

Mathematical Sciences

UNIVERSITY OF MONTANA

Spring 2014



UM To Host Public Lectures at the June PNW Annual Meeting

By Kelly McKinnie

The University of Montana is delighted to be hosting the PNW MAA annual meeting on campus June 26-28, 2014. In addition to a full conference schedule there will be two lectures during the meeting that are open to the public and we would love for you to join us!

The first public lecture will be Thursday evening, June 26, at 8:00 pm in room ISB 110 and will be followed by a reception. The current president of the MAA, Bob Devaney from Boston University, will give an address titled "Chaos, Games and Fractal Images". In his lecture, Dr. Devaney will describe some of the beautiful images that arise from the "Chaos Game" and show how the simple steps of this game produce, when iterated millions of times, the intricate images known as fractals. He will describe how applications of this technique are used in data compression as well as in Hollywood. He also plans to challenge students in the audience to "Beat the Professor" at the chaos game and maybe win his computer. A fun and challenging time is sure to be had by all.

The second public lecture of the conference will follow the Friday evening banquet in the Canyon Club at Washington-Grizzly Stadium. At 8:30 pm Professor Skip Garibaldi

of Emory University will take the stage and deliver an address titled "Math and the lottery: answers to good questions from students and reporters". Professor Garibaldi began his foray into this topic with a question from a student: Why shouldn't we buy lottery tickets? His investigation into this question led to numerous interviews from news agencies (20/20, CNN, ABC World News, and Fox & Friends) and the article "Finding good bets in the lottery, and why you shouldn't take them" which won the MAA's Lester R. Ford award in 2011 (co-authored with Aaron Abrams). Recently Professor Garibaldi became a "math detective" and assisted in analyzing odds for suspicious wins in the Florida lottery. The investigation led to charges being filed in the case! Bring your scratch off tickets and hope to get lucky during this public evening lecture.

We would love to have large audiences on hand for these public events, so please join us if you are able! More information about the full conference schedule and these public events can be found on our webpage:

<http://cas.umt.edu/math/pnwmaa>

Hope to see you there!



Dr. Skip Garibaldi is a Professor in the department of Mathematics & Computer Science at Emory University. He is currently serving as associate director of the Institute for Pure and Applied Mathematics (IPAM) at UCLA.



Dr. Bob Devaney is a Professor of Mathematics at Boston University. His main area of research is dynamical systems.

See PNW, page 2, for a schedule of events

PNW Schedule

Thursday:

8am-2:30pm Project NExT activities
3:00-5:30pm Minicourses
8pm Evening Public Lecture
9pm Reception

Friday:

9:15am - 5:15pm Conference Activities
5:30pm Social Hour
7:00pm Conference Banquet
8:30pm Evening Public Lecture

Saturday:

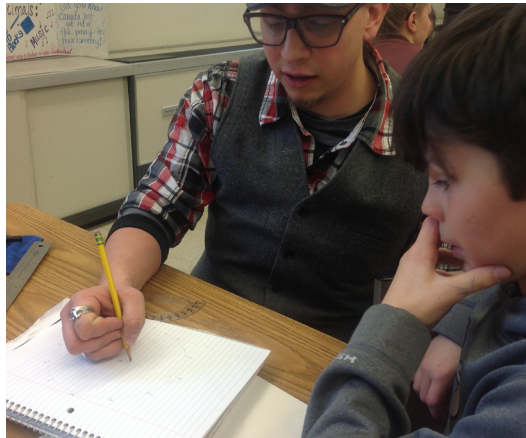
8:45am - 11:45am Conference Activities
1:00pm - 5:00pm Raft trip

Students Teach Students through Gifted and Talented Program

By Bonnie Spence

In March approximately 80 students from Helena School District's Gifted and Talented Program traveled to Missoula to participate in a day of college experience. Students chose careers and were matched with University of Montana classes that related to their areas of interest. Twelve Helena fourth and fifth graders arrived to our Spring Math 136 for K-8 Teachers course. Each participant was matched with a college student for some fun all-class communication activities that got everyone using the vocabulary of geometry. Following the activity each M136 student directed their own individual lesson with their assigned partner. In the week prior, UM students prepared a short lesson, activity, or problem founded on a concept they had studied thus far during the course. Lessons varied from determining angles of rotation without the use of a protractor, to using a compass and straightedge to construct triangles and hexagons. While the visit appeared to be fun for the Helena students, the experience was also a rich one for UM students who had to prepare and implement a lesson, assess and adjust their teaching, and experience one-on-one teaching.

