

MATH IN THE VALLEY

FALL 2017 Alumni Newsletter



Oregon State
University

MATH IN THE VALLEY

FALL 2017

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On the cover

Nearly 150 mathematicians gathered at the Society for Industrial and Applied Mathematics Pacific Northwest Biennial Conference hosted by the Department on campus October 27-29, 2017.



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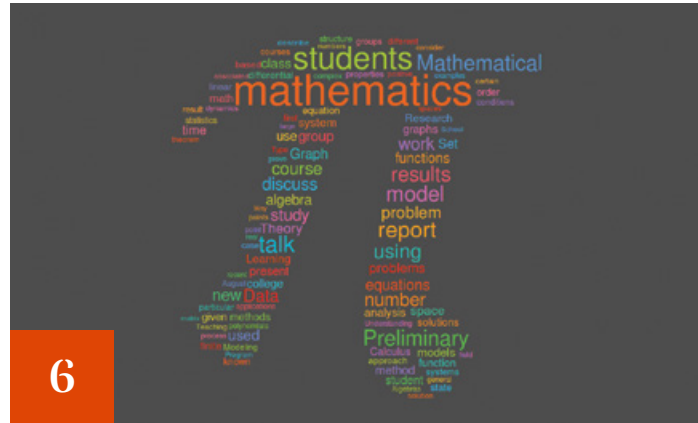


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This word cloud image was developed by David Koslicki from a selection of articles and textbooks of current actuarial studies.

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Oregon State University
College of Science



Dear Friends,

It is my pleasure to share our faculty and student accomplishments, department highlights and news of our alumni and friends from this past year. As OSU celebrates its 150th anniversary, I am excited to share some history of the Department of Mathematics, which is fundamental to OSU's progress and success.

The activities of the department are vast and reach every student at OSU. We continue to explore new teaching methods in our introductory courses to enhance the retention and success of our students. Our faculty continue to receive national recognition for their teaching. In particular, Mary Beisiegel received the 2017 Henry L. Alder Award from the Mathematical Association of America for distinguished teaching.

Faculty research is receiving support from federal agencies and private foundations at an increasing rate. It is particularly gratifying to recognize Elise Lockwood who was awarded an NSF Career Grant for her research in mathematics education. She is the first faculty in our department to receive this prestigious award. Juan Restrepo was honored with a Career Award from the Society for Industrial and Applied Mathematics for his contributions to geosciences. These are examples of the recognition that our faculty are receiving for their contributions to research and education.

In this newsletter, you can read about the interesting history of our Actuarial Mathematics Program that began more than 30 years ago. The program trains undergraduate and graduate students in this unique area of mathematics that has a major societal impact.

Last year, our department successfully promoted mathematics faculty at all ranks, with five promotions in total. Yevgeniy Kovchegov was promoted to Full Professor, Clayton Petsche and Ren Guo were promoted to Associate Professor with Tenure, and Hoe Woon Kim and Daniel Rockwell were promoted to Senior Instructor I. Congratulations to our excellent faculty!

On July 1, Bob Burton and Ed Waymire announced their retirement. We will sorely miss their contributions to the daily activities of our department, even though they will likely continue participating as emeriti faculty. We are planning a special session at the March 2018 Frontier Probability Days at OSU to recognize the incredible impact Bob and Ed have had in the growth of probability in our department.

The growth of the department, our ability to attract outstanding students and faculty and our success in enhancing diversity at all levels would not be possible without the support from our alumni, friends, the College of Science and the university. I am particularly grateful to our former Dean Sastry Pantula for his help in leading these efforts. Likewise, our faculty, staff and students make OSU a vibrant and exciting place for mathematics.

I hope to see you on campus, at professional meetings or at one of our special events. Please stay in touch!

Stay connected

Please volunteer as a way of giving back. Mentor students, give a lecture on campus, coach students about career paths or hire an intern. Contact us at:



alumninews@math.oregonstate.edu



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FACULTY

Advancing mathematics through leadership

Congratulations!

Mathematician wins national award

Mary Beisiegel ('96), assistant professor of mathematics and an Oregon State alumna, received the Mathematical Association of America's (MAA) 2017 Henry L. Alder Award for Distinguished Teaching by a beginning college or university mathematics faculty member. The award "recognizes [Mary's] superb teaching, cultivating engaging classrooms and her work building up professional development among her teaching peers."

Beisiegel and other top mathematics educators were honored at the MAA's MathFest in Chicago on July 27.

College and department awards

Professor **Bill Bogley** was awarded the Fred Horne Award for Excellence in Teaching Science at the College of Science's 2017 Teaching and Advising Awards. The Fred Horne award honors a College of Science faculty member who has demonstrated exceptional instructional qualities and has had significant impact on students over a period of not less than five years.

Bogley joins Tevian Dray (2004) and Tom Dick (2007) in being the third faculty member in mathematics to receive this award.

Mary Beisiegel received the new Ben and Elaine Whiteley Faculty Scholars Award for Teaching Excellence in the College of Science in recognition of her contributions and commitment to increase student success at Oregon State. She will receive an annual award amount of \$12,500 for three years.

Beisiegel will use her award to train faculty and graduate teaching assistants to implement research and evidence-based active learning teaching methods in the classroom.

The award was made possible by the generous support of alumni Ben and Elaine Whiteley and the Provost's Faculty Match Program. Ben (Business '53), who passed away recently, took a number of mathematics elective courses during his undergraduate years at OSU. He was CEO of Standard Insurance in Portland and a leader in Oregon business and philanthropy.

Associate Professor **Holly Swisher** received the department's 2017 Graduate Student Faculty Award for excellence in teaching and mentoring graduate students.

Professors **Malgo Peszynska** and **Adel Faridani** jointly received the department's 2016 Joel Davis Faculty Excellence Award for their outstanding work in applied and computational mathematics. The Joel Davis award was established by former OSU graduate

Jerry Jacoby in recognition of the impact that Joel Davis had on his scientific training and professional career.

NSF CAREER Award

Elise Lockwood, assistant professor of mathematics, received a five-year \$800K National Science Foundation (NSF) CAREER Award for her project, "Developing Undergraduate



Mary Beisiegel



Bill Bogley



Tenure and Promotions

The Department of Mathematics congratulates the following faculty for receiving promotions and/or tenure for the 2017-18 academic year.

Yevgeniy Kovchegov has been promoted to Professor.

Ren Guo has been promoted to Associate Professor and granted indefinite tenure.

