Mathematical Sciences

Teaching at the Core: Profile of Professor Emeritus Jim Hirstein

By John Bardsley

Jim Hirstein

The Math Department at UM consists not only of our current faculty, staff, and students, it is also the culmination of the efforts of generations of individuals going back over 100 years. In this current era of budget challenges and cuts at UM, the Math Department remains strong in part because of the strong foundation that our former faculty, staff, and students have built and continue to help us build. A prime example of a former Math Department faculty member whose service has had a significant positive impact on the department, as well as on UM, is Jim Hirstein, who retired in 2015.

Jim's route to UM was circuitous. He started teaching math as a graduate student at Illinois State University (ISU), where he got both his BS and MS degrees in mathematics, focusing in algebra. One of his early inspirations in teaching was his first analysis professor at ISU. However it wasn't until after he received his MS degree that Jim discovered his own calling for teaching, and specifically, a passion for teaching teachers. It was at this point that he decided to pursue his Doctorate in Mathematics Education at the University of Georgia.

After receiving his EdD in 1976, Jim became a tenure track faculty member in the Department of Secondary Education at the University of Illinois (UI). He found the university to be huge and impersonal, and so after eight years, he moved to the much smaller Slippery Rock University in Pennsylvania, where he served as faculty in the Department of Curriculum and Instruction from 1984-89.

What I Did Last Summer

By Cory Palmer

Actually, this is not about me; it is about what some of our advanced graduate students did last summer. At the Department of Mathematical Sciences Awards Ceremony last spring, I had the distinct pleasure of announcing six recipients of the department's Summer Graduate Research Scholarship. In terms of number of awards given this was the most successful year in recent memory. Such a banner year was due to a strong overall cohort of students in our department. The students awarded were Ellie Bayat Mokhtari, Ricela Feliciano-Semidei, Charlie Katerba, Omid Khormali, Nhan Nguyen and Esmaeil Parsa.

As many of you reading this know, these research scholarships are made possible by the generosity of the Bryan Family through the George and Dorothy Bryan Endowment.

University of Washington names Graduate Student Awards after Emeritus Professor Gloria Hewitt

The Department of Mathematics of the University of Washington recently announced that it will name new awards for outstanding graduate students, funded with a generous gift of the Washington Research Foundation, after Gloria Hewitt, who was a long-time faculty member of UM's Department of Mathematical Sciences. Gloria earned her Ph.D. in 1962 at the University of Washington, becoming the third African-American woman in the US to receive a doctorate in mathematics. Her long and distinguished career at UM lasted nearly four decades, and included four years as department chair. She retired in 1999. Congratulations, Gloria!
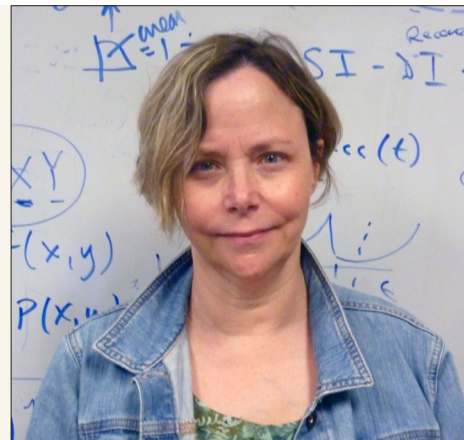
Notes from the Chair

By Emily Stone

Another year has flown by for us here in the Math building. Collectively we have taught over 350 classroom hours per week, over 30 weeks, or 10,500 hours in the entire year. Our grad student TAs have taught 36 recitation sections per week, or 1080 sections over the entire year. Literally thousands of homework assignments have been completed and graded, and hundreds of exams. This year we will graduate 30 majors, 3 masters students and 1 PhD. We welcomed one new faculty member and 10 new grad students, two of whom are from overseas. We had two births (one to a math major, one to a PhD student and his wife) and one engagement (two grad students). In the lounge we went through at least 50 pounds of coffee beans in our expresso machine, busily turning caffeine into theorems, à la Paul Erdös. We won the college-wide Cox teaching award for the second year in a row (congratulations Matt Roscoe!), and one of the very competitive Bertha Morton research awards went to grad student Ricela Feliciano-Semidei. One of our double majors (Soren Ormseth) won an honorable mention in the Goldwater Scholarship competition, only UM's 5th since 2007.

