



Math

WINTER 2017

in the Valley

Featuring alumni, faculty, student and departmental news

Editor

Debbie Farris

Writer

Sriya Nayak

Designer

Sharon Betterton

Department of Mathematics

Enrique Thomann, Head

Newsletter Committee

Vrushali Bokil, chair

Steven Scarborough

Stephanie Wise

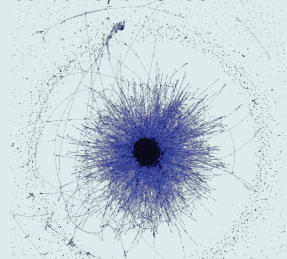
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Department of Mathematics

368 Kidder Hall

Oregon State University

Corvallis, OR 97331

**On the cover**

A de Bruijn graph is a representation of how a set of words overlap. Here the set of words is the contiguous strings of A's, C's, T's, and G's of length 12 found in two sets of DNA sequences, which were obtained by sequencing two different communities of bacteria (one sample in red, one sample in blue).

Graphic provided by David Koslicki, an assistant professor in genomic mathematics.



Math in the Valley

WINTER 2017

2 Alumni

New mathematicians, past postdocs and visitors

5 Retrospect

A departmental history by Hal Parks, Professor Emeritus

6 Our amazing students

Transforming the world through mathematics

12 Balancing the equation

The numbers of women mathematicians at Oregon State are adding up.

18 Faculty

Excellence in research, teaching and leadership

23 News+Events

Building our community



FROM THE HEAD

I am pleased to share our second annual newsletter with recent news about student success, our alumni, exceptional research, teaching excellence, progress in diversity and more. I hope you get a sense for our strong mathematics community and the hard work we are doing.

The cover image created by assistant professor David Koslicki represents the changing face of our research, which is becoming more interdisciplinary and transdisciplinary, while still maintaining our expertise in pure and applied mathematics.

The recent hire of Benjamin Dalziel as an assistant professor with joint appointments in the Departments of Mathematics and Integrative Biology further illustrates our long time commitment to enhancing research and teaching in the life sciences. I would also like to highlight recent faculty awards: National Science Foundation (NSF) research awards to Malgo Peszynska and recently promoted Associate Professor Radu Dascaluc, and a Department of Energy research award to Nathan Gibson.

I am proud of the long-standing record of excellent teaching and training that our faculty continues to provide to our students. Tevian Dray received the Mathematical Association of America's

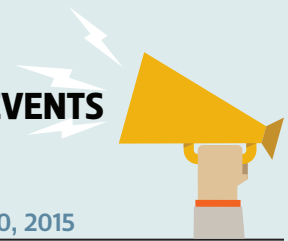
prestigious 2017 Deborah and Franklin Tepper Haimo Award for Distinguished College or University Teaching of Mathematics. Tom Dick received funding for the NSF Noyce Teaching Fellows project to support the teaching of 16 master's students at OSU. Juan Restrepo leads the department by his involvement in the NSF Research and Traineeship program on "Risk and Uncertainty Quantification in Marine Science and Policy" that will train graduate students in mathematics and other STEM disciplines in contemporary problems in Marine Science.

While women are a minority in the field of mathematics and we have a long way to go to equalize opportunities for women, we highlighted in this issue the Mathematics Department's success during the last few decades to advance equalization. I invite you to read about our phenomenal women faculty, their struggles and their successes, and how we might improve gender equality in mathematics and science.

Finally, I want to thank all of our alumni and donors for their generous support and contributions and to applaud their achievements and successes. Please keep in touch and share your stories with us.

Enrique Thomann, Head, Department of Mathematics

PAST EVENTS



MARCH 30, 2015

MILNE LECTURE

"DNA Sequencing in the 21st Century" by Michael S. Waterman

NOVEMBER 23, 2015

MILNE LECTURE

"Statistics: The transfer science, Big Data and an experience with ENCODE" by Peter Bickel

JULY 27–31, 2015

HOSTED CONFERENCE

Computational Representation Theory in Number Theory

APRIL 1–2, 2016

HOSTED CONFERENCE

Pacific Northwest MAA and NUMS

MAY 10, 2016

LONSETH LECTURE

"The Remarkable Journey of Isoperimetric Problem: From Euler to Steiner to Weierstrass" by Richard Tapia

MAY 14–15, 2016

HOSTED CONFERENCE

Pacific Northwest Number Theory

Read more about news and events on page 23.

Alumni

New mathematicians, past postdocs and visitors

Let us know where you are—we'd love to include you in the next newsletter.

POSTDOCS

Anushaya Mohapatra, 2016

Advisor: Patrick DeLeenheer

Chris Jennings-Shafer, 2016

Advisor: Holly Swisher

Thomas Humphries, 2015

Advisor: Adel Faridani

Aditya Adiredja, 2015

Advisor: Tom Dick

RECENT PHD GRADUATES

Timothy Costa, 2016

"Hybrid multiscale methods with applications to semiconductors, porous media, and materials science"

Advisor: Malgo Peszynska

Hieu Do, 2016

"New families of pseudo-Anosov homeomorphisms with vanishing Sah-Arnoux-Fathi invariant"

Advisor: Thomas Schmidt

Duncan McGregor, 2016

"Compatible discretizations for Maxwell's equations with general constitutive laws"

Advisors: Vrushali Bokil and Nathan Gibson

Hussain Al-Hammali, 2016

"Nonuniform Sampling of Band-limited Functions"

Advisor: Adel Faridani

Dojin Kim, 2015

"The Variable Speed Wave Equation and Perfectly Matched Layers"

Advisor: David Finch

SooiHoe Loke, 2015

"Ruin Problems with Risky Investments"

Advisor: Enrique Thomann

Brian Sherson, 2015

"Some results in single-scattering tomography"

Advisor: David Finch

RECENT MASTER'S GRADUATES

Raven Walker, 2016

Eric Fleming, 2015

Matthew Keeling, 2015

Advisor: Mary Beisiegel

Matthias Merzenich, 2016

Advisor: William Bogley

Sayantika Nag, 2016

Zackery Reed, 2015

Advisor: Elaine Cozzi

Wen Chu, 2016

Advisor: David Finch

Sharon Green, 2016

Advisor: Mary Flahive

Michael Griffit, 2016

Charles Camacho, 2016

Christopher Owens, 2015

Allison Stacey, 2015

Advisor: Ren Guo

Jesse Andrews, 2016

Naveen Somasunderan, 2016

Evan Hedlund, 2015

Emerald Stacy, 2015

Advisor: Clayton Pesche

Joseph Umhoefer, 2016

Advisor: Malgorzata Peszynska

Allison Arnold-Roksandich, 2016

Lukas Zeller, 2015

Advisor: Holly Swisher

James Rekow, 2016

Victor Nava, 2015

Advisor: Enrique Thomann

Zheting Dong, 2015

Advisor: Christine Escher

Elisabeth Berg, 2015

Advisor: Robert Higdon

Ian McKay, 2015

Abby Pekoske, 2015

Advisor: David Koslicki

Sarah Erickson, 2015

Advisor: Elise Lockwood

Leslie McDonald, 2015

Advisor: Mina Ossiander

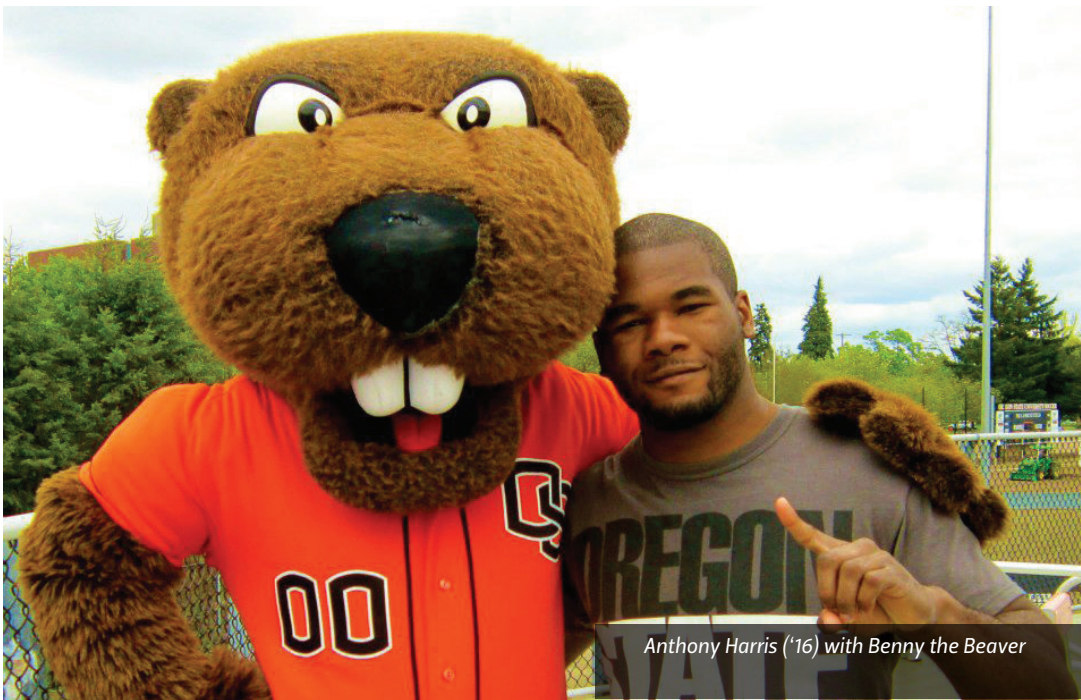
Dwight Holland, 2015

Advisor: Ralph Showalter

Alexander Root, 2015

Advisor: Ed Waymire

>>MATH.OREGONSTATE.EDU/ALUMNI



Anthony Harris ('16) with Benny the Beaver

WRESTLING WITH MATHEMATICS

Mathematics/sociology graduate and wrestler Anthony Harris, received a Pac-12 Postgraduate Scholarship and is pursuing a master's degree in mathematics at Boise State University.