Clayton Petsche has been promoted to Associate Professor and granted indefinite tenure.

Hoe Woon Kim has been promoted to Senior Instructor I.

Daniel Rockwell has been promoted to Senior Instructor I.

Combinatorial Curriculum in Computational Settings.”

The CAREER Award is NSF’s most prestigious award for early career faculty. Lockwood is the first in the department to ever receive the prestigious award. She will use the grant to investigate the relationship between students’ learning and understanding of combinatorial mathematics and students’ computational thinking and activity. The project will contribute to the “national need for basic research” in this area, according to Lockwood.

One of Lockwood’s objectives is to develop “research-based curricular materials in the form of modules to be implemented in mathematics and computer science classrooms.”

**NSF CAREER
Awardee Elise
Lockwood**

Faculty in the news

Professor **Thomas Dick** has published a timely and highly engaging article, “How math education can catch up to the 21st century” in *The Conversation*—a widely read news website that publishes articles by academic scholars and research institute experts. A mathematics education expert, Dick explores the alternative teaching models for mathematics that are changing higher education for the better.

“These alternative pathways involve activities that go beyond students writing examples down in their notebooks. Students might use software, build mathematical models or exercise other skills – all of which require flexible instruction,” writes Dick in the article.

David Pengelley, courtesy faculty in the department and former mathematics professor at New Mexico State University, has published an article on pedagogical alternatives to lecturing in the September 2017 issue of *Notices of the American*

Mathematical Society, “Beating the Lecture-Textbook Trap with Active Learning and Rewards for All.”

The many benefits for both students and instructors of shifting from lecture toward active learning are widely confirmed by scientific evidence and the article is based on Pengelley’s development through two decades of university teaching at all levels.

See related article on adaptive learning, pages 8–9.

Making an impact

Mathematics faculty published or submitted nearly 200 research papers of significance in wide ranging areas of mathematics throughout 2015-17.

By remaining on the cutting edge of research, our faculty expose students to current practices, novel applications and trends in the field. The publications advance research in core and applied areas of mathematics, including physics, biology, ecology, geosciences and computer science.

Out there: Taking mathematics around the world

Last year, our faculty were invited to deliver research talks at 108 academic conferences, seminars and workshops in 19 different countries. These talks, seminars and workshops provide a forum for our faculty to broadly disseminate their results, thereby enhancing scientific understanding at large and raising the visibility of Oregon State's excellence in mathematics.

SIAM Geosciences

Professor **Malgo Peszynska** was selected as a plenary speaker at the SIAM Conference on Mathematical and Computational Issues in the Geosciences on September 11-14 in Erlangen, Germany. The title of her talk was "Methane hydrate modeling, analysis and simulation: coupled systems and scale." Geoscientists recognize the tremendous importance of gas hydrate as a crucial element of the global carbon cycle, a contributor to climate change as well as a possible energy source.

In her talk, Peszynska presented the challenges of hydrate modeling and a cascade of simple and complex models that address different scenarios involving multiple scales, and how coupled phenomena of flow, transport, phase transitions and geomechanics can be formulated.

Professor **Juan Restrepo**, who received the SIAM Geosciences Career Prize (see sidebar on right), was also an invited speaker at the conference. Restrepo's talk, "How warm is it getting?" and other tales in uncertainty quantification," explored big data in the geosciences, and in combination with physics, computation and data to track hurricanes and improve the



Peszynska and Ralph Showalter in Girona, Spain for the 2016 Gordon Conference



Dray and Manogue at the Raman Research Institute in Bangalore, India.



Career prize for outstanding contributions to geosciences

Mathematician **Juan M. Restrepo's** impressive and extensive leadership in mathematical modeling and numerical simulation of oceanography and climate dynamics has earned him the Society for Industrial and Applied Mathematics (SIAM) Geosciences Career Prize.

The award recognizes an outstanding senior researcher who has made broad and distinguished contributions to the field of geosciences.

Restrepo has employed applied mathematics to make salient contributions to geoscience, particularly in computational geosciences. He has proposed new quantitative tools and techniques for improved forecasting, particularly in highly unstable systems like the weather and extreme or rare events like droughts and deluges. Presently he is developing a model for ocean oil spills.

The prize was awarded at the SIAM Conference on Mathematical and Computational Issues in the Geosciences, on September 11-14, 2017, at the University Erlangen-Nürnberg in Erlangen, Bavaria, Germany.

prediction of the time and place of coastal flooding due to ocean swells. This phenomenon is on the rise.

Mathematics in India

Professor **Tevian Dray** and his wife, Corinne Manogue, professor of physics, spent the month of March 2017 in India. Dray was an invited speaker at the conference "Aspects of Gravity and Cosmology," held in honor of the 60th birthday of Professor T. Padmanabhan, an old friend and collaborator.

The conference took place in Pune, at the Inter-University Centre for Astronomy and Astrophysics (IUCAA), India's premier research institute for astrophysics. Dray and Manogue also gave a number of talks and hosted workshops on math and physics education in Mumbai and Delhi.

Prior to joining OSU in 1988, Dray and Manogue had spent six months in India (with their two small children) as Fulbright grantees. In addition to a week in Pune, they spent a week at the Raman Research Institute in Bengaluru (formerly Bangalore). In both Pune and Bengaluru, they had the opportunity to renew old friendships and start new collaborations.

Association for Women in Mathematics 2017 Research Symposium

Several math faculty and students presented talks at the third research symposium of the Association for Women in Mathematics at University of California, Los Angeles in April 2017.

Holly Swisher presented in a special session on "Women in Numbers,"

Elise Lockwood gave a talk in a session on "Research in Collegiate Mathematics Education," **Vrushali**

Bokil spoke in a session on "Women in Mathematical Biology," and **Malgo**

Peszynska presented a talk in a session on "Women in Numerical Analysis and Scientific Computing."

A surge in research grants

Mathematics faculty have 14 active grants totaling more than \$11 million. These grants are primarily through the National Science Foundation (12 grants) with one grant each from the Bonneville Power Administration, the Pacific Earthquake Engineering Research Center and the Gulf of Mexico Research Initiative.

Vrushali Bokil is principal investigator (PI) on a \$350K (OSU will receive \$100K) National Science Foundation (NSF) grant, titled "OP: Collaborative Research: Compatible Discretizations for Maxwell Models in Nonlinear Optics." This is a collaborative grant with Yingda Cheng at Michigan State University and Fengyan Li at Rensselaer Polytechnic Institute.

