

FALL 2014

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LETTERS
& SCIENCE

NEWS from the Department of Mathematical Sciences

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Awards for our outstanding faculty

Our remarkable faculty won important awards and research funding in the last year. **Beth Burroughs, PhD** won a Fulbright Scholarship which is one of the most prestigious national awards for a faculty; **Lisa Davis** won a College of Letters & Science Outstanding Teaching Award and **John Borkowski** won a Provost's Award for Graduate Research/Creativity Mentoring award. In the current highly competitive atmosphere of national funding agencies, we are very proud that our faculty received research funding for two major grants

Tomas Gedeon is a principal investigator of a National Science Foundation (NSF) funded collaborative grant "Emergent properties of synthetic microbial communities." With his collaborators Jeff Heys and Ross Carlson from the Department of Chemical & Biological Engineering they will study how microorganisms co-exist in communities. This four-year grant will support a mathematics PhD student who will be involved in modeling microbial communities.

Burroughs is a principal investigator on a groundbreaking national study that will examine how intensive training can affect teachers' use of "mathematical modeling" in the classroom—a practice that can have far-reaching effects on how students perceive and use mathematics. The IMMERSION project, funded by a \$1.3 million grant from The NSF, will involve teachers in Bozeman, Fairfax County, Va. and Pomona, Calif. Burroughs will work with researchers at George Mason University and Harvey Mudd College, along with LeAnne Yenny of the Bozeman School District and Mary Alice Carlson, PhD, Jennifer Green, PhD, and Megan Wickstrom, PhD here at MSU, to oversee the three-year study.

In addition, **Jarek Kwapisz, PhD** and **Megan Higgs, PhD** were both awarded seed grants from MSU. Kwapisz will work on the project "Self-affine aperiodic tilings and mining for mathematical quasicrystals." Quasicrystals are atomic arrangements that are aperiodic but with enough spatial repetition to be called almost periodic, they resemble the ordinary (periodic) crystals but exhibit many novel physical properties (e.g. unexpected symmetries). The project advances mathematical understanding of such tilings with the aim of discovering general principles constraining quasicrystalline structures and finding methods for their systematic generation.

Megan Higgs received funding as a collaborator in a project designed to study how several microbial and environmental factors may be related to the health of bee colonies; this project combines information on migratory honey bee colonies and native bumble bees to investigate potential factors affecting pathogen transmission and colony collapse. Higgs will be providing support for study design and statistical analysis for the project, working with Michelle Flenniken, PhD in the Department of Plant Sciences & Plant Pathology and Laura Burkle, PhD in the Department of Ecology.

Additional funds were awarded to **Jennifer Green, PhD** who developed a weekly training seminar for new GTA's. **Tom Hayes'** additional funding was used to retrofit two classrooms with chairs that allow group work and collaboration.

Two members of our faculty were awarded sabbaticals: Beth Burroughs is currently on sabbatical at the University of York in York, U.K., where she is a visiting Fulbright Scholar in the Department of Education. She is collaborating with colleagues on current issues in mathematics education, in particular on the overlap between ideas in science education and mathematical modeling. She will also teach a course to York's undergraduates studying to be elementary teachers. **Mark Greenwood, PhD** will spend the Fall 2014 finishing up his previous projects and to work on development of new statistical data analysis tools.

New Statistics Consulting Center

Lillian Lin, PhD will be joining us as of November 1, 2014 as the inaugural Director of Statistical Consulting at MSU. Lin comes to us after nearly 20 years as a statistician at U.S. Centers for Disease Control and Prevention (CDC) in Atlanta, Ga. She was a Lead Mathematical Statistician from 2002–2014 and managed the work of 12 statisticians working in six CDC science branches. This position is funded for five years through the MT Idea Networks for Biomedical Research Excellence (INBRE) grant. MT-INBRE is focused on increasing the biomedical research capacity and has expanded to focus on research on health disparities within the state. She will be providing statistical support for researchers and working to expand statistical consulting infrastructure at MSU for researchers in all disciplines.