Cody Munson, an elementary education student at UM, recounts his experience with this opportunity: "As a University student earning my teaching certificate, I was excited to work with an advanced math fourth grade student from Helena in my Math 136 class during the Spring 2014 semester. I was nervous going into the meeting with my student because I was unsure of his previous mathematics knowledge. I wanted to present a lesson/idea that he hadn't encountered yet, and something that would hopefully be fun for him. After a quick introduction we worked on a group lesson as a class that involved sitting back to back while giving directions and using descriptive geometrical shape terms/words to describe a drawing on a card to be replicated on a white board. I was surprised at how much he knew, and how



Cody Munson directs a one-on-one lesson using central angles of a circle to determine angle measure.

well he excelled at this, as he caught on quickly to all the geometric terms and words I was using. However, I quickly realized just how important it was to give clear directions and instructions and to listen closely to what the student is saying.

After the group project, we turned our one-on-one focus to a lesson involving the hands of a clock face, and the angles which they create. After I showed him a couple examples and drew out a diagram of a clock face explaining what each minute and ten minute marking represented in angle

measurements, I had him draw hands on clock faces to match various degree measurements, and yet again he blew me away with how quickly he was able to grasp the concept. I'm glad I had the chance to work with him; I had fun."

In May each year, Missoula County Public Schools provides a similar opportunity for its gifted and talented students in Grades 3-8. The conference is held on UM campus after spring semester concludes. The math department has continued to support this conference by providing elective workshops for students during their day-long visit.



In the "I Describe You Draw" activity UM student Cody Munson uses math vocabulary to describe a geometrical design for his Helena student to draw. In the following round, Helena students took the role of describing, while UM students attempted to draw what they heard.

Notes from the Chair

By Leonid Kalachev

As usual, I begin this column with congratulations to our graduates who completed different levels of our program during the 2013–2014 academic year: a total of four PhD students, six MA students, and 32 Math Majors have graduated successfully. Our recent and current PhD recipients are very successful in securing positions in academia and industry. Some of the latest examples include: Rachel Chaphalkar who has accepted a position of Assistant Professor of Mathematics Education in the Department of Mathematics and Computer Science at the University of Wisconsin–Whitewater. Tien Chih, who will be a tenure-track Assistant Professor at Newberry College, a private four-year liberal arts school in South Carolina beginning in the fall. Jeff Johnson, who has accepted an offer for the position of Assistant Professor of Mathematics at the American University in Cairo (Egypt), and Clark Kogan who is going to be a postdoc at the Sleep and Performance Research Center at Washington State University in Spokane.

Since I was on sabbatical during the spring semester of 2014, while still serving the department as chair, this column will be a bit shorter than usual. I want to acknowledge with gratitude the help of the policy committee and the assistance that I have received from many of the faculty members and dedicated

staff in running many of the administrative departmental activities long distance.

While no one from the department applied to go on sabbatical during the next academic year, there will be several faculty members on leave, which will cause some challenges in scheduling a number of classes. In fact, in view of the budget cuts throughout the university and tighter projected allocations for adjunct support, I want to express my strong belief that to run the graduate program in our department successfully, the majority of the vacancy savings that materialize due to some faculty members being on leave must not be redistributed among other departments within the School of Humanities and Sciences. We must be allowed to keep the majority of the vacancy savings within the department to hire qualified personnel and to take care of the teaching and research duties on the level appropriate for a successful graduate program. Historically, our base budget reflects the department's involvement in heavy undergraduate teaching, including large lectures, as well as a strong emphasis on graduate education and research. I feel that it is unfair to take our base budget dollars away to maintain adjunct teaching in other programs, thus lowering the capabilities and upper division offerings of our mathematics program.