Holly Swisher (PI) and **Clayton Petsche** (co-PI) received \$6,000, the first installment of a three-year NSF award for "Collaborative Research: Oregon Number Theory Days." This grant will support Oregon Number Theory Days, a joint seminar series to be held at University of Oregon, Oregon State University and Portland State University in 2017 and 2018.

Juan M. Restrepo (co-PI) was awarded a \$150K Partnership for Enhanced Engagement in Research (PEER) grant, for his project, "Flooding predictions and Interface for Pt. Huemene, CA." This is collaborative research with PI Harry Yeh, Professor of Civil Engineering at Oregon State.

ACTUARIAL SCIENCE AT OREGON STATE

The evolution of the actuarial science program: past and present

By Edward C. Waymire

Traditional actuarial science concerns the analysis of mathematical models and data to determine the cost of financial instruments that provide coverage of risk. Insurance companies, for example, will pool moneys from individuals to cover expensive catastrophes. The insurance company will be able to pay out the coverage and make a profit provided that enough small amounts of money are collected from individual customers and the rate of a covered catastrophe is relatively infrequent. The processes that actuaries use to keep insurance companies afloat, exchanging risk for payouts, are remarkably complex, some of which are based on fascinating and far from settled mathematical problems in probability, game theory, social sciences, and economics.

Apart from the scholarly value of mathematical research afforded by the historical development of actuarial science, the opportunity to pass this knowledge to future generations of students has not been missed at OSU.

In efforts to establish new job opportunities for our math majors, the

department established a connection to Portland actuaries, through the Portland Actuary Club (PAC), in 1984. Meetings with members of the PAC provided a forum that eventually spawned a curriculum to support students wishing to take professional certification exams offered by the Society of Actuaries (SOA), and ultimately led to the creation of an actuarial science track in mathematics.

An Actuarial Science Fund was also created in collaboration with the PAC and managed by the OSU Foundation. The fund offers awards to OSU mathematics students who pass a SOA professional examination. The first gift came from Charles Dolezal of Standard Insurance Company in 1984, who had benefited by similar support as a student. The donation was accompanied by a matching gift challenge to his company and to his actuarial colleagues in Portland.

Since then the Actuarial Science Fund has grown to include gifts that support student travel to conferences and meetings related to areas of research in financial risk and uncertainty.

In 2001, our actuarial science program underwent another expansive transformation. As the result of an inquiry by then head of derivatives at

US Bank (formerly headquartered in Portland), a small grant was provided to examine some of the rapidly emerging applications of stochastic processes in mathematical finance.

The additional funding from US Bank provided support for a graduate student to spend one day per week working in Portland, as well as attend research conferences. The fund also was used to bring distinguished researchers from other universities to speak in a newly formed seminar.

In 2002, faculty from business finance, natural resource economics and the statistics departments collaborated with mathematics faculty to create the Finance, Insurance, and Natural Resource Economics (FINRE) initiative. Its principal goal was to sponsor cross-disciplinary visiting lectures of mutual interest to its members and departments. By that time, faculty were also working across departments, co-supervising graduate theses in FINRE-related areas. FINRE alumni include 26 master's students and two Ph.D. students since 1992.

In the spring of 2004, a gift from Gloria Swanson through the OSU Foundation expanded the Actuarial Science Fund, offering the F. Gilbert and Gloria M. Swanson Endowment for Actuarial Sciences in the department. This unrestricted account continues to support travel and research activities of students.

New opportunities abound in the form of research directions pertaining to the mitigation of risk and uncertainty associated with a data-intensive world.

Many mathematics faculty have advised students in the program, including **Don Jones, Mina Ossiander, Edward Waymire, Enrique Thomann, Juha Pohjanpelto, Tom Dick,**



2017 Actuarial Science Award for excellence in mathematics

An Actuarial Science Award was initiated in 1984 through donations by members of the Portland Actuarial Club to support students who are successful in the completion of a professional examination of the Society of Actuaries.

Congratulations to this year's awardees (above, left to right):

Huanqun Jiang
Connor Edwards
Kai Li



it's a less serious program than it was when it offered an actuarial science track, some 20 years ago.

The actuarial profession now reaches far beyond the traditional actuarial mathematics field; into statistics, economics, finance, data science and analytics, and computer science. Actuarial employers now look for a broader set of skills and qualities—quantitative, problem-solving, analytical, financial literacy, leadership, communications, etc.—as well as the ability to pass professional actuarial exams.

Our actuarial science program integrates resources from within and outside the Department of Mathematics to provide students with the tools they need: (1) an in-depth understanding of what actuaries do, (2) knowledge that actuarial science is right for them, and (3) preparation for a career as a practicing actuary or actuarial educator/researcher.

Students interested in actuarial science are assigned an academic advisor and a professional advisor. They receive an orientation that highlights how the minor fits into their educational goals and how their time at OSU can best be used to build profiles and skills, all necessary for a successful actuary.

The Actuarial Science Club serves as a key resource for students to obtain and share information on actuarial careers, exam-prep discussions, scholarship opportunities, job and internship opportunities, and outreach to the professional actuarial community.

Students are encouraged to pass the first two professional actuarial exams while still enrolled at OSU. A variety of mathematics and statistics courses are available to support the exam syllabus. Students with successful exam performances are recognized with Actuarial Science Awards at the annual Lonseth Lecture. Students are also exposed to real-life actuarial work through a Topics in Actuarial Practice course.

Advisors help actuarial students with summer internship searches and job placement, including at insurance companies, consulting firms, government agencies and HMOs.

As a premier actuarial science program in Oregon and the Pacific Northwest, we have built up an extensive regional alumni network in the actuarial profession and maintain close ties to professional actuarial societies.

Author: Manny Hur is our Actuarial Program Coordinator.

Bill Bogley and current Actuarial Committee chair **Yevgeniy Kovchegov**. These faculty have taught actuarial specific courses, directed student papers, and/or have been involved in academic advising. The current health of the actuarial science program was enhanced by the addition of Manny Hur in 2011 as the current Actuarial Program Coordinator.

Author: Professor Emeritus Ed Waymire retired in July 2017 after 36 years in the mathematics department. math.oregonstate.edu/~waymire

Actuarial science program: 20 years in the making

By Manny Hur

The actuarial science program in its current form is centered around an actuarial science minor at its core, but it would be a mistake to think

TRANSFORMING COLLEGE ALGEBRA

The new world of mathematical learning

OSU mathematics faculty are replacing the traditional classroom model to improve student success in introductory algebra courses through technology, new active learning approaches and measurement of student performance and understanding. These have improved retention and performance levels and significantly improved student engagement in lower-level math classes.