The Pac-12 scholarship provides \$9,000 for two student-athletes from each Pac-12 school annually, and is helping Harris finance his graduate education. Students must plan to pursue a graduate degree, maintain a minimum 3.0 grade point average and demonstrate a commitment to education, campus and community involvement and leadership.

Harris also received the Gem Scholarship from Boise State, which waives all out-of-state tuition.

"One of the challenges of being a student-athlete is practicing twice a day with some of the toughest men in the country," remarks Harris. "Wrestling is a physical sport, and pain is expected. The act of balancing academics and competition is an art on its own."

At OSU, Harris studied applied mathematics and was a math tutor

for five years while working as an information research analyst for four years. He analyzed and interpreted large data sets and then compressed the information into a smaller format.

"I have a love-hate relationship with Math. The frustration is real, but the insight is euphoric," said Harris.

"I scored below average in the SATs, GREs, and subject-matter GREs. But I'm pursuing a master's in mathematics. One can only conclude that potential is not measurable."

Harris transferred to OSU from Sacramento City College after completing an associate's degree in the social sciences and liberal arts with concentrations in math and science. He began his undergraduate education in 2008, and received his bachelor's degree this spring. Reflecting on his time at OSU, he says his experience was not all "sunshine and rainbows."

"It was tough, but enlightening. There was a point where my education was in serious jeopardy due to finances. I was just very fortunate I could convince a few people that my future was worth saving."

WHERE ARE THEY NOW?

Arizona Western College
 Berea College
 Cal Poly SLO
 California State University-Fresno
 California State University-Fullerton
 Carson Company
 Central Washington University
 Chulalongkorn University
 Dalton State College
 Federal Univ. of Rio Grande do Norte
 Flathead Valley Community College
 Green River College
 Google
 Hendrix College
 Highline College
 Intel, Math Kernel Library Team
 Lassen Community College
 Lewis-Clark State College
 Los Alamos National Laboratory
 Milliman, Inc.
 National Energy Technology Lab.
 Oakland University, Michigan
 Oregon Institute of Technology
 Rincor Corp.
 Salesforce.com, Inc.
 Sandia National Labs
 SUNY-Korea
 Truckee Meadows Community College
 University of Alaska, Anchorage
 University of Arizona
 University of Idaho
 University of Oregon
 University of Pittsburgh
 University of Texas at El Paso
 University of Washington Bothell
 Winona State University
 Worcester Polytechnic Institute
 Zillow

>>math.oregonstate.edu/alumni_page

On the heels of this tremendous accomplishment, he has his eyes firmly set on his next goal: a master's degree in applied mathematics.

Harris has gone from student to instructor in just a few months. He was hired in the Department of Mathematics at Boise State, where he is teaching about 200 students without any Teaching Assistants.

But the two-year letterman wrestler for the Beavers is up to the task. Juggling the rigors of mathematics with the demands of life as a student-athlete was no easy feat. Just as Harris mastered how to gain control and restrain power over an opponent on the mat, he applied the same focus, discipline and tenacity in the classroom to be in the position of advantage.

Harris knocked on doors in BSU's Computer Science Department in hopes of securing some research dollars. His resume intrigued two computer science professors. Currently, Harris is doing research in BSU's Information, Security, Privacy, and Mining Research Lab, which examines secure data mining, cyber forensics, genomic privacy, cloud computing and bitcoin.

Harris plans to complete his graduate degree with eight courses and a summer internship in just a year and a half. His goal is to launch a career in Data Science and Cryptology.

Harris has already applied for a summer internship in 2017 and has his sights set on an internship opportunity at a government agency. If all goes well, he hopes to be living in Washington, D.C., next summer.

While his days on the mat may be finished, he hopes to pursue a life in the ring: boxing or exploring mixed martial-arts. Harris was a part of the Corvallis Boxing Club for two years (with seven wins and three losses). "Who said nerds can't fight?" he adds.

Having met the mental and physical rigors of both mathematics and wrestling head on, it seems as if Harris has more than a fighting chance of success.

IN MEMORIAM: AN UNUSUAL ALUMNUS

Dr. Jack R. Borsting, a 1951 mathematics alumnus, passed away after a brief illness in August this year. Borsting had a highly distinguished career in academia and government, and was Professor of Business Administration and Dean Emeritus of the Marshall School of Business at the University of Southern California at the time of his death.

Born to Scandinavian parents in Portland in 1929, Borsting completed his undergraduate studies in mathematics at OSU, and then went on to receive his M.A. and Ph.D. degrees in statistics from the University of Oregon.

Among Borsting's professors at OSU were William E. Milne and Arvid T. Lonseth. By his own admission, Borsting had a very unusual career for a mathematics graduate. He began his career in 1960 at the Naval Post Graduate School in Monterey, Calif., teaching in the Operations Research Department before becoming a dean and then provost there.

Borsting's career took an unexpected yet illustrious turn when he was appointed by Presidents Jimmy Carter and Ronald Reagan to be Assistant

Secretary of Defense for the U.S. Department of Defense from 1980-83, where he acted as Chief Financial Officer, with overall responsibility for the Department's information and budgeting systems, and served on the Defense Resources Board.

From there, Borsting joined the University of Miami where he served as dean of its School of Business Administration from 1983 to 1988. He went on to become dean of USC's School of Business Administration from 1988-94.

At USC, Borsting distinguished himself as both an academic and an administrator. He was a visiting distinguished professor at Oregon State University.

In terms of military service, Borsting served two years with the air force as project officer at the Air Force Special Weapons Center in Albuquerque, New Mexico. He was twice awarded the Medal for Distinguished Service by the Department of Defense.

A few of his many awards and honors include the USC Faculty Lifetime Achievement Award, Oregon State University's 2013 Alumni Fellow award, the Steinhardt Prize for Military Operations Research by the Institute for Operations Research and Management Sciences and the Vance Wanner Award for Distinguished Service to the Profession by the Military Operations Research Society.

Borsting is survived by his wife of 63 years, Peggy Ann Borsting, two children and three grandchildren.

Source: Marshall School of Business, University of Southern California

Retrospect

A departmental history by Hal Parks, Professor Emeritus

Continued from our Winter 2015 newsletter

The Department of Mathematics has benefited from some extraordinary leaders during the past 150 years. Our department chairs have served as strong leaders with inspiring leadership for faculty and have played a pivotal role in the department's success. Perhaps more importantly, the strong values and leadership of our chairs has been critically important to shaping and growing the department.

In our last newsletter, we took a look at our history and identified department chairs who served as strong leaders and who inspired students, faculty, alumni and the University to achieve success. We continue our history of Department of Mathematics chairs below.

FIREY & CARTER

The late 1960s were a time of discontent and turmoil in higher education, which was reflected in OSU's College of Science and the Department of Mathematics. There was much internal turmoil among leadership and faculty. A particularly intense dispute in 1968 even ended with the resignation of the department chair, Arvid Lonseth. William James Firey (1923-2004) then served as acting chairman, followed by a brief term of service by David Southard Carter.

BROWN

Associate Professor James Russell Brown (1932-1985) became chairman in 1970. Brown received his bachelor's degree from OSU and

his Ph.D. from Yale in 1964 under the direction of Shizuo Kakutani. In 1962, he returned to OSU. During Brown's chairmanship, mathematics education was strengthened by several new appointments. In addition to their traditional duties of teaching prospective elementary and secondary teachers, these math education specialists began to work at the state level to interact with mathematics teachers and to upgrade standards for mathematics teaching at all levels.

The Mathematical Sciences Learning Center (now the Mathematics and Statistics Learning Center) was created, offering students tutorial, testing, and other services.

Brown served as chairman until 1977 and resigned his professorship in 1980 to attend law school.

SINCE 1977

Professor Firey again served as acting chairman during 1977-78. During that academic year a nationwide search was held that led to the appointment of Richard Schori as department chairman.

In the 36-year period from 1932 until 1968, there were just two department chairmen. In the last 36 years from 1978 until 2014, there have been eight chairs. We now prefer to use the gender neutral term "Chair" for that role.

The last nine department chairs are listed on the right.

DEPARTMENTAL CHAIRS, 1978-2014

Richard Miles Schori (1978-83)

Ph.D., University of Iowa, 1964

Philip Marshall Anselone (1983-88)

Ph.D., Oregon State University, 1957

Francis Joseph Flaherty (1988-97)

Ph.D., University of California, Berkeley, 1965

John Walter Lee (1997-2000)

Ph.D., Stanford University, 1969

Robert Main Burton, Jr. (2000-01)

Ph.D., Stanford University, 1977

Harold Raymond Parks (2001-04)

Ph.D., Princeton University, 1974

Ralph Edwin Showalter (2004-07)

Ph.D., University of Illinois, 1968

Dennis Joseph Garity (2007-11)

Ph.D., University of Wisconsin, Madison, 1980

Thomas Patrick Dick (2011-14)

Ph.D., University of New Hampshire, 1984

Enrique Thomann (2015-present)

Ph.D., University of California, Berkeley, 1985

Our amazing students

Transforming the world through mathematics

MATHEMATICS + ROBOTICS = GOOGLE JOB

Honors College and mathematics major **Johnathan Van Why** landed a job at Google months before graduation. He was hired as a software engineer at Google's Mountain View, Calif. headquarters, Googleplex.

