. But even more, I believe, it enabled me to think about even technical subjects and current questions, like the nature of causation and inference in genetics and evolution, in ways that not many seem able to do, or at least not interested in even trying to do. So, while never working in any serious sense in 'mathematics', I am forever grateful to my Oberlin major.

Karen Fuson, '65 Roger Howe was one of the mathematicians involved in the 2010 Common Core State Standards for mathematics, in which I was also involved. Roger wrote an influential paper before the CCSS that was titled Three Pillars of First Grade Mathematics. As part of a book about Roger's contributions, I wrote a chapter drawn from my 35 years of classroom research describing visual supports for understanding these pillars. I also summarized strengths and weaknesses of Roger's pillars. If you'd like an overview of some mathematics and cognition that is important for children aged 5 to 8 and that can help all children in this country learn more successfully, email me and I'll send you a file of the chapter.

Mary Dart, '66 Three years ago I retired from teaching at George School, a Quaker school in Newtown, PA. I have moved down to Asheville, NC, and own a little house for the first time in my life. After over 30 years of teaching mathematics to high school students, I have laid aside all things mathematical and am spending my time folk dancing, playing traditional music on accordion and other instruments, taking craft classes, and painting watercolors. It is a treat to have time for some of my other interests after focusing so heavily on teaching over the years.

Doug Holley, '66 Writing this note in early May, I am looking forward to the Math Department reception on Sunday afternoon, May 22, when we are back at Oberlin for my 50th reunion. I think it is very unlikely that I will see any retired professors I had, although it seems Mr. Andrews retired only a few years ago! But it will be enjoyable to see what is going on in the department. I am now partially retired and this will be the first reunion for which I have returned. I retired as Director of Mathematics, K - 12, for the Hingham (MA) Public Schools in June, 2013, and have spent the last three years with various part time math teaching jobs, including covering six medical or maternity leaves in local school districts. I continue to enjoy math teaching very much, and to be aware of the excellent education I received from Oberlin's mathematics department.

Tom Gregory, '67 I'm on the Class of 1967 Reunion Committee (for our fiftieth reunion next year).

Glen Blume, '68 Since retiring in 2013 as a professor in the Penn State Mathematics Education program, I have continued my mathematics education editorial work. I recently co-edited a book with colleagues from Penn State and the University of Georgia titled Mathematical Understanding for Secondary Teaching: A Framework and Classroom-Based Situations. I'm currently co-editing a mathematics teacher professional development facilitators guide to accompany that book. Volunteer activities, hiking, and grandchildren also keep me busy.

Ted Heavenrich, '74 After 42 years of teaching high school mathematics, the last 41 at the Taft School in CT, I am retiring in June. One of the highlights of my career was coaching the Math Team. In the last decade, Taft Mathletes qualified for the US Math Olympiad (USAMO) twelve times. I am looking forward to travel, reading, exercise, and maybe even attending an Oberlin reunion!

Robert (Bob) Kelley, '74 I retired from ATT $1\frac{1}{2}$ years ago, after almost 36 years, mainly managing software development of network design and performance software. Since then I've fallen into 3 non-paid jobs: 1) 10 hours per week doing volunteer math tutoring at local Brookdale Community College, mainly remedial. But I'm using time between students to revisit my math skills, bringing them back up toward what they were 40 years ago (!). 2) Spending 1 day a week as baby-sitter for now-11-month-old twin grand-daughters at my step-daughters house 50 minutes away. 3) Starting a contemporary folk music series at our UU church in Lincroft, NJ (see http://earthroomconcerts.org). Life is good!

Roy Tamura, '78 I work as an associate professor of biostatistics in the Health Informatics Institute of the University of South Florida. All of my work is associated with research grants so there is no teaching. I primarily consult with endocrinologists working in clinical research on Type 1 diabetes or rheumatologists working on vasculitis. This year, Kelley Kidwell, assistant professor of biostatistics at the University of Michigan and I were awarded a three year contract by the Patient Centered Outcomes Research Institute (PCORI). The award will allow us to study analytical approaches for a class of clinical trials called sequential multiple assignment randomized trials and their applications in small patient populations. Fellow Obies should feel free to get in touch with me if they are ever in the Tampa area!