On behalf of all the faculty members in the Department of Mathematical Sciences, I would like to express gratitude and deep appreciation to our numerous donors and longtime supporters. Your generous contributions allow us to run various educational and research activities that benefit large numbers of students and that would not be possible without your participation and continued attention to our program.

Thank you very much!

I want to finish with wishing everyone a great summer! I look forward to seeing you in the fall.

A handwritten signature in black ink, appearing to read 'Kalachev', followed by a long horizontal line extending to the right.

Spring 2014 Scholarship and Award Winners

Joseph Hashisaki Memorial Scholarship

Holt Bodish
Jay Egenhoff

Anderson Mathematics Scholarship

Cory Charles Raeth

Duane and Kathleen Adams Scholarship

Jessica Hurd

Mac Johnson Family Scholarships

Shelby Frazier
Sara Killeen
JonAlan Osborne

Manis Memorial Scholarship

Johnathan Bush

John A. Peterson Awards for Mathematics Education

Thea Layton
Emily Wilson

Undergraduate Teaching Scholar

Johnathan Bush
Sara Killeen

Undergraduate Tutorial Scholars

Matt Detrick
Seth Donahue
Jessica Hurd
Jonathon Knudson
Daniel Lande

N.J. Lennes Competition

1st place: Patrick Tresslar
2nd place: Cory Charles Raeth
3rd place: Adam Clemons
Honorable Mention: Jessica Hurd

Carolyn and Johnny Lott Elementary Education Scholarship

Emily Curtiss

William Myers Mathematics Scholarship

Denis Shchepakina

Graduate Distinguished Teaching Awards

Rachel Chaphalkar
Elizabeth Lask
Daisy Matthews
Cody Palmer

Graduate Student Summer Research Awards

Kevin Joyce
Charles Katerba
Omid Khormali
Grant Swicegood

Mortar Board - Outstanding Seniors

Statistics: Nathan Sponberg
BA in Mathematics: Emily Weaver
Mathematics Education: Mariah Smith
Pi Mu Epsilon: Emily Wilson
Applied Mathematics: Arlan Dirkson

Degree Recipients 2013-2014

BA in Mathematical Sciences

Tomi Rae Ahearn	Ariel Cornelius	Sam Doyle	Olivia Lisin	Mariah Smith	Emily Wilson
Michael Allred	Malachi Cryder	Lance Fisher	Marie Mavencamp	Nathan Sponberg	Christopher Wright
Ileana Areiza-Serna	Evan Cummings	Maddey Frey	Clark Miller	Ashley Tombelaine	
Cory Beckham	Zachariah Deister	Alicia Heckel	Mackenzie Moss	Peter Walde	
Peter Bender	Arlan Dirkson	Katrina E. Knoll	Maddy Murray	Emily Weaver	
Chad Bunselmeier	Kellie Donahue	Thea Layton	Pamela Seitz	Liam Whaley	

MA in Mathematical Sciences

Soya L. Bjorlie	Elizabeth Lask
Adam Clinch	Jack Lelko
Cody Fouts	Daisy Matthews

PhD in Mathematical Sciences

Rachel Chaphalkar	Advisor: Ke Wu
Tien Chih	Advisor: George McRae
Clark Kogan	Advisor: Jon Graham
Michael Severino	Advisor: Mark Kayll

Halfway Around the World

By Mariah Smith



Mariah Smith (center), Mini, Graham, Joice, and Shubhankar made up the marvelous Mathematics Department.

The adventure began with a 12,000-foot climb on a barely two-car wide road to my new home in Kodaikanal, located in the Tamil Nadu state in southern India. A fellow classmate, Karissa Gordon, and I were going to spend the next four months student teaching at Kodaikanal International School (KIS). Christian missionaries founded KIS about 100 years ago to be able to send their children to school in a malaria-free environment. KIS became the first boarding, International Baccalaureate School in India and consists mainly of high socioeconomic status students mostly from India but also from Korea, Bhutan, Nepal, Thailand, Bangladesh, Tanzania, and many European countries.