Teaching innovations in college algebra

Failure rates in college algebra courses are high across the country and present barriers to earning STEM degrees. Through the use of adaptive approaches—innovative and collaborative active learning tools blending in-class and online activities—math instructors have implemented bold new solutions that will help OSU students succeed at mathematics.

Oregon State University is one of eight universities awarded funding from a Gates Foundation grant through the Association of Public and Land Grant Universities (APLU). This grant

supports implementing adaptive courseware in high enrollment general education courses, including College Algebra/MTH 111.

Mathematics instructors **Sara Clark, Scott Peterson, Lyn Riverstone, Dan Rockwell, Katy Williams, David Wing** and **Elizabeth Jones** of the Equal Opportunities Program spent more than 300 hours across several months working together to re-design college algebra. To ensure the use of best practices that lead to student success, the team worked closely with OSU's Center for Teaching and Learning, Ecampus, Academic Technologies and the Academic Success Center. The team piloted the redesign in five sections of MTH 111 in spring term 2017.

Adaptive courseware in MTH 111 involved using Learning Catalytics, a web-based student response tool, and Assessment and Learning in Knowledge Spaces (ALEKS), an adaptive courseware platform. These tools allow instructors to adapt to student needs both inside and outside of class.

Learning Catalytics acts as a type of clicker that tabulates responses to problems posed in class. Learning

Catalytics helps the instructor use real-time analytics to monitor student responses to questions and find out where they are struggling. Instructors also use Learning Catalytics to promote interaction by grouping students who have different answers.

“We were inspired to adopt this tool after visiting Physics Instructor KC Walsh’s class,” said Riverstone. “He teaches in a big lecture hall and the class just explodes. Students turn around, face each other and start discussing the question. There is a lot of problem-solving, discussion, critiquing and mutual guidance.”

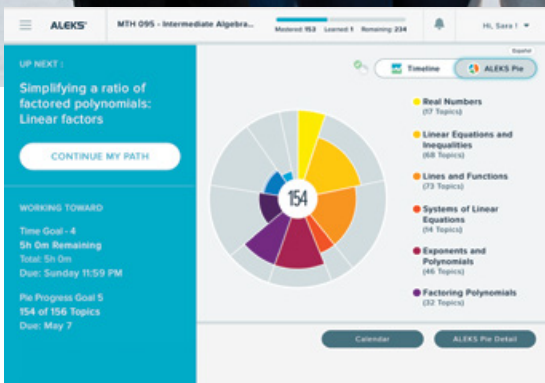
ALEKS is the adaptive courseware used by students outside of class throughout the term to check on their prerequisite knowledge and get up to speed on the topics they need to be successful in class. ALEKS provides individualized pathways for students to learn foundational content. They can come to class prepared to work in teams for supported, intensive problem solving.

“Numerous studies have shown that students don’t learn by passively listening to lectures. Students learn by constructing the knowledge



Developmental math that delivers results

The adaptive and customized learning program has changed Mathematics Instructor Sara Clark's developmental math classes for the better. In recognition of her work, she was granted a Digital Learning Innovation Award last fall from the Online Learning Consortium, the leading professional organization devoted to advancing quality in online learning, funded by the Bill and Melinda Gates Foundation.



Above: Lyn Riverstone, David Wing, Sara Clark, Scott Peterson, Katy Williams, Dan Rockwell and Elizabeth Jones

Overlay: A screenshot of the ALEKS platform. Students can view their progress in this pie chart. Colored areas represent mastery and gray areas indicate concepts that need work.

Instead of listening to a lecture and taking notes in a classroom, students in Elementary and Intermediate Algebra courses meet for three hours each week in a computer lab to work independently on their individualized course work or “path” on ALEKS. Clark moves among them, interacting with students and coaching or facilitating as needed as well as providing supplemental material via class-wide assignments, quizzes, and customized worksheets for each student.

The results have been astounding. The failure-withdrawal rate in Clark's classes has dropped to 14% from 40-45% and is as low as 9-10% for the most recent cohorts.

The importance of gateway math courses such as algebra cannot be overemphasized. It represents the path through which students must pass to gain access to STEM education and STEM degrees. By enhancing student success in their classes, math instructors at OSU are ensuring that their students have a bright future at the university and beyond.

themselves through active learning exercises,” Riverstone stated.

Additional strategies, such as a modeling project designed by mathematics doctoral student Emerald Stacy, inspired students to work on interesting real-world data sets to understand the uses of specific algebraic functions and their practical relevance.

Results from spring term are very encouraging. The student withdrawal rate decreased from 17% to 10% from last year, and there was a small improvement in the exam average.

The APLU math team is developing new syllabi structured around adaptive courseware for fall courses in Algebraic Reasoning and spring courses in Elementary Functions.

In class evaluations, students responded positively to the class and its innovative pedagogical tools and structures. They reported more confidence in their ability to understand and apply algebraic concepts as well as an increased enjoyment of mathematics.

“I gained insight into what I might want to do with my life. I have been considering going into education and I might focus on math,” wrote one student. Another mentioned, “This class was engaging, interactive and educational—and packed into a ‘math support system.’ There never was a dull moment.”

“We heard a lot of things from students that we wouldn’t have heard before in the Algebra class,” said Riverstone.

ALUMNI

Thinkers and doers



New mathematicians

We had a banner year graduating 10 Ph.D.s and 10 master's students!

New Ph.D. graduates, 2017

Mathew Titus

Ali Al-Saedi

Brandon Edwards

William Felder

Kenneth Kennedy

Kirk McDermott

Thomas Morrill

Forrest Parker

Charles Robson

Puttha Sakkaplangkul

New master's graduates, 2017

Nurideen Abubakari

Lida Bentz

Kirana Bergstrom

Kevin Cramer

Sarah Hagen

Samantha McGee

Alexander Putnam

Dane Skinner

Christopher Watkins

Hooman Zabeti

Alumni achievements

Kevin McGown has been awarded tenure and promoted to associate professor at California State University, Chico. McGown earned his B.S. ('04) and M.S. ('05) degrees in mathematics and was a postdoctoral scholar in the department from 2010-12.

Chris Jennings-Shaffer (M.S. '11) joined Professor Kathrin Bringmann's number theory group as a postdoctoral scholar in September 2017 at the University of Cologne, Germany. He was a visiting assistant professor in the math department since 2015.