While the University is still struggling to "trim the boat" and get on a straight course, if you look at our daily endeavors and our annual accomplishments, it is clear that we are part of a very, very large and sturdy vessel that continues to ply the waters regardless of what sort of gyrations and machinations are occurring on the poop deck of our upper administration. And we will continue to sally forth on our mission to provide quality education in a rich environment for our undergrads and grad students, next year and into the future. All while remaining the best department at the University in which to develop your career and enjoy your work for both our faculty and staff.

Last but not least, we received many, many generous donations from our alumni and business sponsors. Thank-you everyone for helping to support our efforts!

Our best wishes for a wonderful summer,

Emily F. Stone

Honor Roll of Donors

Dr. Duane Adams	Matthew Edmonds	Robert O'Donnell
Anonymous	Lewis Frain	Nirmita Panchal
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Landon Bideaux	Francis Hannick	Adele Rothan
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Rodney and Mary Jean Brod	Mary Hashishaki	Goang and Huey-Fen Shiue
Cynthia Bryan	Gloria Hewitt	Gregory and Jan St. George
John and Tiffany Bulger	Gregory and Sydney Hulla	Jason Stewart
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James and Kay Coghlan	Johnny and Carolyn Lott	Keith Yale
Mark and Terry Eastman	Todd Oberg	Rebecca Yates

Alumni News

Jeff Johnson, who earned his Ph.D. in 2013 under the supervision of the late Professor **Toma Tonev**, is returning to the US after four years as an assistant professor at the American University in Cairo, Egypt. He accepted an offer as Assistant Professor of Mathematics at Kenai Peninsula College in Homer, Alaska. KPC is a small college with a few practical degree programs and is part of the University of Alaska Anchorage system, thus it allows students to take courses transferable for degree programs at UAA. The emphasis of Jeff's work will be on teaching and community projects, which includes the development of distance learning courses for people in remote areas of the peninsula. Congratulations, Jeff!

After graduating with a BA in Mathematics with high honors in 2014, **Maddy Murray** was hired by AT&T and works in their Dallas, TX office as a financial analyst for an operations team. She still has strong ties to UM and to our Women's Tennis team, for which she played as a student. She visited us twice during the spring semester, and spoke in several math classes about life in industry as a mathematician, and how to prepare for it. Thanks, Maddy!

Cody Palmer, PhD 2016, introduced us to challenges in disease modeling in our last newsletter. Since then, as part of his research postdoc at the Institute for Disease Modeling in Seattle, he went to Guinea, a small country in West Africa, for the official "kick-off" of the *Trypa-No! Partnership*, whose goal is to eradicate Human African Trypanosomiasis, aka sleeping sickness. The events included meeting various government health officials and local scientists, and visits to a village (to see some of the vector control strategies that are being implemented) and to a local treatment center for the disease. What an interesting career with potentially profound impact on the quality of life of millions of people!

We recently received the sad news that **Jack Silver**, BA 1961, passed away last December. After completing his undergraduate degree at UM (then still Montana State University) at age 19, he went on to the University of California at Berkeley, where he earned his doctorate in mathematics in 1966 and served on the faculty of the mathematics department until his retirement in 2010. You can read more about his distinguished career, which included 18 Ph.D. students, at http://logic.berkeley.edu/news.html.

N.V.

Department News

At Montana Tech's commencement ceremony this May, Professor **John Bardsley**, who earned his undergraduate degree there, received the Chancellor's Medallion honoring his academic achievements! Only one such award is given each year; it recognizes a Tech alum who has excelled in academia in both their educational and professional careers. Congratulations, John!