It is a highly impressive feat considering Google's hiring statistics: They receive more than two million applicants a year and only one in 130 applicants gets a job, according to Forbes and Staff.com. In essence, it is approximately 10 times harder to get a job at Google than it is to get into Harvard University. Not to mention the fact that the multinational tech giant is consistently rated as the most desirable company to work for on a global scale.

Johnathan's case is made more exceptional given that he did not actually apply for a job at Google, but rather stumbled into its recruitment process.

An Albany, Ore. native, Johnathan says he has been passionate about mathematics and programming since the fourth grade. Enthusiastically involved in robotics research in OSU's College of Engineering from his high school days, Johnathan made up his mind to pursue a Ph.D. in robotics at Carnegie Mellon University.

But one day in the summer of 2015, he changed his plans for life after graduation.

Johnathan, who is an avid and

frequent programmer, was doing a programming-related search when a black box with white text popped up with the question, "Would you like a challenge?" Thinking it was a game, Johnathan hit 'yes.' Thus began the gradual unfolding of the Google recruitment dragnet.

Johnathan eventually realized he was being evaluated as a potential hire by Google. He faced off a series of programming challenges of varying levels of difficulty over a 10-day period.

"I was able to select mathematical challenges and I have a solid knowledge of programming. So between the two, I was able to do well at the challenges."

Confronted by one of the most difficult problems in his set of programming challenges, Johnathan was able to solve it rapidly. A recruiter contacted him shortly after that.

"It would have probably been difficult for a computer science major. But it was a basic math problem, which I completed in 21 minutes and sent it off."

As Google is wont to do with job candidates, Johnathan went through onsite interviews at Googleplex as well as a phone interview before receiving an enthusiastic job offer.

When asked if certain mathematics courses at OSU played a role in his success, Jonathan responded, "I am very glad that I had computational

number theory. Problems in that area would repeatedly show up in the online challenges as well as in the interviews."

Mathematics played a vital role in Johnathan's undergraduate research career. He conducted controls research for legged robots and was part of a team that developed software for the multi-university ATRIAS robot project. As the only math major in the robotics lab, Johnathan realized he had unique strengths in a roomful of mechanical engineers.

"Anytime something math-related would come up, I knew what I was doing. Computational number theory, modular arithmetic, multivariable calculus, differential equations and linear algebra—all of them helped me write most of the software that runs the robot and in controls and optimization research."

Johnathan notes that his interests in mathematics, robotics and programming dovetailed in very rewarding and meaningful ways as an undergraduate as well as helped him succeed in his job interview.

"An undergraduate degree in math is a foundation to work on other stuff. You can either go to graduate school or you find another field that relies on math and you get to be the math person on the team. It is so useful in so many fields," added Johnathan.

His parting advice for incoming

mathematics majors: Do research.

“It is hard for an undergraduate to find a research topic in math,” said Johnathan. He recommends that students find applications that they are interested in where mathematics would play an important role.

“For instance, in an area like robotics, math undergraduates can jump in and make significant research contributions.”

A SEMESTER ABROAD

Senior **Caleb Smith** attended the prestigious and rigorous Budapest Semesters in Mathematics (BSM) in fall 2015, a study-abroad program in the beautiful city of Budapest.

Smith and his BSM classmates—mathematically talented students from colleges across the United States and Canada—spent 15 weeks together immersed in measure theory, computation theory and combinatorics. Smith, who is from La Grande, Ore., says he benefited immeasurably from the educational and cultural experiences at BSM.

“The quality of professors is very high. The caliber of students was very high. It was a pleasure to interact with really dedicated young mathematicians-in-training. That was eye-opening and a little humbling,” says Smith.

Smith is a wunderkinder of sorts. He completed a significant part of his



Google recruit Johnathan Van Why developed software for the ATRIAS robot project.



Senior Caleb Smith attended a prestigious study-abroad program in Budapest.



Sooie-Hoe Loke won the 2014–15 Graduate Achievement Award. He is currently an assistant professor of mathematics at Central Washington U.



Emerald Stacy received the 2015 Herbert F. Frolander Graduate Teaching Award

UNDERGRADUATE AWARDS AND HONORS

The Botond Gabor Eross Math Memorial Scholarship award-winners for 2015 are **Cameron Bowie, Samuel Kowash, John Baldwin, Brian Livingston** and **Marianna You.**

The 2015 WIC award was given to **Peter Killgore.**

The 2016–2017 Gilman Scholar is **Dillon Rhoades.** Dillon attended the highly selective Budapest Semesters in Mathematics (BSM) program last fall.

>>math.oregonstate.edu/awards



The decomposition of the "T" Jacobi diagram of order 4, depicted artistically by Ally Stacey.

math major by taking classes at Eastern Oregon University while still in high school, and is all set to graduate at 20 years old. He intends to apply to graduate programs in mathematics and begin graduate school in 2017 with hopes of pursuing his interests in topology.

Smith praised the advising and highly interactive learning community in the department.

“Bill Bogley has been a really good guide and a big influence on my mathematical learning. He helped me with getting all my credits transferred and encouraged me to apply to the BSM program. A big part of my OSU math experience has been doing math with other people. I have built relationships with other people here, doing homework together.”

MATH ART

Fourth-year doctoral student, **Ally Stacey** draws with acrylic and crayon to illustrate her research on knot theory. She has an online art gallery displaying a series of vibrant and beautifully colored circles with sharply delineated intersecting lines and arcs (people.oregonstate.edu/~stacey/gallery.xml). The result is an intricate network of forms melding into one another both inside and outside the circles. The drawings are a literal write-up of her math results and research.

“Math has always been my muse. My gallery is a collection of my results in the form of art pieces,” observed Stacey.

She describes each drawing as an intersection graph made up of diagrams within the circle and chord diagrams that parallel the vertex-to-vertex lines inside the circles.

Stacey started drawing her beautiful geometric patterns as a 20-year-old sophomore at Willamette University when she first encountered knot theory in a topology class. She says her mathematical drawings have taken on a new meaning at Oregon State as she uses her art to explore mathematical problems and properties.

Stacey is excited about her current artistic and mathematical adventures where she tries to decompose wheels of a certain number of spokes into chord diagrams.

“My Ph.D. work has been really inspiring me as an artist. Now I am at a stage where art and research are really the same,” says Stacey, who wanted to delve deeper into knot theory after completing her master’s degree in mathematics, convinced that the subject was going to result in “a lot of art.”

Stacey’s drawings are so complex that they easily give the viewer a glimpse into the vast amount of mathematical research behind them. One of her recent paintings took nearly five months of research and featured in her talk at a graduate topology seminar at OSU. The painting shows the decomposition of the Jacobi Diagram of order 5 into three chord diagrams.

Stacey draws virtually every day. Her interests lie in converting the rigor of mathematical rules into the concrete playfulness of art, leading to the discovery of new shapes and relationships.

Passionate about teaching, Stacey would like to teach mathematics to undergraduates or high school students after completing her Ph.D.

GRADUATE STUDENT HONORS

Jhjh-Jyun Zeng

2016-17 Wei Family Scholarship,

Huanqun Jiang

2016 Gene Golub SIAM summer School Travel Award

Ally Stacey

2016 Topology Students Workshop Travel Award

Emerald Stacy

2016 UCG Summer School Travel Award

Puttha Sakkaplangkul

2016 SIAM Annual Meeting Travel Award; 2016 SIAM Gene Golub Summer School Full Funding

Tim Costa

2016 Oregon Lottery Graduate Scholarship,

Mathew Titus

2015-16 Graduate School Travel Award

Dwight Holland

2015-16 Graduate Achievement Award

Jeff Monroe

2014-15 William F. Burger Graduate Teaching Award

Sooie-Hoe Loke

2014-15 Graduate Student Academic Achievement Award

Duncan McGregor

2014-15 Graduate Student Academic Achievement Award

See website for a current list of awards: math.oregonstate.edu/graduate-awards

“Any opportunity I get to teach my own class at OSU, I just take it because I love teaching.” Originally from Great Falls, Mont., she says her dream is to teach in the mathematics program at her undergraduate alma mater.

Stacey has always loved mathematics. She has a younger sister who is a high school chemistry teacher and says her parents are very happy to have “two STEM-teacher daughters.”

Stacey has given a few mathematics talks where she has shown audiences slides of her paintings. The reaction to her “math art” has been overwhelmingly positive and lay people as well as her math students can actually grasp facets of knot theory through her sketches. “I like using the concreteness of art to explain abstract mathematical stuff.”

Stacey’s meetings with her advisor, **Ren Guo**, usually begin with her ecstatic proclamation, “Ren, look at the art I did this week!” The talk then turns to a discussion of the mathematics in the art.