I came to a school that prides itself for being international but realized how much of a minority I was, being from a Western culture. This required some adjustment: when I was asked about those early days, I replied, "When I first got here, I realized that this is actually going to be hard. Life has worked out for me so far, but this is different. I'm alone in a different culture and I don't have it all together...and that's ok." My experience student teaching in India presented big and little challenges in both school and everyday life. Right away, I saw a communication challenge with how students and teachers phrased mathematical sentences. For example, to express "three times four" one would say "three into four." This is because almost everyone at the school learned British English, which has a surprising number of differences from American English. A larger challenge I struggled to overcome the whole semester was discovering what my role was in an International community and as a student teacher. Often I thought I was in the groove of things and then suddenly I would slip out of my assumed position, for example when one of my hard thought-out lesson plans would get denied.

But there were some great perks that came with student teaching at an international boarding school, such as celebrating holidays I have never heard of. Holi is a holiday celebrated by throwing colored powders and water at each other while walking around town, no matter if you are old, young, white, or Indian. Even though this holiday is mainly celebrated in northern India, the school prepared what a teacher dreams of all the time: getting in a color and water war with their students. All of the students enjoyed running away from each other dodging from the airborne bright colors. I enjoyed cornering my students and mischievously covering them with all sorts of color.

I was blessed to get the chance to work with such a great team of Mathematics teachers. It was wonderful that they let me get involved right away in the activities of the math department such as leading the all-school Math Quiz Competition on Pi Day and being in charge of the Math Squad that consisted of juniors and seniors helping out middle school students with their math. At the end of my time at the school, I realized how much I had loved getting involved with the math department and how the teachers had become part of my family in the short four months I was there. As cheesy as it might sound, we bonded over the love of mathematics and the desire to learn about new cultures. In all I would sum up the last semester as a great preparation for my professional career of teaching mathematics to the children of the world.

I wrote a blog throughout the four months in Kodaikanal, India and if you would like to read more about my experience please go to theworldwithmariah.blogspot.com



Mariah Smith during the week of Holi after being in an epic color fight with high school students.

Adam Clinch Awarded KSTF Fellowship

By Matt Roscoe



Adam Clinch has always been the kind of student who strives for excellence. As a member of Helena's Capital High School's graduating class of 2007, Adam was named valedictorian. As an undergraduate at the University of Montana, Adam finished a rigorous double major in mathematics and physics in 2011, graduating with high honors. Adam's interest in becoming a mathematics teacher led him back to UM in the fall of 2011 where he pursued state certification in mathematics education. He finished his Master's Degree in Curriculum and Instruction in Fall 2012, and his Master's Degree in Mathematics in Spring 2014. Adam has recently accepted an offer to teach high school mathematics at Helena High School starting in the fall of 2014.

During Fall 2013, following advice from Dr. David Erickson in the Phyllis J. Washington School of Education, Adam applied for a teaching fellowship offered by the Knowles Science Teaching Foundation (KSTF). KSTF was established in 1999 with the goal of increasing the number of high-quality high school science, technology, engineering and mathematics (STEM) teachers. KSTF operates programs that seek to build capacity for improving STEM teaching, leadership and learning. The Fellowship offers beginning STEM teachers a five-year professional development portfolio that includes summer stipends, funding for professional development, grants for classroom teaching materials, mentoring networks and leadership opportunities. KSTF invests an estimated \$175,000 over five years

in each Fellow. According to KSTF, this investment insures that these highly qualified teachers remain in the profession. One metric indicates that KSTF has been successful in its efforts: nationally about 50% of beginning teachers are retained after 5 years of service; among KSTF Fellows, teacher retention is 95%.