Carrie Manore (Ph.D. '11) was hired as a permanent employee at Los Alamos National Labs. She started there as a Director's Postdoctoral Fellow in 2016.

A passion for teaching

Celeste Wong, who graduated in June, has harbored an ambition to teach mathematics to middle and high school students right from her own school days in San Francisco. Her exceptional performance and dedication as a teaching assistant in the Foundations of Elementary Mathematics earned her the 2017 Gary L. Musser Award, which recognizes outstanding mathematical achievement for a prospective elementary or middle school teacher.

The course Math 211, taught by Marie Franzosa and Charisse Hake, was a milestone in Wong's undergraduate career, helping her acquire "a really strong foundation in problem-based mathematical teaching, learn about effective class structure and ways to make the subject interesting to students." The class is designed for teachers who want to teach mathematics in high schools.

In the class, Wong assisted students with group problem-solving and helped guide their thinking toward mathematical knowledge and discovery.

Wong is also highly appreciative of her courses in Algebraic and Geometric Transformations—a set of three courses taught by Mary Beisiegel and Thomas Dick. The classes, she observes, taught her an interesting way of looking at math and helped her develop logical thinking.

"Mathematics at Oregon State was nothing like I expected. I found a bunch of great professors and lots of friends who I did math with. I truly enjoyed doing homework problems with my friends in the Math Learning Center; We were like a math family," Wong observed.

Wong will begin the Master of Science in Education program at OSU this year to specialize in mathematics education.

Changing the world through mathematics, finance and philanthropy

It was not unusual for **Judy Faucett ('70)** to be the only woman in the room. She recalls that she was the only female among 90 students in her advanced calculus class at Oregon State, her first class after she transferred from the mathematics program at University of Oregon (UO).

At Pacific Mutual Life, which she joined right after graduation, Faucett was one of the first women to be hired and complete the company's actuarial training program. She not only made an impression for being one of the few women in her math classes and at her job, but also for her exceptional performance both academically and professionally.

Faucett received excellent grades in her calculus class as well as every other mathematics course at OSU, which made her professors and fellow classmates realize that she was "a serious student of math." Faucett transferred from the UO because she wanted to study statistics and applied mathematics. Her unwavering goal throughout her undergraduate career was to become an actuary, an idea instilled in her by a high school counselor, who told Faucett, "If you want to study math, why not become an actuary and make some money?"

Faucett achieved a career milestone when she passed her actuarial exams after five years at Pacific Mutual Life, which led to a fulfilling career as an actuary, and propelled her into management and corporate operations. She started her career at Pacific Mutual as an actuarial trainee and rose to the position of Vice President over a 15-year span (1970-85).

"My courses in applied mathematics at OSU and passing the actuarial exams opened the doors to better opportunities for me," observed Faucett, who was the first person in her family to go to college. Describing herself as hailing "from a long line of farmers," Faucett lived in Salem with her family until she was 15, at which point they moved to eastern Oregon, where her parents owned and operated a hardware store.

Faucett's career took her quite far from her agrarian roots and into the offices of top actuarial firms in the country. After Pacific Life, she was a consulting actuary at Miliman and Roberston for a few years before joining Coopers & Lybrand (now Pricewaterhouse Coopers), where she worked as a principal and consulting actuary. Faucett retired in 2004 as a senior vice president from Equitable Life Assurance (now AXA US).

After spending her career in California, New York City and Philadelphia, Faucett settled near Newport, Oregon, after retirement to be closer to family.

As a student many decades earlier, Faucett relied on scholarships to attend college and graduate debt-free.

That experience inspired her to create a difference in the lives of students who may face similar personal and financial obstacles in their paths to higher education.

Highly passionate about helping hard-working students achieve their dreams, Faucett is a longtime contributor to the Science Scholars Fund, which broadly supports science students with financial needs. She is also working with the OSU Foundation to establish a scholarship fund in the College of Science for students with disabilities.

Faucett enjoys reading the letters from scholarship recipients that eloquently testify to how the award helps them continue with their education and keep moving forward with their dreams.

"These young people are going to change the world. They are doing incredibly important things," she enthusiastically states. Her favorite letter is from a student who thanked her for making it possible for her to drop a third job to focus on academics.

An active donor for more than 40 years, Faucett has also supported a broad range of educational endeavors in the sciences and contributed to other academic resources for diverse groups of students. These include the Actuarial/Financial Mathematics Unrestricted Fund, the SURE Science Program, which funds summer undergraduate research opportunities, as well as the Gretchen S. Schuette College of Science Fund, which supports and encourages students from Oregon community colleges to complete a bachelor's degree in science at Oregon State.

With Faucett's deep commitment to philanthropy, it is clear that young people aren't the only ones who are going to change the world.



Judy Faucett with pandas in China

Welcome!
 Mathematics Department
 Graduate Orientation
 2016-2017

OUR STUDENTS

Transforming the world through mathematics

Welcoming a new cohort!

We are delighted to welcome 20 graduate students in 2017, including seven women and one self-identified transgender student. The cohort also includes eight minority students that are Hispanic, Indian, Asian and African-American. The new student body includes a Marshall Fellow and an Achievement Rewards for College Scientists (ARCS) Fellow.

The department received University Graduates Laurels Block Grant for \$50,000 to support our graduate program. Laurel Blocks grant helps pay graduate tuition charges for highly-qualified students with financial need.

Congratulations!

Outstanding teaching

Puttha Sakkaplangkul, who received his doctorate in June 2017, was awarded the department's William F. Burger Graduate Teaching Award (jointly with Samantha Smith) in spring 2017.

Sakkaplangkul, who is from Trang in Southern Thailand, joined the department in fall 2012. He is now a

postdoctoral scholar in mathematics at Michigan State University.

ARCS Scholars

Mathematics doctoral students Dallas Foster and Martijn Oostrom are the Achievement Rewards for College Scientists (ARCS) Foundation Oregon Scholars for 2016 and 2017 respectively. The ARCS Foundation Oregon award provides doctoral students with \$18,000, payable over three years at \$6,000 per year.

ARCS Foundation Oregon supports exceptional doctoral students in STEM fields at Oregon Health & Science University, Oregon State and University of Oregon

Foster also received the Provost Distinguished Scholarship at OSU.

Advancing the status of women in STEM

Doctoral student **Emerald Stacy** received the President's Commission on the Status of Women (PCOSW) Scholarship at OSU to fund her travel to Mathematical Association of America MathFest 2017 in Chicago.