“My advisor is impressed and very encouraging of my art because it is a completely different way of looking at the subject,” said Stacey. She added, “When I complete my dissertation, it will contain this much art (throwing her hands wide open) and this much math (drawing her hands close together).”

GOING BEYOND MATH: INTERDISCIPLINARY STUDIES

Our graduate students are increasingly involved in interdisciplinary studies. **Kirana Bergstrom** and **Joseph Umhoefer** are studying fluid and ocean dynamics; **Patricia Medina** and **Tim Costa**

conducted research in porous media; **Jason McClelland** is examining bioinformatics; and **Duncan McGregor** and **Puttha Sakkaplangkul** are working on computational aspects of electromagnetic wave propagation.

OUTSTANDING GRADUATE TEACHING ASSISTANT

Congratulations to Ph.D. student **Emerald Stacy** who received Oregon State University’s 2015 Herbert F. Frolander Award for Outstanding Graduate Teaching Assistant. The award recognizes graduate teaching assistants who demonstrate outstanding teaching and professional involvement with both faculty and students.

Currently in her fifth year of the graduate program, Stacy has excelled as a graduate teaching assistant, helping hundreds of students tackle math at Oregon State.

Stacy is also committed to helping female students succeed and shrinking the gender gap in math. Her mentor is associate professor Holly Swisher, from whom she has drawn tremendous inspiration.

Stacy is no stranger to math, teaching and Corvallis: She was born in Corvallis and her father was an instructor in OSU’s Department of Mathematics as well as chair of the math department at Bellevue College in Washington state.

Although math has always been her passion, Stacy took up advanced studies in mathematics 10 years after graduating from college with an undergraduate degree in math. Stacy ran a coffee shop and a bead making business before deciding to return to mathematics as a graduate student

because she wanted to do something bigger and more fulfilling in her life.

“For me this award is an indicator that after spending my twenties trying to pull my socks up, I was able to meet graduate school head on,” said Stacy.

Recently Stacy earned a Graduate Certificate in College and University Teaching. Students complete this 18-credit certificate program on top of their graduate coursework and research.

ON THE ROAD

Our students traveled and participated in regional, national, international conferences, workshops and summer schools at the Mathematical Sciences Research Institute in Berkeley, Calif., Institute for Mathematics and its Applications at University of Minnesota, Statistical and Applied Mathematical Sciences Institute in North Carolina and Centré International de Rencontres Mathématiques in Luminy, France.

Three of our graduate students—**Huanqun Jiang**, **Puttha Sakkaplangkul**, **Will Mayfield**—were selected by the Society for Applied and Industrial Mathematics (SIAM) to attend the 2016 Gene Golub SIAM summer school on “Stochastic Wave Propagation” at Drexel University in Philadelphia.

INTERNSHIPS

Our graduates have been pursuing prestigious and rewarding internships in government labs.

Duncan McGregor: Projects on computational electromagnetics at Los Alamos National Lab and Department of Energy National Energy Technology Laboratory (DOE NETL).

Tim Costa: Projects on multiscale modeling at Sandia National Laboratory, 2015–2016.

Joseph Umhoefer: Project on modeling and predicting the oil spill impact at DOE NETL.

Kirana Bergstrom worked in summer 2016 at the Los Alamos National Laboratory estimating model bias in data assimilation methods using machine learning with applications to solar physics.

Will Mayfield will participate in National Center for Atmospheric Research workshops on Uncertainty Quantification in climate and weather. He is involved in the NSF supported Research Traineeship on Risk and Uncertainty Quantification in Marine Science starting in fall 2016.

CONFERENCE HIGHLIGHTS, 2015–2016

Tim Costa: SIAM Geosciences 2015.

Mathew Titus: Joint Mathematics Meetings (JMM) 2016.

Duncan McGregor: SIAM Computational Science and Engineering (CSE) 2015.

Puttha Sakkaplangkul: SIAM Annual Meeting 2016, SIAM Nonlinear Waves 2016, SIAM CSE 2015, Pacific Northwest Numerical Analysis Seminar 2015.

Zack Reed and **Sarah Erickson:** Research on Undergraduate Mathematics Education, JMM 2016.

Hieu Do and **Brandon Edwards:** American Mathematical Society (AMS) Special Session, 2016. Moduli Crossroads Retreat at University of

Wisconsin, 2015.

Brandon Edwards: CIRM Dynamics and Geometry in the Teichmüller Space conference, Luminy, France, 2015.

A SUMMER OF GRADUATE MATHEMATICAL SCIENCES RESEARCH

Our graduate students have had wonderful learning experiences at the Mathematical Sciences Research Institute (MSRI) Summer Graduate School in the University of California-Berkeley. Every summer MSRI organizes several summer graduate schools.

The past two summers the following students have participated in the MSRI:

Charles Camacho (2016): Chip Firing and Tropical Curves.

Dwight Holland (2016): Harmonic Analysis and Elliptic Equations on real Euclidean Spaces and on Rough Sets.

Joseph Umhoefer (2016): Electronic Structure Theory.

Forrest Parker (2015): Geometric Group Theory.

>>math.oregonstate.edu/graduate-stories



MATHEMATICAL EXCELLENCE

Congratulations to **Timothy Costa** who earned his Ph.D. this year and embarked on his “dream job.” Costa is a software engineer at Intel and he works on the Intel Math Kernel Library. Costa was an outstanding graduate student at Oregon State and has many achievements to his credit.

With his advisor Malgorzata Peszynska, Costa published numerous research articles and focused his research on applied and computational mathematics. He was a graduate research assistant on multiple NSF funded interdisciplinary projects. Tim’s Ph.D. focused on “Hybrid Multiscale Methods with Applications to Semiconductors, Porous Media, and Material Science.”

Costa has presented his research at 9 national and international conferences and spent a year as an intern at Sandia National Laboratories. Costa’s many awards for exceptional academic achievement include the department’s Graduate Academic Achievement Award, the Oregon Lottery Graduate Scholarship and the Distinguished Dissertation Award at Oregon State University.

“I left Oregon State having accomplished everything I had hoped to accomplish in graduate school and more,” said Costa.

Balancing the equation

The numbers of women mathematicians at Oregon State are adding up.

Mathematics associate professor Holly Swisher is eloquent about what it means to be a woman mathematician at a time when the number of female research mathematicians continues to remain low.

“I think the biggest obstacle for an individual in an underrepresented group is just being able to see yourself doing a certain job that people have never imagined someone like you doing. I can think of at least three instances when a female student has come up to me and said, ‘Meeting you makes me visualize myself in this job.’ ”

Swisher is one of nine women tenure track faculty in Oregon State University’s Department of Mathematics, an impressive number considering the national trend. When you do the math, that’s 30% women in the department, which is home to 30 tenured and tenure-track faculty.

According to a 2010 survey by the Conference Board of the Mathematical Sciences, women comprise only 14% of the tenured and tenure-line faculty at doctoral-level mathematics departments. Despite

gains in the numbers of women opting to study math and science*, a large disparity exists between men and women’s representation in tenured and tenure-track positions in the fields of mathematics, physics and engineering.

The statistics clearly indicate that the gender composition of OSU’s Mathematics Department marks a striking departure from the norm.

Currently, the department has three tenure-track women mathematicians: Elaine Cozzi, Mary Beisiegel and

Christine

Holly

ELAINE

MARY

Elise



on

Elise Lockwood. It has two associate professors, Vrushali Bokil and Holly Swisher, and four professors, Mina Ossiander, Mary Flahive, Christine Escher and Malgo Peszynska.

Ossiander, who joined the department in 1988, was the first woman to become a full professor. The women mathematicians boast of highly impressive research and teaching accomplishments. They have received competitive research grants from prestigious institutions across the country, and have been lauded for

their extraordinary teaching and service contributions.

Cozzi was awarded a 4-year National Science Foundation (NSF) grant for a project on mathematical fluid mechanics and the graduate student faculty award for her mentorship and teaching. Bokil has received multiple NSF awards as well as grants from the National Energy Technology Laboratory (NETL). She is currently collaborating with a mix of biologists and mathematicians on a project funded by NIMBioS, the NSF funded

National Institute of Mathematical and Biological Synthesis.

Escher has received grants from the NSF and the Association for Women in Mathematics for her work in algebraic topology and differential geometry. Mary Flahive has collaborated with Bella Bose in computer science on work funded by NSF. She has written three books, including a research monograph published by the American

Mathematical Society, and has received the College of Science's Olaf Boedtker Award for

Vrushali

MALGO

Mary



From left to right: Elise Lockwood, Christine Escher, Holly Swisher, Elaine Cozzi, Mary Flahive, Vrushali Bokil, Malgo Peszynska, Mary Beisiegel. Not pictured: Professor Mina Ossiander

Excellence in Undergraduate Advising.

A computational mathematician, Malgo Peszynska has received numerous NSF and Department of Energy grants (DOE, NETL) for her interdisciplinary research projects spanning computational mathematics and applications in hydrology, oceanography, environmental engineering, physics and materials science.

Ossiander, whose research encompasses theoretical and applied probability, has been principal investigator and co-investigator on a number of grants from NSF and other governmental agencies. Recently she has contributed her expertise in statistical modeling to interdisciplinary projects in hydrology and geostatistics.

Holly Swisher is a member of one of the most ambitious mathematical collaborations in recent times. She was chosen to join a team of more than 70 mathematicians from 12 different countries who worked over a period of five years to create a massive mathematical database called the “L-functions and Modular Forms Database (LMFDB). The database catalogs objects of central importance in number theory and maps out the intricate connections between them.