Chris Leary, '79 The State University of New York has recently promoted me to Distinguished Teaching Professor, and I'm pleased to say that I'm ending my five-year stint as Chair of the Department of Mathematics at SUNY Geneseo. So, I get to spend more time in the classroom and less time worrying about everything else that makes an academic department function. On the personal side, the big changes are that my daughter, Heather, has graduated from SUNY Brockport with a degree in theatre, and my son, Eric, will start college this fall at SUNY Geneseo, studying physics and theatre.

Esther (Marx) Massimini, '79 I majored in Math and History. MS in Operations Research from George Washington Univ. I'm in my 28th year as an aerospace engineer at Honeywell, worked for Motorola and the USAF before that. For the past few years I have specialized in software development processes for Flight Management Systems. Doing a lot of statistical work with metrics, trying to resolve cultural biases about software defect discovery. I live in Phoenix, with my husband (an electrical engineering research analyst) and our 2 cats. Our children finally launched in their mid-late 20s–my daughter is a public defender for Sacramento County, CA, and never wanted anything to do with Math. She persists in telling me that the only time she uses math is to mentally calculate her client's potential sentence. Our son at least uses numbers–he's a CPA with an MBA in Accounting. In our spare time, my husband and I go to Comic Cons, operas and baseball games. This spring we attended the first Silicon Valley Comic Con, which was also a tech fair heavy on virtual and augmented reality. Got to talk STEM with both Adam Savage of Mythbusters and the Woz himself. I am a latecomer to baseball as I grew up in Europe, but if I were graduating these days I definitely would be interested in working in sabermetrics.

Kathy Wilson (now Kate Mooneyham), '80 After a loooong time in New Jersey, I am now back in my hometown of Yellow Springs, Ohio, running the family business, Dark Star Books. Being a Math major, I have probably the best math book section of any used bookstore in the area! Can't help playing favorites. Using math all the time at work though no differential equations needs so far.

Alice Rogot Pressman, '86 I've never written in to the newsletter before, but I just attended my 30th reunion, and reconnected with a bunch of old friends, so I thought I'd give it a try. By way of introduction, I graduated in 1986 as Susan Colley's very first advisee. A few years after Oberlin, I went on to earn a masters degree in statistics from the University of Wisconsin and many years later, a PhD in epidemiology from UC Berkeley. I have devoted my career to health research, most recently at Kaiser Permanente (1996-2013) and Sutter Health (for the past 3 years), both in Northern California. 2 pieces of recent exciting news: (1) I just received an NIH grant to conduct an RCT of mindfulness-based stress reduction for migraine. (2) Even more exciting... my son just graduated from Oberlin!!! Sadly, he did not take any math classes. Alas, math seems to have fallen to the females in my household,... probably best that way as my daughter and I would be horrible lawyers.

Christl Donnelly, '88 In 2015, I was elected to be a Fellow of the Academy of Medical Sciences and this year I was elected to be a Fellow of the Royal Society. See http://www.acmedsci.ac.uk/fellows/fellows-directory/ordinary-fellows/0009312-professor-christl-donnelly/ and https://royalsociety.org/people/christl-donnelly-12859/

Carey McDougall, '91 I currently am serving as Interim Chancellor/Chief Academic Officer at Penn State Beaver. After ten plus years as a faculty in art, I decided to move into administration to support other faculty, hopefully as well as I was supported.

Stephen Josiah Spurr, '96 I am currently the Chair of the Economics Department at Wayne State University in Detroit. I can attest that math is crucial to having a successful career in economics; the amount of math you know, or can learn after your formal education is over, determines how far you go in economics. I am waiting for my stint as Chair to be over so I can get back to research. The amount of administrative nonsense one must deal with as a Chair is mind-boggling. In any case, I want to say that Oberlin gave me a great start, and I am grateful for it.