FACULTY NEWS

NEW FACULTY



David Ayala Professor Ayala's research is in the area of algebraic topology as it informs manifolds and surrounding concepts. His approach makes use of higher categories, (derived) algebraic geometry and moduli spaces. He has published in *Proceedings of the AMS* and *Expositiones Mathematicae*.



Mary Alice Carlson Professor Carlson's research interests include teacher learning and teacher change in mathematics, particularly when teachers work to elicit, understand and make use of students' mathematical ideas. She studies innovative formats for teacher professional development as well as the competencies facilitators need in order to lead teacher study groups. Her current projects include a study of the prompts facilitators use to promote teachers' inquiry into their own practice and the work involved in creating and sustaining communities of practice when the participants include teachers, math coaches and administrators.



Scott McCalla Professor McCalla's interests lie in applied dynamical systems, pattern forming partial differential equations, and social and crime modeling. He has published in the *Journal of Statistical Physics*, *Physica D*, *Physical Review Letters*, *SIAM Journal on Applied Dynamical Systems*, *SIAM Journal on Applied Mathematics* among others.



Megan Wickstrom Professor Wickstrom's research interests are in pre-service and in-service teacher learning and development. Specifically teacher noticing and conceptions and applications of research into practice, the role of reciprocity in creating partnerships between research and practice, and the role of context in elementary and middle level mathematics classrooms.



Kevin Wildrick Professor Wildrick's research focuses on the role of distance in mathematical analysis and geometry. A notion of distance, called a metric, encodes important information about the underlying mathematical object. He is particularly interested in using metrics to study spaces that may not be equipped with a familiar smooth or algebraic structure; fractals are important examples of such spaces. His work has appeared in *Proceedings of the London Mathematical Society*, *Geometric and Functional Analysis*, *Transactions of the American Mathematical Society* and *Mathematische Zeitschrift* among others.

Department of Mathematical Sciences News

NON-TENURE TRACK FACULTY

Math Club adviser **Christina Hayes, PhD** received the MSU Student Organization Adviser of the Year Award for her work with the club. The title as well as cash prize are awarded based on student nominations and student voting and is given at the annual Day of Student Recognition.

To support our teaching mission, we were awarded \$220,000 to expand our highly successful Student Success Coordinator (SSC) program. This allowed us to hire additional SSCs **John Antonioli, PhD** for M 273, **Jocelyn Short** for M 151, **Kim Nordby, PhD**, for M 161, M 166 and M 167 and **Kim Graham, PhD** for M 145. Each of them provides GTA training, implements new interactive teaching

methods and provides additional help to struggling students with the goal to make mathematics classes more responsive to varied needs of students, thus enhancing student success. These funds will also be used to continue our TEAL classes program in M 121 and Stat 216 classes that dramatically improved student success in the past year.

Our highly successful Math Learning Center that helps thousands of students a year with mathematics and statistics is under a new leadership. When Sandy Bowers and Mary Ann Sojda who successfully led the center for many years retired, Sabrina Rosenstein and Damien Pitman stepped in and continue to provide outstanding service to our students.

STUDENT NEWS

Math major **Brett Green** was recognized as the Phi Kappa Phi Outstanding Junior Award. He was one of five MSU Math Sciences majors on two teams competed in The Montana Mathematical Contest in Modeling (MMCM) held at Carroll College in September 2014. This year, teams worked either on aiming to create a water-recycling program for the city of Billings, Mont., or on analyzing the effects of a National Football League rule on two-point conversion. Both MSU teams placed in the top at the MMCM. Team Champion (written and oral presentation categories): Michael Gengler, Tess Hamzeh and Julia Platt. Honorable Mention (oral presentation category): Peter Fleischman, Brett Green and Jessica Bauer (Carroll College).

In February of 2014, nine students on three teams competed in the Mathematical Contest in Modeling (MCM), an international contest for high school students and college undergraduates. The MCM challenges teams of students to clarify, analyze and propose solutions to open-ended problems. The grueling four-day contest attracts diverse students and faculty advisors from over 900 institutions around the world. Team A: Colton Marchwinski, Brett Green and William Huhner; Team B: James Dilts, Joseph Bretz and Brandon Wessel; Team C: Drew Gottman, Colton Smith and Matthew T. Meerdink.