A specialist in mathematics education for post-secondary teaching, Mary Beisiegel has been awarded an NSF grant for “Improving Undergraduate STEM Education,” a collaborative effort among 11 institutions aimed at improving teaching in lower division mathematics and science courses.

Elise Lockwood, an expert in mathematics education research, is a co-principal investigator on a

grant awarded by the NSF Research on Education and Learning (REAL) program.

Lockwood investigates student learning in a variety of mathematical environments. “My zeal for math education research developed when I took a combinatorics class,” Lockwood observed. “I fell in love with counting problems and became obsessed with learning everything I could about why students struggle to solve such counting problems and how I could help them improve.”

Many say they learn something new every day as mathematicians.

“I loved math before I knew what a ‘career’ is,” said Peszynska, who grew up in Poland and once encountered a university professor who called her parents to suggest they steer their daughter to a career other than mathematics. Her sentiments toward the pursuit of mathematics are widely shared by her colleagues.

“What inspires me is my love for teaching mathematics and sharing the conceptual ideas and representations with students,” emphasized Beisiegel. Escher enjoys studying the “powerful tools” of algebraic topology and their uses in various other fields such as differential geometry and theoretical physics. “It is a beautiful connection between different areas of mathematics that leads to strong classification theorems.”

DUAL CAREER MATHEMATICIAN COUPLES

In a study of dual-career academic couples by Stanford University’s Clayman Institute of Gender Research, a participant remarked, “Talented

academics are often partnered, and if you want the most talented, you find innovative ways of going after them.” Not surprisingly, traditionally a lack of institutional support for dual-career hiring or meeting the needs of academic couples has held women back from pursuing competitive jobs in academic STEM fields.

A key reason behind the Mathematics Department’s success in hiring and retaining higher numbers of female mathematicians is its friendly and encouraging attitude toward accommodating academic couples. The department has successfully implemented a dual hiring initiative in several cases and currently has five mathematician couples in tenured or tenure-track positions—all of whom were partnered before they arrived at Oregon State.

There is ample evidence suggesting that lack of career support for partners leads to a high proportion of women accepting non tenure-track and part-time positions at research universities, instead of tenured or tenure-track positions. The American Association of University Professors views partner hiring at academic institutions as “common and necessary.”

There is yet another unconventional feature that sets the Mathematics Department apart from most other academic departments—in most of its dual partner hires, the woman was the first hire. According to a survey of 9,000 full-time faculty at 13 leading U.S. research universities, men comprise the majority of first hires: 58%, in fact, reported Stanford University’s Clayman Institute. OSU’s Mathematics Department has reversed the gender ratio in this respect.



Bokil observed that four of the five women mathematicians were the first hire. OSU was able to successfully hire their partners for faculty positions as well. It was a win-win situation: the partner hires brought skills and qualifications that matched important research and teaching objectives in the department.

When Cozzi was interviewed, she informed the hiring committee that her mathematician spouse, Clay Pletsche, was on the job market as well. They were both interviewed and both offered tenure-track jobs.

“The department made a huge effort to consider both of us for jobs. They are very good at taking advantage of situations where there are two people who want to come and are quality candidates,” said Cozzi.

Mentorship has also played a significant role in enhancing the career success of women faculty.

“This department has been, in addition to creating space for spouses, really good in mentoring young faculty,” Bokil pointed out. She was mentored by men and women in the department,

and received valuable advice on writing grants, editing proposals, applying to workshops and conferences.

“In our department, people go out of their way to think of others, help others, promote others,” added Bokil. Several research studies have shown the significance of mentoring for women’s success in achieving tenure and promotion.

A number of OSU women mathematicians say they attended Ph.D. programs where there were no or very few female research professors. Swisher

had very few women professors in graduate school. “At University of Wisconsin-Madison, while I was a graduate student, there were only two female faculty out of 50 professors. It was very different from here,” said Swisher.

Little wonder then that Oregon State’s Department of Mathematics feels like a breath of fresh air to its women professors.

The department’s younger women mathematicians were encouraged at what they saw during the interview process: the hiring committees were either chaired by women or comprised women members.

“I think, in some degree, I was drawn to a department where I saw other women. OSU Math has done a really good job ensuring they interview qualified women candidates and then give them a chance to showcase their work,” said Cozzi.

Flahive, who joined the department in 1990, has witnessed the gender diversification of the Mathematics Department over the years.

“It has something to do with the attitude of my colleagues. We don’t think of hiring women mathematicians as unusual.”

OVERCOMING BIASES AND STEREOTYPES

Society at large continues to stereotype mathematics as a male domain, and such beliefs can discourage women from entering or pursuing mathematical careers. A 2010 CBMS survey reported that women earn 45% of the undergraduate degrees in mathematics, but women comprise

only 11% of tenured faculty and 27% of tenure-eligible faculty in doctoral mathematics departments.

OSU’s Mathematics Department has done its fair share to overturn stereotypes about gender and mathematical ability and send a powerful message that women can do math and excel at very high levels of mathematical performance.

Women mathematicians at OSU have mentored and advised high numbers of women undergraduate and graduate students as well as postdoctoral researchers over the years. Bokil proudly mentioned that her first doctoral student was a woman who is pursuing a successful research career at Los Alamos National Laboratory.

They are also acutely aware of their influence as educators and mentors in a field that has fewer female role models.

Swisher is the organizer and faculty mentor of OSU’s highly successful Research Experiences for Undergraduates (REU) program in Mathematics, an NSF-funded research program in mathematics and theoretical computer science for undergraduate students that has been held nearly every summer since 1987.

Focused on cutting-edge research in pure and applied mathematics, the REU program supports 10 undergraduate students and runs for eight weeks in the summer. The program has a strong track record of enrolling at least 50% female students in each cohort from large and small, public and private universities who would not otherwise be exposed to the research process.

There were times as a student when

Cozzi, who conducts research in mathematical analysis, admits she would find herself thinking, “I am the only woman in this room. Maybe there is something to this idea that I don’t belong.” Cozzi is pleased that some of the women she is teaching may see her and believe that a research career in mathematics is possible.

Over the years, Bokil has found herself thinking about cultural forces that stand in the way of women mathematicians. After attending numerous mathematics conferences throughout her career, she was struck by the privileges enjoyed by men.

“I notice that male mathematicians at conferences get more exposure, more access to research networks and collaborations. It can appear as an impenetrable men’s club.” This year, Bokil is part of a research group of three women that has received funding to do research at the Institute of Computational and Experimental Research in Mathematics (ICERM) at Brown University and the Mathematisches Forschungsinstitut Oberwolfach (MFO) in Germany.

“I was determined to find more women mathematicians to work with. I think this is one way women mathematicians can be successful: By coming together to form research teams,” Bokil said.

A number of initiatives exist to redress gender imbalance in mathematics and combat entrenched sociocultural biases that hold back women mathematicians in the areas of research collaboration, promotions, research awards, inclusion in journal editorship, scientific associations and conference committees. Prominent among them is the Association for



Women in Mathematics (AWM), which supports domestic and foreign research travels for women mathematicians and has recently received a \$750,000 NSF ADVANCE grant to help establish research networks for women by fostering research collaborations at conferences and AWM Workshops.

**According to the National Science Foundation, in 1966 women earned 6% of doctorates in mathematics and in 2006 earned nearly 30% of doctorates.*

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Faculty

Excellence in research, teaching and leadership

WELCOME!

Ben Dalziel has joined the department as an Assistant Professor with a joint appointment in integrative biology, after a year as a postdoctoral research associate in the Department of Ecology and Evolutionary Biology at Princeton University. He has a Ph.D. in ecology and evolutionary biology from Cornell University.

Dalziel is a population biologist working at the interface of theory and data. He uses mathematical models to uncover causal connections among different types of time-series data, including high-resolution data on animal movement patterns, population density, and the incidence of infectious disease.

Current applications include using cities as natural experiments to explore how population structure affects the frequency and severity of epidemics, and the risk posed by emerging pathogens, and understanding the emergence of animal migration patterns from individual and collective behavior.

Aijun Zhang joined us this fall as a Postdoctoral Scholar in Mathematical Biology. He received a Ph.D. in mathematics from Auburn University in 2011, and has been a visiting assistant professor at the University of Kansas, Drexel University and the University of Arkansas.

Zhang's research interests are

in differential equations with applications to mathematical biology, computational neuroscience and dynamical systems.

TENURE AND PROMOTIONS

The Department of Mathematics congratulates the following faculty for receiving promotions and/or tenure for the 2015–16 academic year. Outstanding!

Radu Dascaliuc has been promoted to Associate Professor and granted indefinite tenure. His research focuses on qualitative properties and long-time behavior of nonlinear partial differential equations.

Stephanie Bowers and **Lyn Riverstone** have been promoted to Senior Instructor I of Mathematics. Riverstone is also serving as Interim Assistant Dean of Academic and Student Affairs in the College of Science.

Marie Franzosa and **Scott Peterson** have been promoted to Senior Instructor II of Mathematics.

TEACHING AWARDS

Mathematics professor **Tevian Dray** was awarded the 2016 Outstanding Educator in Science and Mathematics, Higher Education Award by the Oregon Academy of Science. His wife, physics professor Corinne Manogue, was also honored with this award! The award promotes merit in research and

education by recognizing individuals who have made an extraordinary impact in their fields. Academy officials say that award winners serve as inspirational leaders to members of the Oregon Academy of Science, and embody the core values of serving students and advancing science for the common good.