Gamaliel Lodge, '01 I'm currently employing my skills to build energy models for the residential energy audit software OptiMiser. Here's a little conversation I had with my son that my fellow alumni might find entertaining. A four year old's first glimpse of infinity:
Finian (who had been counting into the hundreds as part of his bedtime routine): Papa, when do the numbers end?
Me: They don't ever end.
Finian: They have to end. If the people stopped, then they would stop.
Me: The people might stop counting the numbers, but that doesn't mean the numbers end. They just keep going.
Finian: But, they HAVE to end.
Me: Do you want to know how I know that the numbers don't ever end?
Finian: Yes
Me: If there was a biggest number, what would happen if you added one more to that number?
Finian: What?
Me: You would get an even bigger number?
Brief pause*
Finian (throwing his arms around me and squeezing tight): Papa, you scared me!
Me: What scared you? The idea that there isn't a biggest number?
Finian: Yeah

Laurel Paget-Seekins, '01 I am currently the Director of Strategic Initiatives for the Massachusetts Bay Transportation Authority in Boston. The bureaucracy is slowing breaking my spirit but it is an amazing opportunity to build community-academic-public sector collaborations to improve public transport. My book *Restructuring Public Transport through Bus Rapid Transit* was published by Policy Press in January 2016.

Ian Biringer, '04 No new news. I've been a math prof at Boston College for 4 years, and have a son, Elliot, with my wife Sarah.

Nick Winter, '08 The Skritter app I cofounded after graduating has grown to become the #1 app for learning to write Chinese characters. It does Japanese, too. Oberlin students get free Skritter with their oberlin.edu email. Meanwhile, I've started another startup, CodeCombat: a programming game for learning to code. Turns out learning programming is way easier than learning math, so give it a try at codecombat.com when those integrals are melting your brain! If you want to work at either of these companies, find me at nickwinter.net.

Jenna Lindeke, '09 and **Coulter Heavenrich, '09** were married in August of last year. Before getting married, Coulter joined the US Navy as an officer and served aboard a minesweeper in Sasebo, Japan for two years. Meanwhile, Jenna completed a double-masters in International Development and Global Cooperation from American University in DC and Ritsumeikan University in Kyoto, Japan. During that time, she received a Boren Fellowship to study the role of Japanese NGOs in international development. Now, they are stationed in Kanagawa prefecture, where Coulter serves as Training Officer aboard USS STETHEM. Jenna translates at a Tokyo-based think tank The Genron NPO and picks up research consultant work on the side. Jenna has found a fun balance of math and social science in her research and wishes she had taken more statistics at Oberlin.

Oliver Pechenik, '10 I'm currently finishing my PhD in algebraic combinatorics from the University of Illinois at Urbana-Champaign. My thesis was recently awarded the mathematics department's inaugural Tondeur Dissertation Prize. This fall, I will start as a Hill Assistant Professor at Rutgers University in New Jersey.

Anthony Bonifonte, '11 won the 2016 Outstanding Graduate Student Instructor Award at Georgia Tech for teaching probability and statistics courses. He will be applying this fall to professor positions at liberal arts colleges.

Ian Walker, '11 I will be pursuing a PhD in Computing at Imperial College London starting this Autumn where my research will focus on machine learning and computer vision. If you are in London in the next few years, drop me a line!

Claire Djang, '13 I just completed my first year at the Graduate School of Design at Harvard. While I am pursuing a Masters in Architecture, I still love math and am always trying to find ways of bringing mathematical ideas into my design work. I found out last summer that a group research paper I contributed to (during the MAXIMA REU in Minneapolis, MN summer 2012) was published in the International Journal of Computational Geometry Applications (IJCGA Vol 25 Issue 2, link: http://www.worldscientific.com/doi/10.1142/S0218195915500065). Now I can brag about my Erdos number of 3!

William Broderick, '13 This fall, I'll be starting a PhD program at New York University's Center for Neural Science, funded by an NSF Graduate Research Fellowship, where I plan to rotate with some combination of David Heeger, Eero Simoncelli, Jonathan Winawer, and Weiji Ma. I intend to use human neuroimaging and computational models to investigate visual representations in the brain and explore how meaning is extracted from visual stimuli.