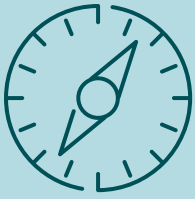
"This conference is an opportunity for me to break down some barriers that can hold women back in their mathematical careers," says Stacy.

MathFest is a major annual conference in mathematics, with a focus on both mathematical research and mathematics education. At Mathfest, Stacy will be presenting results from her research in number theory in a talk, entitled, "The Smallest Nontrivial Height of Abelian Totally p-adic Numbers."

She was closely involved with the department's extensive redesign of college algebra, an invaluable experience in curriculum development. Stacy led summer programs in 2015 and 2016 to train incoming Graduate Teaching Assistants (GTA).

"Emerald is one of our stalwart graduate students and has shown excellence in all possible areas of scholarly life: coursework, research teaching, service, and collegiality/peer mentorship," says her advisor, Associate Professor **Clay Petsche**.

Stacy won the prestigious university-wide Herbert F. Frolander teaching



Conference Highlights, 2016-2017

SIAM Computational Science and Engineering Conference, 2017:
Diana Gonzalez, Choah Shin

American Mathematical Society conferences, 2016-2017: **Azhar Alhammali, Choah Shin, Brandon Edwards, Hieu Do**

Joint Mathematical Meetings, 2017: **Zackery Reed, Thomas Morrill, Sarah Erickson, Jason McLelland, Hooman Zabeti**

Research in Undergraduate Mathematics Education (RUME), 2017: **Lida Bentz, Sarah Erickson, Claire Gibbons, Michael Lopez, Samantha McGee, Zackery Reed, Branwen Schaub**

Mathematical Sciences Research Institute summer school

Every summer, the Mathematical Sciences Research Institute (MSRI) at the University of California in Berkeley organizes several summer graduate schools usually two weeks long. This summer the following graduate students from our department participated:

Allison Arnold-Roksandich, “Automorphic Forms and the Langlands Program.”

Jhjh-Jyun Zeng, “Nonlinear dispersive PDE, quantum many particle systems and the world between” in Cortona, Italy.

Stephen Krughoff, “Positivity Questions in Geometric Combinatorics.”

award in 2015, and the department’s William F. Burger Graduate Teaching Award in 2013. She was also awarded the 2016 Graduate Student Excellence award (along with Zackery Reed) at the department’s 2017 Lonseth Lecture.

Grad student attends prestigious math program at Princeton

Doctoral student **Samantha (Sam) Smith** attended the 2017 Program for Women and Mathematics, a two-week workshop, at the Institute for Advanced Study at Princeton University. This is a by-application/invitation-only program that boasts an impressive track record of supporting professional development of female researchers in mathematics.

“I would recommend the program to anyone. Being surrounded by empowered, adventurous women, who studied math with such joy, reinvigorated my own passion for the subject. I walked away with many new friends and role models,” said Smith.

Smith was also awarded the department’s William F. Burger Graduate teaching award (jointly with Puttha Sakkaplangkul) and the 2017 Graduate Student Achievement Award for academic excellence in mathematics at the Lonseth Lecture in May 2017.

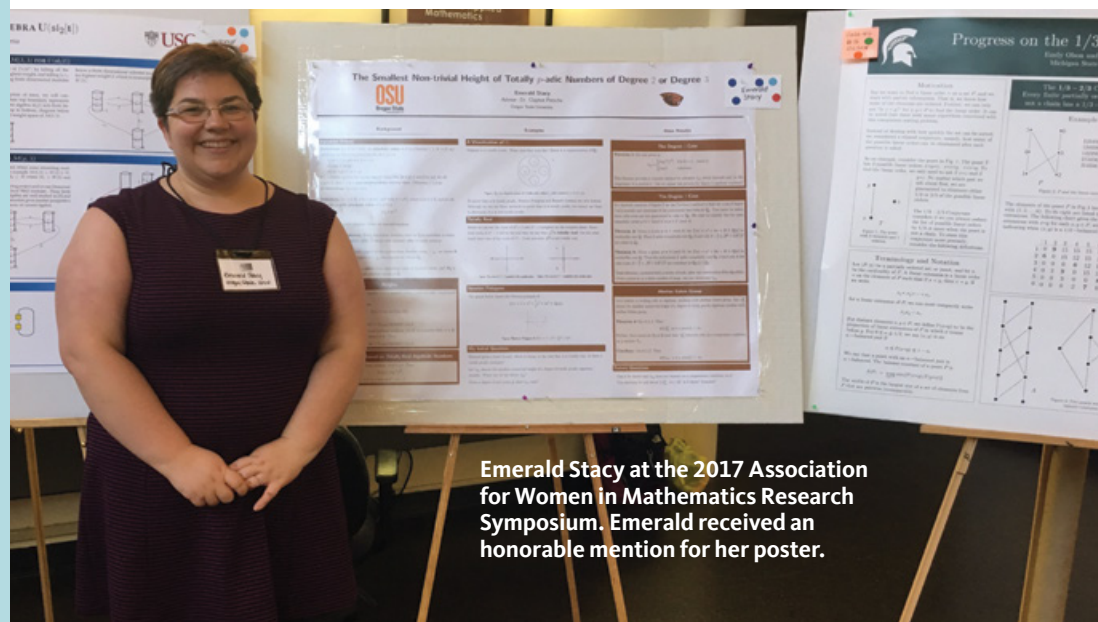
Recognizing excellence

In 2013, doctoral student **Zackery Reed** arrived at Oregon State University from Pepperdine University, where he graduated summa cum laude. Since then, he has distinguished himself in research and teaching.

His dissertation project in the area of mathematics education research involves “very in-depth analysis of student mathematical activity that results in the creation of new theoretical perspectives.”

To date, Reed has two journal publications (with another submitted) and a monograph chapter, four papers in refereed conference proceedings, and has presented two posters. He has also been a part of nine presentations, including three at the Joint Mathematics Meetings.

Reed has been recognized by several groups for his extraordinary accomplishments: he received a best paper award (with advisor, Assistant Professor **Elise Lockwood**) at the 2017 Conference on RUME (Research in Undergraduate Mathematics Education), a 2016 Graduate School Travel Award, and the department’s 2016-17 Graduate Student Excellence Award.



Emerald Stacy at the 2017 Association for Women in Mathematics Research Symposium. Emerald received an honorable mention for her poster.