Dray and Manogue have co-authored dozens of publications addressing ways to improve mathematics and physics education. Through initiatives such as “Paradigms in Physics” and the “Vector Calculus Bridge Project,” they have helped change how students learn math and physics, while working with professional organizations regionally and nationally to improve teaching and foster awareness of best practices.

Tevian Dray is also the winner of the Mathematical Association of America's prestigious 2017 Deborah and Franklin Tepper Haimo Award for Distinguished College or University Teaching of Mathematics.

Mathematics instructor and undergraduate advisor **David Wing** received the 2015 Loyd Carter Award for Outstanding and Inspirational Undergraduate Teaching in Science. He is the first math instructor to win this award in 30 years.

NEW GRANTS

Nathan Gibson is co-PI for a \$1.2M grant awarded from the Bonneville



Ben Dalziel



Aijun Zhang



Radu Dascaliuc



Lyn Riverstone

Power Administration (BPA): Framework for Quantification of Risk and Valuation of Flexibility in the FCRPS, along with PI Leon (Civil), Co-PI Hoyle (MIME), Co-PI Chen (Applied Economics) and Co-PI Fuentes (Statistics). This three-year project seeks to apply uncertainty quantification techniques and robust optimization to statistical and economic models of the Federal Columbia River Power System (FCRPS) in order to quantify flexibility and value risk. This work continues the OSU effort funded by BPA for the previous three years.

In August, **Radu Dascaliuc** (PI) was awarded National Science Foundation grant DMS-1516487, “Collaborative research: Turbulent cascades and dissipation in the 3D Navier-Stokes model.” The main theme of the project is a rigorous study of various manifestations of turbulence in three-dimensional fluid flows modeled by the Navier-Stokes equations. This is considered both from the perspective of the mathematical theory of turbulence, and as a physical mechanism underlying possible blow-ups (singularities) of the solutions of the system. This is a three-year grant in the amount of \$79,000.

Malgorzata Peszynska (PI) has received a National Science Foundation grant to explore “Phase transitions in porous media across multiple scales.” This 3-year, \$384K grant is in computational mathematics and will involve graduate and undergraduate

students. The grant will combine modeling, rigorous analysis, and computations as well as continued collaborations with colleagues from oceanography, imaging science, and high performance computing.

Dan Rockwell was awarded an individual learning innovation grant in 2015 to purchase 3D printed teaching aids for mathematics courses. Dan has worked in the design and redesign of teaching aids also known as manipulatives. He has designed items that help students understand the primary concept of “the two path test for the non-existence of limits in 2 dimensions” topic in multivariable calculus.

MAKING A BOLD MARK ON STEM EDUCATION

Mathematics faculty are actively involved on two NSF-funded projects at Oregon State that impact STEM (Science, Technology, Engineering, and Mathematics) education at both the K-12 and college levels.

\$1.39 million NSF grant to support math and science teaching fellows

Mathematics professor **Tom Dick** is the principal investigator on a Noyce Teaching Fellows Project that will provide funding for 16 teaching fellows to complete a Master’s degree program in secondary mathematics or science education at OSU. Rebekah Elliott (mathematics education) and SueAnn

Bottoms (science education) serve as Co-PIs from the College of Education.

Teaching Fellows are provided with both a \$16,000 forgivable fellowship loan during the Masters degree licensure program and a full academic year of tuition remission through the OSU graduate school.

Following successful completion of the Masters degree licensure program, each Teaching Fellow is expected to serve four years in a high needs local educational agency defined by at least one of the following: high percentage of individuals from families with incomes below the poverty level, high percentage of secondary teachers not teaching in the content area in which they were trained, or high teacher turnover.

Teaching Fellows will receive mentoring and professional development in preparation to take on leadership roles. Part of the fellowship loan is forgiven for each year served as a mathematics or science teacher in a high needs setting, with 100% forgiven after four years. In addition, each fellow will receive a \$10,000 annual salary supplement for each of the four years.

The Noyce project is a collaborative partnership between OSU's Mathematics Department, the College of Science, the College of Education and the Graduate School.

The Mathematics Department is a recognized leader in K-12 mathematics teacher education, and this latest project builds on two previous major NSF-funded efforts in the past decade: the Oregon Mathematics Leadership Institute project from 2004-12 (Math Science Partnership Program) and

the Mathematics Studio Fellowship Program (Noyce Scholarship Program) from 2009-15.

ESTEME@OSU and the Math Excel program

The ESTEME@OSU (Enhancing STEM Education at Oregon State University) project is supported by the National Science Foundation's WIDER (Widening Implementation & Demonstration of Evidence-Based Reforms) program which enables STEM faculty members to substantially increase their use of evidence-based instructional practices.

Mathematics professor **Tom Dick** is a co-PI. The principal investigator is Milo Koretsky of the Department of Chemical, Biological & Environmental Engineering.

ESTEME@OSU seeks to improve student learning in STEM fields by widening the implementation of evidence-based teaching and learning practices. What many of these practices have in common is the engagement of students in active learning in a variety of STEM courses. In the mathematics department, the ESTEME@OSU project has focused our Math Excel program on the first-year calculus sequence taken by so many science, mathematics, and engineering majors.

What is Math Excel? Imagine a room full of students working together in small groups solving relatively challenging math problems. The room is noisy, there is laughter, and there is much conversation about mathematics.

The model for Math Excel is based on University of Texas, Austin mathematician Uri Treisman's Emerging Scholars Program and is

nearing its 20th year at OSU. The ESTEME@OSU project has enabled the department to widen the impact of Math Excel to reach more students in introductory calculus.

MASSIVE ONLINE DATABASE LAYS FOUNDATION FOR 21ST CENTURY MATHEMATICS

Associate Professor of Mathematics **Holly Swisher** is part of an international team of mathematicians that released a massive mathematical database that catalogs objects of central importance in number theory and maps out the intricate connections between them.

The "L-functions and Modular Forms Database" (LMFDB) serves as an atlas of mathematical functions and other objects, and also reveals deep relationships in the abstract universe of mathematics.

The team includes over 70 mathematicians from 12 countries and more than a dozen research areas. They represent a range of institutions including the American Institute of Mathematics; Arizona State University; University of California, San Diego; Massachusetts Institute of Technology; Oregon State University; University of Vermont; University of Vienna, Austria; University of Warwick, UK; and others.

Swisher has been a member of the project since its first official workshop in Paris during the fall of 2010. The LMFDB explores underlying relationships among elliptic curves, modular forms and L-functions as well as their intricate web of mathematical subcategories. Every mathematical object has connections to objects in other categories, which project members refer to as its "friends."



Marie Franzosa

The LMFD is really the only place where these interconnections are given in such clear, explicit, and navigable terms,” Swisher said. “Before our project it was difficult to find more than a handful of examples, and now we have millions.”

Read more online at AllMath.org.

NEXT GENERATION OF SCIENTISTS TO MANAGE OCEAN SYSTEMS

Mathematics professor **Juan Restrepo** is a co-principal investigator on a transdisciplinary research team, including professors **Enrique Thomann** and **Ed Waymire**, that was awarded \$3 million to implement the National Science Foundation (NSF) Research Traineeship on campus.

The program encourages the development of bold, transformative models for graduate education in STEM.

The proposal, “Risk and uncertainty quantification in marine science and policy,” prepares a new generation of natural resource scientists and managers to study, protect, and manage ocean systems.

NSF chose Oregon State to develop the program, which focuses on the use of Big Data to analyze and understand the effects of human activities and climate change on the ocean system around the world. It also requires students to look at the impact of potential management decisions on the stakeholders—the fishing industry, for example—as well as the environment.

Aimed at advancing graduate education training in STEM, the program emphasizes the use of big data and mathematical and statistical

models to address climate and policy problems in marine systems.

The program will provide more than 30 fellowships for OSU master’s and doctoral students, with room for 30 more students if they have alternative funding. Students and participating faculty will determine the projects.

MATH WELL REPRESENTED AT 2016 JOINT MATHEMATICS MEETINGS

The Mathematics Department was well represented at the 2016 Joint Mathematics Meetings (JMM) in Seattle in January 2016. The JMM is the largest mathematics meeting in the world, attracting about 5,600 mathematicians.

The following OSU faculty, postdocs and students presented their research and participated in panel discussions: Assistant Professors Clayton Petsche, Elaine Cozzi, Radu Dascaliuc, David Koslicki and Mary Beisiegel; Associate Professor Holly Swisher; and Professors Patrick De Leehnheer, Tevian Dray, David Finch and Tom Dick; Instructor Torrey Johnson; Postdoc Anushaya Mohapatra; and students Sarak Erickson, Emerald Stacey, Jesse Andrews, Zachary Reed, Matthew Titus, Allyson Rogan Klyve and Brandon Edwards.

Professor Emerita **Barbara Edwards** organized a Mathematical Association of America session, Professional Development for Mathematicians, which featured a talk by mathematics professor **Tevian Dray** and his wife, physics professor Corinne Manogue.

In addition to these sessions, 20 faculty and students presented talks in various sessions and panels at JMM.



Scott Peterson



Malgo Peszynska in Brazil. Malgo was a plenary lecturer at CENPES in Rio de Janeiro.