MSU's Math Department team finished 48th out of 430 teams competing in the 2013 William Lowell Putnam Mathematical Competition, widely considered the most prestigious university-level mathematics competition in the world. The team consisted of Joe Bretz, Gaoyang Fan, Brett Green, Devin Hansen, Matt Meerdink, Patrick Murphy and Colt Smith. The highest individual result was scored by Gaoyang Fan, who ranked 365th out of 4,113 contestants across the U.S. and Canada. The impressive team result is the best for MSU since 2009, and may be an all-time record for our department.

Tamra Heberling was awarded the prestigious Kopriva Graduate Student Fellowship. Heberling's research focuses on mathematical modeling and numerical analysis. She is currently modeling transcription, which is the first step of gene expression when a particular segment of DNA is copied into RNA by the enzyme RNA polymerase. During transcription, RNA polymerases are known to frequently pause for short lengths of time. In the high density setting, where there are many polymerases transcribing the gene in a line, the transcriptional pauses can cause a "traffic jam" of polymerases on the DNA strand. A mathematical analysis of this phenomenon will lead to a greater understanding of the cause and effect of these pauses on gene expression and regulation.

Thanks to the generosity of **Gary G. Sackett, PhD** (BS '61 and MS '62), the Department of Mathematical Sciences is able to provide increased support for students pursuing a graduate degree with a research program in Applied Mathematics. We are extremely grateful to him for providing us with this opportunity to improve our programs, and as we strive to maintain academic competitiveness and to recruit quality graduate students, Sackett's contribution will have a significant impact on our graduate program for students in the applied mathematics track. The Applied Math faculty has chosen to use the donation in two ways: the first is to provide four PhD students with scholarships; the second is to establish a fund for travel awards. The first recipients of the Gary G. Sackett Award for Academic Excellence in Applied Mathematics are **Ben Jackson**, **Ryan Waters**, **Tamra Heberling** and **Dan Kanewske**.

On August 1, we had a visit from our donors **Bill (PhD) and Donna Stannard**. Every year they provide resources for "Stannard Awards" for teaching excellence for teachers from MSU, other campuses and service to mathematics education in the state, and a presentation award for a graduate student. Award winners and members of the awards committee were able to enjoy their company, learning about their history in Montana and reasons for sponsoring the awards at MSU. Over the course of a couple of hours, nearly 10 faculty members were able to meet Bill and Donna. The conversation involved discussing what we have been doing with the awards, and much more importantly, the fascinating history that Bill had with mathematics in the state of Montana. Everyone enjoyed their visit and all left with new appreciation of the wonderful people behind the awards.

Doctoral student **Kacey Diemert** received the College of Letters & Science Outstanding Graduate Teaching Assistant Award for 2013–14. Kacey, a native Montanan who also earned BS and MS degrees from MSU, taught in the department for over five years and earned a reputation as an exceptional instructor who is devoted to student success. After graduating, Kacey took a position as an Assistant Professor of Mathematics Education at Lewis-Clark State College in Lewiston, Idaho, and faculty in our department look forward to working with her as a colleague.

Statistics graduate student **Marie Liley** received the Ellis R. Ott Scholarship for Applied Statistics and Quality Management from The Statistics Division of the American Society for Quality (ASQ). It is a merit scholarship awarded to a graduate student studying applied statistics or quality management.

MATH OFFICE NEWS

This year we have experienced a change in the front office when **Josie Powell** left to move to Oregon to be closer to her family. Josie had been in charge of both our undergraduate and graduate program and was a beloved "mom" to all our students. As a real mom, Josie was there to remind you to fill out your paperwork for graduation and do what needs to be done, but she was also a person with a big heart that was defending her students to the last breath. We were fortunate to be able to replace Josie with **Monique Kleimer** who came to us from the Financial Aid office at MSU.



NOTE TO FORMER STUDENTS

We truly value the role you played in the Department of Mathematical Sciences at Montana State University. We hope that your time here led you to a rewarding career and that our people and programs were just what you hoped they would be. We will continue to use these newsletters to update you on all of the extraordinary things going on here in Bozeman.