Botond Gabor Eross
Math Memorial
Scholarship Winners



Goldwater Scholar
Mirek Brandt

Undergraduate honors

Seniors win awards in Putnam Math Competition

Of our many talented mathematics majors, two stand out for their mathematical abilities both inside and outside of the classroom. Seniors **Gregory “Mirek” Brandt** and **Patrick Thomas Flynn** are both Honors College students double majoring in mathematics and physics with straight A’s. Both participated in the Putnam Math Competition and the COMAP (Consortium for Mathematics and its Applications) Mathematical Contest in Modeling last year.

The 77th annual William Lowell Putnam Mathematical Competition held last December included a six-hour exam with only 12 problems. However, of the more than 3,000 U.S. undergraduate

participants, approximately half scored zero points. Mirek and Patrick both scored 10 points, landing in the 66th percentile.

The 33rd Annual COMAP Mathematical Contest in Modeling held last January featured 96 hours of competition in which teams of three undergraduates worked to formulate a solution to an open-ended, real word problem. This year’s problem was to perform an analysis of the effect on traffic flow of allowing self-driving, cooperating cars on particular highways in Washington state.

Mirek’s team won Honorable Mention, or roughly 50th percentile, out of 8000 teams of three internationally.

Each student received further recognition this year: Mirek won the prestigious 2017 Barry Goldwater Scholarship, the top undergraduate award in the country for sophomores and juniors in science, technology, engineering and mathematics fields. Patrick was awarded the Joel Davis Award and also won the Writing in the Curriculum Award.

High-powered research internship

Gabriel Nowak, who graduates in December 2017 with a double major in mathematics and physics, was



Student Awards, 2016-17

Graduate students

Achievement Award
Samantha Smith

William F. Burger Graduate
Teaching Award
Samantha Smith, Puttha Sakkaplangkul

Excellence Award
Emerald Stacy

ARCS Foundation Scholarship
Dallas Foster, Martijn Oostrom

Undergraduates

Edward H. Stockwell Award for
Excellence in Mathematics
Joel Belsterling, Gregory Brandt, Katherine Stevens

Harry & Molly Goheen Memorial
Scholarship (For an outstanding
junior or senior majoring in
mathematics or computer science)
Rong Yu

WIC Award (For outstanding
mathematical writing in a writing
intensive course)
Patrick Flynn

Botond Gabor Eross Math
Memorial Scholarship (For
outstanding work in mathematics)
Corinne Andriola, Michael Hunter, Huu Duc Huy Le, Jesse Rodriguez, Jill Weimer

Davis Award for Excellence in
Mathematics
Patrick Flynn

selected for a summer internship at the prestigious Lawrence Berkeley National Laboratory (LBNL). With the help of a Department of Energy Science Undergraduate Laboratory Internship (SULI), Nowak spent nine weeks at LBNL, working with the Atomic Molecular and Optical Science experimental group on a project devoted to investigating laser generated nanoparticle array formation and the dynamics of charge transfer in the process. Nowak designed and planned the experimental process and handled the design and set up of equipment systems and spatial lighting sources.

The SULI internship is a highly competitive program that offers STEM undergraduate students research experiences at 17 participating Department of Energy laboratories nationwide.

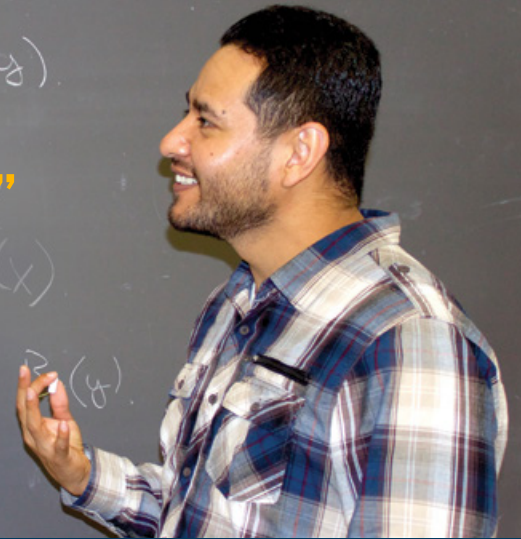
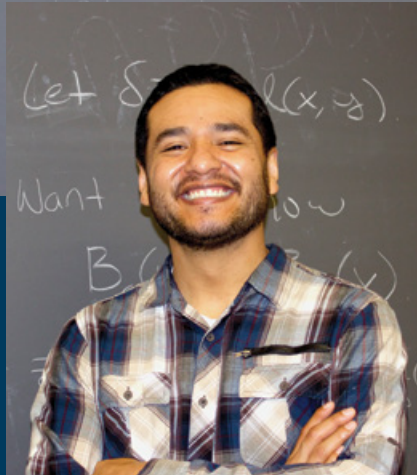
Nowak found the “extraordinarily experimental internship” to be “very valuable” giving him many opportunities to learn about different aspects of being part of a larger scientific community and a collaborative research group.

Nowak has acquired a rich, interdisciplinary education at OSU, and he intends to continue to study both mathematics and physics at the graduate level. He will apply to master’s programs in mathematics this year and eventually plans to pursue a Ph.D. in particle physics. To his delight, Nowak has found that he can use his math skills in a variety of fields of research. “For me, mathematics is an incredibly useful tool and bridge to understand most phenomena in the natural and physical sciences,” said Nowak.

Nowak has a passion for theoretical mathematics and has enjoyed many intellectually transformational moments in his classes in modern algebra, advanced calculus and topology.

“I HAVE ALWAYS ENJOYED MATH.”

—Michael Lopez ('17)



always good at it, but I always enjoyed it,” remarked Lopez.

Mathematics faculty Scott Peterson, Elise Lockwood, Mary Beisiegel, Elizabeth Jones and Juan Restrepo have provided invaluable guidance to Lopez throughout his undergraduate career. Restrepo got Lopez involved in research and strongly encouraged him to join OSU’s SACNAS (Advancing Chicanos/Hispanic & Native Americans in Science) Chapter.

In 2015, Lopez presented his research at a SACNAS conference in Washington, D.C. He was also elected Vice-President of OSU SACNAS.

He has “loved every minute” of his time as a teaching assistant in College Algebra and Elementary Functions courses over the past two years.

Walking through open doors has earned Lopez many “firsts:” He is first in his family to graduate high school (followed by his twin brother a year later), first to graduate college and, first to attend graduate school. Lopez began a master’s degree in mathematics at OSU and plans to become a mathematics professor. He was awarded a Diversity Scholar Recruitment award to support his graduate studies.