Vrushali Bokil at the Great Wall of China. Vrushali was an invited speaker at ICIAM.

TAKING MATHEMATICS AROUND THE WORLD

Vrushali Bokil was an invited speaker in the mini-symposium “Women in Applied Mathematics: Recent advances in modeling, numerical algorithms, and Applications,” at the 8th International Congress on Industrial and Applied Mathematics, held in Beijing in 2015. It sought to bring women mathematicians together to share current research and was one of the first of its kind in China.

Adel Faridani gave an invited talk at the workshop “Inverse Problems in the Alps” in Obergurgl, Austria.

Malgo Peszynska was a plenary lecturer at the Workshop on Unconventional Reservoirs, Research Center of Petrobras in Rio de Janeiro, Brazil in August 2014; she was also a visitor at Laboratorio Nacional de Computacao Cientifica, Petropolis, Brazil, and gave invited talks at Computational Methods in Water Resources conference in Stuttgart, Germany and in Mathematisches Forschungsinstitut in Oberwolfach, Germany.

Ed Waymire was an invited speaker at the 2015 Aarhus Conference on Probability and Statistics in Denmark.

Ralph Showalter was an invited participant at the 2016 Gordon Research Conference in Girona, Spain as well as at the Isaac Newton Institute in 2016 in Cambridge, UK.

RETIREMENTS

After 15 years of service as an instructor, **Stephen Scarborough** has retired from the Mathematics Department at the rank of Senior Instructor I. Steve earned his Ph.D. in

mathematics from Oregon State in 1982. He worked with Dave Carter in the area of applied analysis. Steve’s first job was as an assistant professor at Loyola Marymount University in Los Angeles. For family reasons, Steve left LMU as an associate professor in 2000 and moved to Oregon. He joined the faculty at OSU in 2001.

Dianne Hart arrived at OSU in 1981 as a graduate student having earned her master’s degree from the University of Illinois. In 1991, Hart earned her Ph.D. under the guidance of Tom Dick. Her dissertation was the first in mathematics education that had been accepted by the Mathematics Department. Hart worked as an instructor from 1996–98 and from 2000 to 2015 before she retired at the rank of Senior Instructor I.

Her accomplishments included co-developing material for the calculus sequence and for the sequence for pre-service elementary teachers.

Hart was involved in two large NSF-funded projects at OSU: the Calculus Connections Project in the 1990s and the Oregon Mathematics Leadership Institute (OMLI) project from 2005–07, where she served on the geometry instructional team involving 180 K–12 mathematics teachers.

IN MEMORIAM

Source: “In Memoriam: Cliff Kottman” <http://opengeospatial.org/ogc/honors/kottman>

Cliff Kottman of Clifton, Va. (1942–2014) was a beloved mathematics professor at OSU (1970–76). After an early and rewarding career as a teacher and researcher at OSU—where he received tenure—and at

Louisiana State University, Kottman went on to distinguish himself as a brilliant and far-sighted innovator and mathematician in geospatial information and technology within government and industry.

Kottman served as technical leader at the Defense Mapping Agency, a National Geospatial Intelligence Agency’s predecessor organizations. He held positions at NGA, Lockheed, MITRE and Open Geospatial Consortium, where he was vice president for technology development and chief scientist.

During his long and impressive career, Kottman pioneered the development of many important aspects of geospatial intelligence standards and expanded the use of digital geospatial technologies. He was widely lauded for being a scientific visionary and an outstanding teacher who had the ability to translate complex ideas on geospatial mobility into lucid and comprehensible terms.

Kottman graduated with his bachelor’s from Loyola University. He earned his M.S. and Ph.D. degrees in mathematics from the University of Iowa. He is survived by his wife, Toni Kottman, and their children and grandchildren.

Kottman’s career took him all over the globe, and he and his wife enjoyed traveling immensely.

“When we first married, Cliff put a large map on the wall and said, ‘Let’s see if we can get to all 50 states before we go overseas to Europe.’ We got to 47 of the states and later to about 30 countries,” wrote Mrs. Kottman in an email.

The department expresses heartfelt thanks to Toni Kottman for her generous donation of math books.

News + Events

Building our community

2016 LONSETH LECTURES: MATHEMATICIAN AND DIVERSITY ADVOCATE RICHARD TAPIA

The 2016 Lonseth Lecture was presented by Rice University mathematician **Richard Tapia** on May 10, 2016. Dr. Tapia delivered a lecture on “The Remarkable Journey of Isoperimetric Problem: From Euler to Steiner to Weierstrass.” His talk offered an overview of the history of the impactful isoperimetric problem.

Tapia also presented a lecture on diversity for STEM leaders and faculty across campus about, “Building a Culture of Diversity in Higher Education: Obstacles and Successes.” His public lecture, “Using Mathematics to Enhance My Personal Life” featured his creative use of mathematics to tackle the fair lane assignment problem in BMX bicycle racing.

Dr. Tapia is a University Professor in Rice University’s Computational and Applied Mathematics Department, the university’s highest academic title awarded to only seven faculty in its history.

Internationally recognized for his research in the computational and mathematical sciences, Tapia is a national leader in the preparation of women and underrepresented minority doctoral degree recipients in science, engineering, and mathematics.

Tapia is a first-generation college

graduate born to parents who emigrated from Mexico. He was honored with the 2011 National Medal of Science by President Obama.

The Lonseth Lecture Series was established in 1985 to honor Arvid T. Lonseth, former chair of the Mathematics Department. A superb and devoted scholar and teacher of mathematics, Lonseth joined OSU in 1948. The lecture series is a testimony to his deep commitment to the mathematical education of students.

2015 MILNE LECTURES

It was a busy year for the Milne Lectures in Mathematics, Statistics and Computer Science.

Oregon State mathematics alumnus, **Michael S. Waterman** ('64, '66), was the first Milne speaker of 2015 and delivered a public lecture on “DNA Sequencing in the 21st Century” in March. In his talk, Waterman discussed the mathematical, statistical and computational challenges of sequencing DNA.

One of the founders and current leaders in the area of computational biology, Waterman helped create the international conference Research in Computational Molecular Biology and is a founding editor of the *Journal of Computational Biology*.

Waterman also delivered a second lecture entitled, “Using Word Counts

for Alignment Free sequence Analysis.”

This lecture was organized by mathematics faculty Ed Waymire and Vrushali Bokil as well as statistics and computer science faculty. The Center for Genome Research and Biocomputing also helped organize and fund the Waterman lecture.

Waterman is a University of Southern California Dornsife Professor and holds joint appointments in the Departments of Biological Science, Mathematics and Computer Science.

Hosted by the Department of Statistics, **Peter J. Bickel**, Emeritus Professor of Statistics at the University of California, Berkeley, presented a second Milne Lecture in November. His talk, “Statistics: The transfer science, Big Data and an experience with ENCODE,” addressed the new challenges posed by “big” and complex data. He also discussed the ENCODE project, a public research project that aims to identify all functional elements in the human genome and that serves as one of the follow-ups to the legendary Human Genome Project.

The Milne Lectures in Mathematics, Statistics, and Computer Science is a collaborative series of distinguished lectures launched in 1981 to honor founding Mathematics Department Chair William E. (Ted) Milne. A pioneer in numerical analysis, Milne was known around the world for the

“Milne method” of solving differential equations, for his three textbooks and numerous technical papers.

CONFERENCES AND EVENTS

The annual **Pacific Northwest Number Theory Conference** held in May 2016 attracted about 40 number theorists from various universities to OSU. Congratulations to our faculty members who organized a very successful conference: **Mary Flahive**, **Clay Petsche** and **Holly Swisher**.

In July, the Mathematics Department hosted the **Computational Representation Theory in Number Theory Conference**. Approximately 35 invited speakers and participants from universities across the United States as well as from the United Kingdom, Canada and Switzerland attended the conference. The conference was co-organized by associate professor **Holly Swisher**.

The Department hosted the 2016 spring meeting of the **Pacific Northwest Math Association of America** (MAA) in April along with the 8th annual **Northwest Undergraduate Mathematics Symposium** (NUMS). Kudos to our faculty who were part of the local organizing committee: **Nathan Gibson** (Local Arrangements Coordinator and founder of NUMS conference), **Tom Dick**, **Tevian Dray**, **Elise Lockwood** and **Holly Swisher**.

OSU's chapter of **Pi Mu Epsilon** (PME) honored and inducted 19 undergraduates exhibiting exceptional scholarly activity in mathematics. PME is dedicated to the promotion of mathematics and recognition of students who successfully pursue mathematical understanding.

A highlight of the event organized by **Dan Rockwell** included the lecture, “From Queueing Theory to Modern Stochastic Network Models: A Mathematician’s Perspective,” by **Amber Puha** of California State University, San Marcos.

GEORGE ANDREWS AND THE MAN WHO KNEW INFINITY

The Department of Mathematics and the College of Science sponsored a trip to the movies followed by dinner and a Skype discussion with world famous alumnus and mathematician, **George Andrews** (BS/MS '60) for faculty and students.

The group watched “The Man Who Knew Infinity,” the biographical drama film on the life of Indian mathematical genius, Srinivasa Ramanujan.