Many of you know *The Mathematics Enthusiast*, an open-access, eclectic, independent, international research journal hosted by the Department of Mathematical Sciences under the editorship of Professor **Bharath Sriraman**. How truly international this 14-year old journal is can be seen from its download statistics: Last year, it was accessed from over 150 countries, more than 75% of all officially recognized countries in the world. Visit http://scholarworks.umt.edu/tme/ for some interesting, free reading.

And speaking of Professor Sriraman, we should mention that the U.S.-Norway Fulbright Foundation for Educational Exchange awarded him an International Fulbright Specialist project to develop "inquiry-based teaching units in mathematics teacher education programs in Arctic Norway." The project will take place in June at the University of Tromso, Norway.

Montana was recently singled out in a *Mindshift* article as one of the two states closest to achieving statewide Math Teachers' Circle coverage. The Montana Math Teachers' Circle is coordinated by math professors **Fred Peck**, **Matt Roscoe** and **Ke Wu**, together with Professor **David Erickson** from the Department of Teaching and Learning. In a nutshell, Math Teachers' Circles are professional development communities of mathematics teachers and mathematicians who meet regularly to work on rich mathematics problems. They provide an opportunity for teachers to enrich their own knowledge and experience of mathematics, while building long-term, meaningful partnerships with other teachers and mathematicians. Find out more at *www.MontanaMathTeachersCircle.org*.

Graduate Teaching Award winners
Ricela Feliciano-Semidei and Ted Owen

The teaching load, however, was heavy and didn't contain enough mathematics, which was not to Jim's liking. This must have been clear to his wife Cheryl, who found the advertisement for a tenure track position at UM. She told Jim, "You've always been a cowboy at heart; you should apply for this." He did and got the job, starting at UM in 1989.

One of the qualifications that got Jim hired by UM was his experience doing assessment at UI. When Jim applied, Johnny Lott and Rick Billstein (now both emeritus professors) had submitted two huge grants to the National Science Foundation, for funding of the SIMMS and STEM curriculum development projects. Unexpectedly, both grants were awarded to the tune of 10 million dollars each, an impressive amount even today, let alone nearly 30 years ago. For his first years at UM, the SIMMS project generated so much assessment work for Jim that he didn't have to teach. His assessment results showed that SIMMS was successful, but because it required significant professional development for the teachers using it, once the grant money dried up, the materials developed by SIMMS eventually fell out of use.

As the SIMMS project wound down, Jim found his way back to his first love of teaching mathematics. Indeed, he mentioned that one of the real attractions of the job at UM was that he would be in a Math Department and hence he would be able to teach more math courses. Jim's favorite courses to teach at UM were Euclidean and Non-Euclidean Geometry, Number Theory, Introduction to Abstract Math, and graduate courses in math education. He mentioned the story of one student in Intro to Abstract Math who worked hard throughout the semester, struggling to break through with the material, which she finally did on the final exam. He found these types of experiences, when a student finally realizes that he or she can do it, very satisfying. He also said that some of his most memorable

Jim Hirstein hard at work circa 1999.

connections with students came from teaching Math for Elementary School Teachers. He recalled one particular non-traditional student at Georgia who came to him at the beginning of the semester convinced that she would not be able to pass the class, which was required for her degree. Jim helped her get through the course with great success, and in recalling the thank you letter that she sent him from her first job as an elementary school teacher, he became emotional, adding that teaching was always the most rewarding part of the job.

It was not long, though, before Jim started to work his way into the service jobs in the Math Department, beginning in 1997 when then Chair Gloria Hewitt asked him to serve on the advisory committee to the chair, which in our department is known as the Policy Committee. When Gloria announced that she would retire in 1999, Johnny Lott encouraged Jim to run to be her replacement, and he won. Jim said that back then it meant a lot to the math education group, and to him in particular, that the department chose a math educator to be chair.