Marine to mathematician

Graduating senior **Michael Lopez ('17)** is not your typical mathematician. Lopez is a former U.S. Marine who served three tours in Iraq and a total of 10 years in the military. He worked in law enforcement for four years. He was kicked out of three high schools. He is a “nontraditional” student in that he is in his mid-thirties, married, and the father of two children.

Lopez grew up in Santa Ana in Orange County, California, where violence on the streets and gun shootings were an inescapable part of his early life. His family left California for a better, safer life with more opportunities in Oregon.

His two passions have always been mathematics and teaching.

He transferred to OSU mathematics from Central Oregon Community College in Bend, Oregon. “I have always enjoyed math. I was not



BUILDING COMMUNITY

Outreach, news and events

2017 Ambitious Math and Science Summer Institute (AMSSI)

Expanding access to mathematics for all

The department launched a Math Summit, a three-year plan to equalize access and student success at OSU, develop alternative pathways for students and to attract more students into STEM fields.

We are pleased to announce that the department increased its Honors College offerings to 18 courses, the largest number of courses for any department within the College of Science.

Summer institute for math and science

More than 50 math and science teachers, teacher candidates, and teacher leaders flocked to campus for the inaugural 2017 Ambitious Math and Science Summer Institute (AMSSI) on June 27-30, co-sponsored by the College of Science, the College of Education and the Oregon Department of Education.

At AMSSI, participants enjoyed multiple opportunities to connect

with OSU scientists and faculty for professional development on math content and equitable teaching practices. Five invited plenary speakers shared expertise on a range of critical issues for math and science teaching and for supporting diverse learners.

The conference was organized by **Tom Dick**, professor of mathematics and Rebekah Elliott, SueAnn Bottoms and Wendy Aaron (College of Education).

Math professional development night

The second Math Professional Development Night was held this year. More than 30 students and faculty participated in this event which featured career-related presentations on the academic, actuarial and industry/lab paths, CV-tuning and mock interview booths, as well as Skype chats with our alumni.

Oregon Academy of Science

The 2017 annual meeting of the Oregon Academy of Science was held

on February 25 in OSU's Learning Innovation Center. Professor Tevian Dray and his wife, physics Professor Corinne Manogue made an interactive presentation on "Lessons Learned from the Paradigms and Bridge Projects."

Mathematics worth spreading

In April 2017, the College of Science hosted "Science Worth Spreading," a series of powerful, stimulating 7-minute talks from scientists in our own backyard at Oregon State followed by a mind-bending conversation about science. Students, faculty, and community learned about the discoveries, powerful insights and sustainable science happening at OSU and were invited to become part of the ongoing conversation about the impact and value of science.

Talks by mathematics faculty were very well-received. They spoke on the following topics:

Assistant Professor Ben Dalziel, "Ecology in the age of cities." Dalziel's

eloquent address centered on how a scientific understanding of the physiology of cities and the complexity of their human networks is becoming increasingly important.

Associate Professor Vrushali Bokil, "From love to despair and health to disease: how mathematics helps understand change." Taking an unusual approach to introduce the subject of mathematical modeling, Bokil demonstrated how a mathematician used differential equations to capture the dynamics and patterns of unrequited love between sonneteer Petrarch and his muse Laura as evidenced in Petrarch's *Canzoniere*.

Mathematics competition

The department hosted approximately 150 high school students and 50 teachers and parents for the annual Oregon Invitational Mathematics Tournament (OIMT) on May 13, 2017. These students qualified for the state contest by finishing in the top 12 percent of many regional contests held at various locations across the state, mostly community colleges. Bravo!

The contest had four divisions: geometry, algebra, pre-calculus, and calculus. The top 10 finishers in each

division were recognized and awarded an OIMT medallion as well as other prizes. Coordinators Raven Dean and Katy Williams, along with the help of many mathematics faculty and graduate student volunteers, made the event a resounding success.

2017 Lonseth Lecture: "Math missionary" William Yslas Velez

The Department of Mathematics welcomed **William Yslas Velez** as the speaker for the 32nd annual Lonseth Lecture Series on May 2, 2017. A Distinguished Professor at the University of Arizona, Velez is a renowned teacher dedicated to student success and diversity.

Velez spoke passionately about how students should be introduced early on to the dynamic, exciting and interconnected world of mathematics research, which would help students succeed in math courses in greater numbers.

Velez argued that, too often, undergraduate students rule out further study in mathematics due to self-assessments based on peer interactions, instructor feedback, and their uncertain relationship to the material itself.

2017 Milne Lecture: Data scientist Michael Jordan

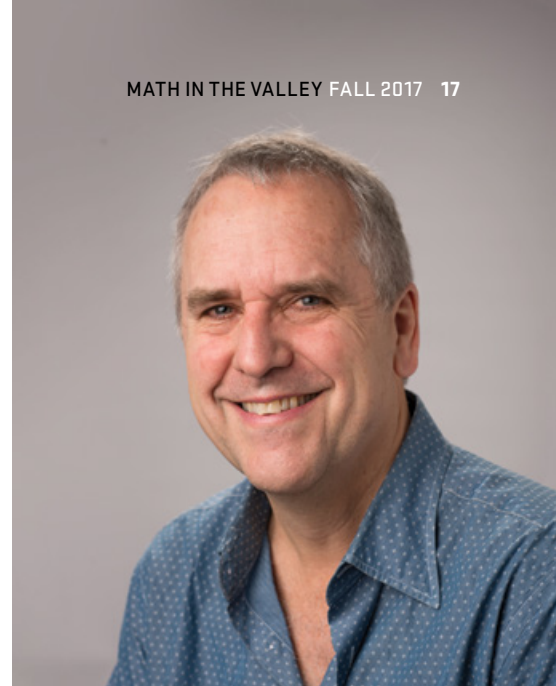
The 2017 Milne Lectures Series featured **Michael I. Jordan**, the Pehong Chen Distinguished Professor in the Department of Electrical Engineering and Computer Science and the Department of Statistics at the University of California, Berkeley. Jordan presented his talk, "On Computational Thinking, Inferential Thinking and Data Science," in May 2017.

The Milne Lecture Series in Mathematics, Statistics, and Computer Science (LMSCS) is a revival of a collaborative series of nine distinguished lectures in honor of founding Mathematics Department Chair William (Ted) Milne from 1981-97.

Jordan presented several research vignettes aimed at bridging computation and statistics, including the problem of inference under privacy and communication constraints, and methods for trading off the speed and accuracy of inference.

"IF YOU KNOW
MATHEMATICS,
YOU CAN DO
ANYTHING."

—William Yslas Velez





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