After the movie, the group was enthralled by a 45-minute Skype discussion with Andrews, the Evan Pugh Professor of Mathematics at Pennsylvania State University and a member of the National Academy of Sciences. Among his many mathematical achievements, Andrews is perhaps best known for his 1975 discovery of Ramanujan’s “Lost Notebook” as it is called in the mathematical community.

CASCADE RAIN

OSU Mathematics was well represented at CASCADE RAIN (Regional Interdisciplinary, Applied and Numerical Mathematics Meeting) at Washington State University, Vancouver in April. In total, OSU represented nearly one-third of the conference attendees.

The following presented talks at the meetings: Professors **Malgo Peszynska** and **Vrushali Bokil** and mathematics graduate students **Dwight Holland**, **Duncan McGregor**, **Puttha Sakkaplangkul**, **Azhar Alhammali**, **Tim Costa** and **Joe Umhoefer**. Professor **Ralph Showalter** also participated.

SCIENCE FACTORY IN EUGENE

The Science Factory, a children’s museum, in Eugene asked the department to help plan and participate in a Pi Day event on March 14, 2015, to celebrate the ubiquity of π and mathematics. **Dan Rockwell** gave a public talk on π . Other participants included **Stephen Scarborough**, **Ryan Hass** and student **Melissa Scarborough**. 2016 participants included **Stephen Scarborough**, **Dan Rockwell**, **Felix Maisch**, and **Melissa Scarborough**. Participants had fun promoting OSU Mathematics in duck territory!

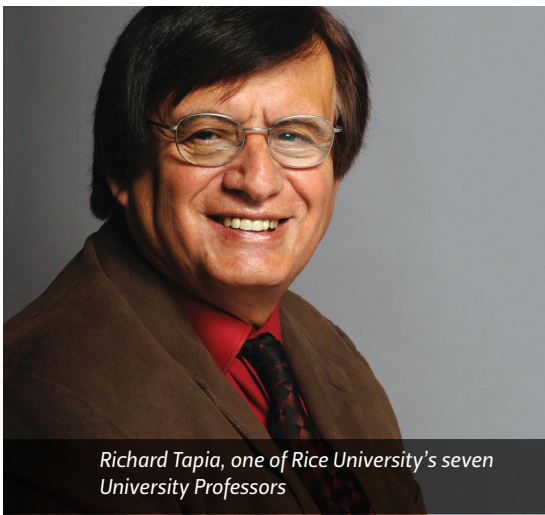
A PIECE OF THE π

At the OSU Math Club’s annual Pi Day celebration this year, students celebrated with a “pi” to the face of their favorite professors. Willing volunteers—the dean, professors, instructors, grad students and others—agreed to be “pied” for a good cause.

The Math Club donated all proceeds to the Edible Corvallis Initiative, which seeks to make local, fresh and healthy food available to everyone.

BEST LASAGNA DINNER

Competition for the best lasagna didn't shake the collegial atmosphere among students. The 2016 Lasagna Potluck dinner was held in February 2016, and one of the winning lasagna dishes was



Richard Tapia, one of Rice University's seven University Professors

a delicious "Generalized Lasagna."

The department held other events last year, including the matching event between first-years and advanced students, and "It Is Never Too Late to Enhance Your Professional Portfolio," a professional development event.

GIFTS AND GRATITUDE

Through a generous donation from the Vernier Corporation, the Math Learning Center's (MLC) main classroom received a facelift and a technological upgrade. The MLC classroom is where students take Math Excel workshops and Foundations of Elementary Mathematics classes in preparation to become K-8 mathematics teachers.

An anonymous donor pledged to match up to \$5,000 in donations made either to the Math Excel Fund or to the Mathematics Learning Center Fund. The gifts will be used entirely to support undergraduate learning assistants and for professional development for graduate teaching assistants and instructors.

ACTUARIAL CLASSROOM INITIATIVE

Professional actuary-in-residence and actuarial program coordinator **Manny Hur** is collaborating with the Actuarial Science Committee to again host a hands-on research/work experience for mathematics students interested in a career as an actuary.

This year's topic was the automobile insurance rate making methodology of State Farm Insurance. State Farm's rate filing documents are publicly available from the insurance department in each state. Students are guided through a typical auto insurance rate filing, then select a

research topic of interest, conduct substantial research and write a summary report on their findings. At the end of the term, students present their findings and analysis to State Farm actuaries via a video conference.

SPEED IS EVERYTHING: ACCELERATED MASTERS PLATFORM IN MATHEMATICS

The Accelerated Master's Platform in Mathematics is a new opportunity for undergraduate mathematics majors to take graduate classes, apply nine credits to their undergraduate degree, and transfer them to a participating graduate program. With careful planning, students can complete a master's degree within one year of their bachelor's degree.

EXCHANGE STUDENTS

The Department hosted exchange students Marilena Leichter and Victor Peñaranda-Velez last year. Both students helped enhance the global identity of our graduate program.

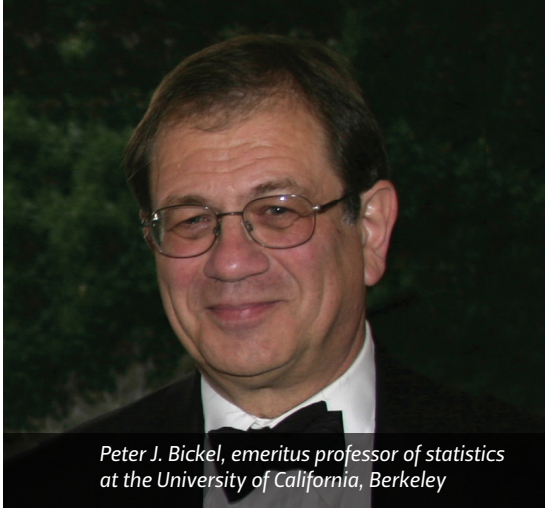
Marilena visited from Germany during her semester abroad. She graduated from the University of Tübingen with a B.Sc. in mathematics and is currently studying for an M.Sc in Math at the University of Ulm.

Time at OSU was well spent says Marilena: "It's an absolutely great department with wonderful people. I'm glad I got the opportunity to study at OSU for two terms!"

Victor is studying water resources engineering at the National University of Colombia-Medellin. He enjoyed learning advanced concepts in modern mathematics and interacting with OSU professors. Victor expressed gratitude for OSU's support of foreign scholars.



Michael S. Waterman ('64, '66), University of Southern California Dornsife Professor



Peter J. Bickel, emeritus professor of statistics at the University of California, Berkeley



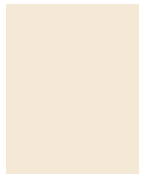
Members of OSU's Math Club celebrate Pi day with a little pie to the face



Department of Mathematics

Kidder Hall 368
Oregon State University
Corvallis, OR 97331

math.oregonstate.edu/give

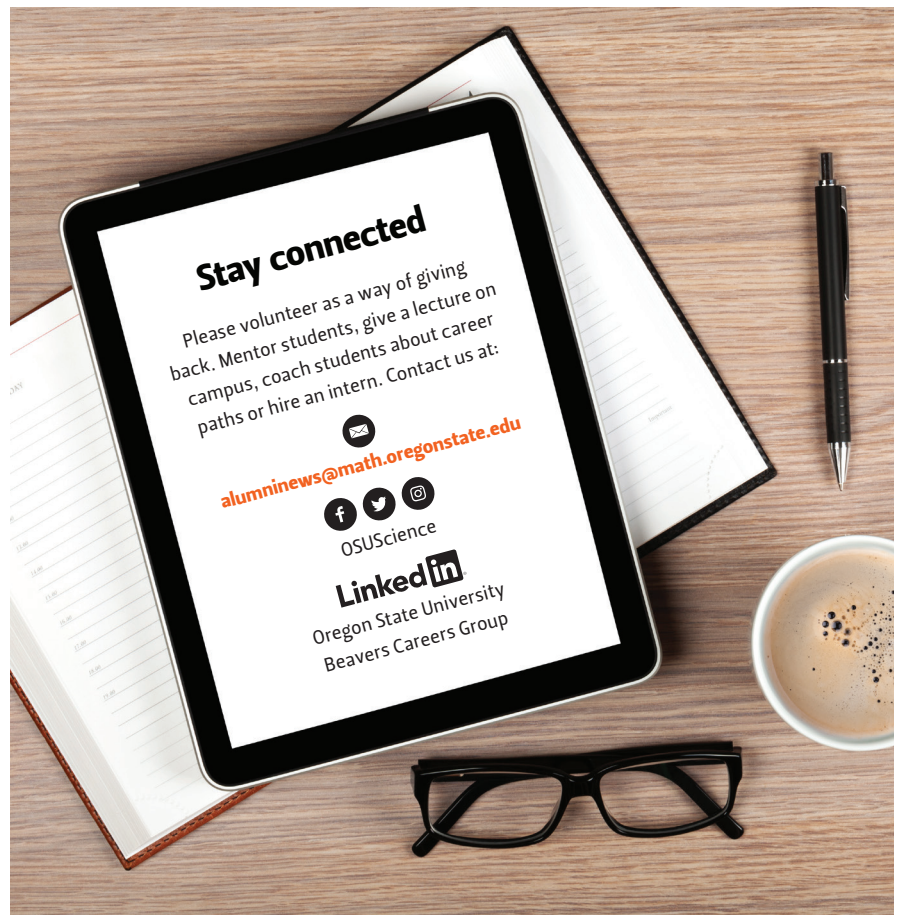


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