Adam's application to become a KSTF Fellow required him to submit an extensive paper application that included three essays on the subjects of content knowledge, pedagogical knowledge and teacher-leadership qualities. A phone interview was followed up by an invitation to participate in a 2-day face-to-face interview in Moorestown, NJ. After meeting with representatives from STEM fields in group and one-on-one settings, Adam was given an opportunity to ask his interviewees any remaining questions. Adam challenged KSTF representatives to select him based on his sound educational preparation and the fact that there has never been a KSTF Fellow named in Montana. In April of 2014, Adam was notified that he had been accepted as the first KSTF Fellow named in the state. He joins an elite group of early-career STEM teachers from some of the nation's top universities, including Stanford, MIT and Harvard.

As a KSTF Fellow, Adam will participate in networked, on-line discussions with other KSTF Fellows across the United States. He will travel to three meetings with Fellows each year for his first five years of teaching. He will be supported with a \$1200 teaching grant to help with the purchase of teaching-related materials and \$3000 in travel funds to pursue professional development and financial assistance for membership dues for professional groups. Adam plans on using the KSTF Fellowship as a springboard for National Board Certification.

The Department of Mathematical Sciences applauds Adam on his prestigious award.

Professor William Ballard

We sadly note the passing of Emeritus Professor, and department stalwart, Dr. William (Bill) Ballard, on 11 April 2014. Bill taught in the department for thirty years (1957–1987), and was still attending colloquia and an occasional algebra seminar up until this last year. He was an inspiration, both for his devotion to scholarship and for his generosity. He will be missed, and long remembered.



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The Department of Mathematical Sciences increasingly relies on donations to support its activities. With tuition increases continuing to outpace inflation, scholarships are vitally important. Scholarship and other existing funds that help to meet some of the educational needs of the department and our students are:

Anderson Fund - an endowed scholarship for a student majoring in mathematics

Joseph Hashisaki Fund - an endowed scholarship for one or two upper-class math majors based on academic achievement

Mac Johnson Family Fund - endowed scholarship for undergraduate students showing promise in mathematics

Manis Memorial Fund - an endowed scholarship for a student majoring in mathematics

George and Dorothy Bryan Endowment - an endowment in support of undergraduate and graduate students

Lenes Fund - an endowment to provide funds for the Lenes Exam Competition

Colloquium Fund - an endowment to provide funds to bring in visiting speakers.

Please consider a gift to one of these funds or to the Math Department's Excellence Fund to be used where the need is greatest.

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Student Spotlight

By Jen Halfpap



Those whose knowledge of mathematics comes from its portrayal in pop culture may think all mathematicians come to the discipline via a single path: nerdy kid with graphing calculator and no social skills wins MathCounts and takes calculus at 16. The rest follows. And to look at graduating math major Nathan Sponberg, one might initially imagine

he is one of these mathletes. Winner of our prestigious Hashisaki award, teaching scholarship, and mortar board award in statistics, with a nearly-perfect GPA and a couple grad courses under his belt, Nate's path through math seems more like a smooth cruise down the Autobahn in a Mercedes.

You would never suspect that Nate did not finish high school because of severe migraines. You would never suspect that he spent 4 years in Missoula working at Bernice's making

croissants before deciding to try college part time. You would never suspect Nate started his math career at UM at the very beginning, in College Algebra. You'd never guess that Nate is fluent in Chinese, skilled with origami, or an enthusiastic cook of Indian food. In fact Nate's story illustrates an important point: there are almost as many paths to and through mathematics as there are mathematicians. The common feature is our love for and dedication to the subject.

Nate says his real love for math began to develop in earnest when he took our transition to proof class. In this course he saw clearly that math is about ideas and arguments and connections. His interests further developed as he pursued his statistics option. He likes that, in statistics, one can tackle real-world problems that matter to real people. When the math is this applicable, one feels even more motivated to study the theoretical aspects because one knows this theory will be applied right now and not just 50 years in the future when someone discovers an application. Nate is particularly intrigued by connections between math, statistics, and computer science. He wants to spend a year working in the "real world" to see more clearly how these fields interact and then pursue graduate work, perhaps in the new and hot emerging field of Big Data. Even if his future plans are still developing, those of us who have had the pleasure of working with Nate during his time here know he will be a wonderful asset to the discipline we all love.



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