The Department of Mathematical Sciences increasingly relies on donations to support its activities. In particular, scholarships are very important for our students. Please consider a gift to the *Math Department's Excellence Fund*, to be used where the need is greatest, or to one of the other funds and endowments:

Endowed Scholarship Funds: *The Adams Scholarships, Anderson Mathematics Scholarship, Joseph Hashisaki Memorial Scholarship, Mac Johnson Family Scholarships, Merle Manis Award, William Myers Mathematics Scholarship*

George and Dorothy Bryan Endowment: Supports undergraduate and graduate students

Lennes Fund: Provides funds for the Lennes Exam Competition

Colloquium Fund: Provides funds to bring in visiting speakers

To donate online, please visit http://hs.umt.edu/math. For information on other ways to give, please contact Marci Bozeman: marci.bozeman@mso.umt.edu or by phone at 406-243-2646 (or call toll free 1-800-443-2593).

Spring 2017 Scholarship and Award Winners

Joseph Hashisaki Memorial Scholarship
Anastasia Halfpap

The Adams Scholarships
Junior: Matthew Kingston
Senior: Soren Ormseth

Anderson Mathematics Scholarship
Glenn Woodworth

Mac Johnson Family Scholarships
Andrew Bedunah   Katerina Hall
Jennifer Powers

Merle Manis Award
Randal Rivas

Undergraduate Research Scholar
Soren Ormseth

Undergraduate Teaching Scholars
Anastasia Halfpap   Jennifer Powers

Undergraduate Tutorial Scholars
Emily Engstrom   Heather Kelly
Matthew Kingston   Eli Ninnemann
Ryan Smith

N.J. Lennes Competition
1st place: Alec Patterson
2nd place: Carolyn Graham
3rd place: Anna Gasner

**Carolyn and Johnny Lott
Elementary Education Scholarship**
Mariah Harvey

John A. Peterson Awards for Mathematics Education
Shunteal Jessop   Jennifer Konicek

Graduate Student Distinguished Teaching Awards
Ricela Feliciano-Semidei   Theodore Owen

Graduate Student Summer Research Awards
Elham Bayat Mokhtari   Quy Xuan Cao
Roger MadPlume   Nhan Nguyen
Esmaeil Parsa   Denis Shchepakin

President's Senior Recognition Awards
Dylan Gross   Morgan (Jimmy) Henderson
Shunteal Jessop   Gilia Patterson

Jim Hirstein, continued from page 4

Jim's years as chair were years of growth at UM and in the department. One of the biggest changes during these years was the creation of the faculty position of Lecturer, which gave–and continues to give–greater job security to some of our best teachers. There were also many retirements and new faculty coming into the department during these years; indeed, many of our current faculty, myself included, were hired when Jim was chair. Finally, Jim mentioned that as chair he served under three supportive deans, but that he was always a 'data person,' strongly advocating for the Math Department based on our exceptional output. He said that the Math Department was always an easy sell, noting, for example, that as a department we generate more student credit hours (i.e. serve more students) than most departments at UM.

After serving as chair, Jim took a high profile university-wide service responsibility when he agreed to chair the Accreditation Steering Committee, which convened from 2008-2010. UM was going through a 10-year accreditation review, obviously a very important process. Provost Engstrom singled Jim out to be the chair of the committee, which speaks to the respect he had earned from the administration during his years as math chair. The Accreditation Steering Committee consisted of vice presidents, deans, faculty, and students, and Jim had full access to the Provost's Office, including (he emphasized) very capable administrative help. He said that this job was a great experience.

Toward the end of our conversation, Jim came back to teaching, saying that nothing was as good as teaching, that teaching was the core, and that it was always the most rewarding part of the job for him. He specifically came back to his commitment to teaching teachers, which began with his early experiences teaching mathematics at ISU, leading him to pursue his doctorate in Mathematics Education. Jim also fondly remembered his PhD students at UM: Jim Trudnowski, Todd Oberg, Debbie Sloan, Brenda Frame, and Grant Swicegood. "I really got to do what I wanted," he said, and he expressed a twinge of regret that he had retired when he did. Although he was in his early 70's at the time, he was still enjoying the job and was healthy. A part of him wondered, why not keep going? We should all be so lucky. However, by finishing strong, Jim added yet another item to a long list of positive examples that he set for those of us who follow him.

Degree Recipients 2016-17

Bachelor Degrees

Zachary David Brackett
Shayna Brewer
Adam Michael Clemmons
Audra (Ross) Coulston
Wesley Thomas Cratty
Jeffrey Jordan Crozier
Kellen Donahue
Taylor Marie Dubé
Rachel Suzanne Ehlers
Anna Rae Gasner

Dylan Matthew Gross
Morgan James Henderson
Elizabeth Anne Hobbs
Shunteal Marie Jessop
Adam Robert Johnson
Jennifer Olivia Konicek
Emily Kathleen Leonhardt
Anthony John Mayer
Lindsey Mosely
Kristen Owens

Gilia Patterson
Scott Bryan Payne
Payton Arvilla Pietron
Makenizy Leane Roberts
Benjamin A Stark
Bobbi Lynn Tatar
Patrick Tremper
Mac Haugen Widdicombe
Nicole Marie Zarling

Master's Degrees

Daniel Murphy   JonAlan Osborne   Nathan Taylor

Doctoral Degree

Charlie Katerba - Advisor: Eric Chesebro
Thesis: *Modules, Fields of Definition, and the Culler-Shalen Norm*

Claire Summers, continued from page 8

collection of accomplished STPI researchers and the one-of-a-kind opportunities that the fellowship provides. When I was offered the fellowship, I was both surprised and ecstatic, and immediately accepted.

As a Science Policy Fellow, I am provided with opportunities to interact with leaders from OSTP in the Executive Office of the President and other federal science agency personnel, and gain professional mentorship from the STPI research staff. I work with teams on a diverse set of challenges in science and technology policy areas. So far, I have focused on work related to open data and data sharing policies, as well as earth observations work. I am able to apply my interest in data science to coding, preparing, and analyzing different types of data, but also work on improving other skillsets, such as conducting interviews, writing reports and memoranda, and presenting results.

The skills and knowledge I acquired by taking a wide range of courses within the mathematics, economics, computer science, and business departments at UM are what prepared me for this fellowship. Additionally, opportunities through the Big Data Analytics program to work directly with local businesses' data, derive original solutions, and present findings were helpful in preparing me for similar projects conducted at STPI.

Finally, although the mountains and big skies of Montana are deeply missed, life in D.C. has been wonderful. Missoulians would be proud of how accessible the city is

An exciting time to be in D.C. Picture taken at the 58th Presidential Inauguration, United States Capitol

by bike and public transportation, but dismayed at how everything shuts down after one or two inches of snow. Additionally, there is always something to do in the D.C. area, whether that be visiting the seemingly endless museums and monuments, trying the variety of foods, watching Congressional hearings, attending protests, or even witnessing a United States presidential transition. I'm excited for the remaining time I have with STPI, and looking forward to whatever my future holds.

These scholarships are important in allowing our graduate students to focus on their research during the summer months. They are helpful to ensuring our students graduate on time. Being able to work on research in the summer ultimately leads to stronger PhD dissertations and makes our graduates more competitive on the job market.

It is often remarked in our department how much good these scholarships do. They have funded research that ultimately helped lead to a dissertation for many of our graduate students. Many of these graduate students use their degree to go on to teach mathematics and statistics at all levels of instruction. In this way, I don't think it's a stretch to say that these scholarships, in addition to directly benefiting our graduate students, also indirectly impact hundreds of math students all over Montana and the world.

In what follows I would like to highlight some of the research that was done last summer under the support of these scholarships.

Charles Katerba, who just defended his dissertation, works in the area of low-dimensional topology. This field involves the study of two-, three- and four-dimensional objects. It also includes the subject of knot theory which is the study of mathematical knots. Topology is also well-known as the field that consistently produces many of the most beautiful and interesting pictures in mathematics. Charlie's research in topology involves using algebraic tools to study the properties of so-called 3-manifolds which are objects that, when viewed close up, look similar to our familiar every-day 3-dimensional space.

In June, Charlie travelled to Snowbird, Utah for the 2016 Mathematics Research Communities summer research conference. At this conference Charlie participated in a week-long event studying Character Varieties. It would be impossible to go into the definition here, but this topic is relevant to a number of different fields including topology, algebra and physics.

One of the goals of this conference was to bring together early-career mathematicians to foster new collaborations. In Charlie's case this lead to a new project with a fellow graduate student at Temple University. Charlie tells me that they are now working on a new manuscript that was initiated by their discussions in Snowbird. This example perfectly highlights the importance of these summer research scholarships. Without the time and funding to travel to conferences this new collaboration likely would not have been possible.

Ricela Feliciano-Semidei is one of our graduate students in the area of math education. As you can guess this field is the study of the pedagogy of mathematics.

Graduate Summer Research Scholarship recipients: Esmaeil Parsa, Nhan Nguyen, Ricela Feliciano-Semidei, Ellie Bayat Mokhtari and Omid Khormali

During the summer, Ricela developed a study concerning how students learn and reason about conditional probability. Conditional probability is the measure of the probability of a fixed event occurring given knowledge of the occurrence of some other event. This fundamental notion in probability theory is frequently misunderstood and misinterpreted both in school and in our everyday lives.

Ricela's study involved the famous Monty Hall problem. This problem can be summarized by the following example (quoted from vos Savant's column in Parade magazine in 1990):

> Suppose you're on a game show, and you're given the choice of three doors: Behind one door is a car; behind the others, goats. You pick a door, say No. 1, and the host, who knows what's behind the doors, opens another door, say No. 3, which has a goat. He then says to you, "Do you want to pick door No. 2?" Is it to your advantage to switch your choice?

It is not hard to show, but it tends to be VERY counterintuitive that you can increase your chances dramatically if you switch your choice. After vos Savant published her explanation for why you should switch your choice she received thousands of letters (including many from PhDs) explaining why her solution was incorrect. Unfortunately for the many letter-writers vos Savant's solution is absolutely correct.

You can see why Ricela chose this example for investigation by students. If it was good enough to stump so many PhDs, it is definitely worth exploring!

UNIVERSITY OF MONTANA

Department of Mathematical Sciences (MMAI01)
Mathematics Building
32 Campus Drive
Missoula, MT 59812-0864
Phone: 406-243-5311
Website: http://hs.umt.edu/math

From Student at UM to Researcher in D.C.

By Claire Summers

Originally from the central coast of California, I began my undergraduate studies at Loyola Marymount University in Los Angeles. As a sophomore, I transferred to the University of Montana, and I wholeheartedly believe that this relocation was the best decision I could have made. I decided to focus my math degree in statistics, and enjoyed expanding my studies to include economics, computer science, and business analytics. Through the Big Data Analytics program I was able to gain insight on the math, business, and computer science interactions within the data science field. Before graduating, I worked at NASA's Jet Propulsion Laboratory (JPL) as a 2015 summer intern. As a member of the cyber defense team, I explored an approach to the detection of energy theft in Los Angeles' smart grid using statistical methods. I graduated in Spring 2016 with a BA in mathematics with a focus in statistics, a minor in economics, and a certificate in big data analytics.

In the fall of my senior year, I applied for a two-year fellowship with the Science and Technology Policy Institute (STPI) in Washington, D.C. STPI is a federally funded Research and Development Center, meaning that it's funded by and works in close partnership with the federal government, but is not part of it. STPI provides rigorous and objective analysis on a breadth of issues in science and technology policy supporting the White House Office of Science and Technology Policy (OSTP) and other federal government organizations (e.g., the National Science Foundation, the National Institutes of Health, NASA, etc.). A few months after applying, I received notice that I was selected for a day of in-person interviews. While in D.C., I was in awe at the diverse

Claire Summers