A f t e r m a t h

Message from the Chair
by Aaron Bertram

This has certainly been a year to remember! Right from the beginning of the academic year, it was clear that something was amiss. The legislature held a special session to react to a precipitous drop in tax receipts and the first "adjustment" to the budget for higher education was a result. Then the economy fell off a cliff and we were cut one more time. Fortunately, the dire predictions of 15% (or more) budget cuts for 2009-10 did not materialize, though we have been warned that we are not out of the woods yet.

I am happy to report that the budget cuts did not result in any staff cuts to the Mathematics Department, nor has it forced us to substantially cut our graduate program. We will welcome five new postdocs and fifteen new funded graduate students in the fall, which is about normal for our department. In addition, our lines for new tenure-track hires are intact and I expect that we will be able to search for at least three new faculty members next year. There were, as I am sure you are all aware, no raises this year, so we didn't emerge completely unscathed.

And, of course, while the world has been crashing around us, the Mathematics Department has continued its tradition of excellence in teaching and research! Peter Alfeld won the University's Distinguished Teaching Award and Fred Adler won the Distinguished Mentor Award. Nick Korevaar won the MAA's teaching award, and two of our graduate students, Blerta Shtylla and Sarah Kitchen, respectively, won the University's Graduate Research and Teaching Fellowships. In addition, Christopher Hacon won the AMS Cole Prize in Algebra, Ken Golden chaired Mathematics Awareness Month, Firas Rassoul-Agha and Tommaso de Fernex recently won NSF CAREER grants, and the Department's NSF VIGRE grant was (thankfully!) continued. There are more research triumphs that I'm sure I'm missing, but I think you get the picture. It is a great pleasure for me to watch as colleagues and students receive the recognition they richly deserve.

Have a wonderful summer all, and especially Nat Smale, who will spend next year in Hong Kong after five years of exemplary service to the Department as Associate Chair.

Adler Receives Mentor Award
by Courtney Davis

Congratulations to Fred Adler, who was recently awarded the University's Graduate Student and Postdoctoral Scholar Mentor Award. The award recognizes and honors mentors who "effectively guide graduate students and postdoctoral scholars throughout their professional training in a continuing, multifaceted partnership sustained by mutual respect and concern." Fred has already helped nine graduate students in Math and Biology earn Ph.D.'s, and he is currently advising eight others. We are all thrilled for him for receiving this well-deserved recognition.

Alfeld Receives Teaching Award
by Nick Korevaar

College of Science faculty were awarded four out of the five 2009 University of Utah Distinguished Teaching Awards. Our own Peter Alfeld is one of these winners, in recognition of his long-time and continuing contributions to our department's teaching mission. Peter arrived in Salt Lake City in 1977, and received his first teaching award here from the College of Science in 1982. He's never let up.

Peter has a 30+ year record of teaching friendly, supportive, organized, effective and challenging classes, at all undergraduate and graduate

levels. In addition, he has focused extra efforts on students who lack a solid math background, or even a solid sense of what it means to learn mathematics. Therefore Peter has gladly and frequently taught many of the large precalculus classes; been instrumental in establishing the University of Rochester WeBWork system here, and in creating many of its best homework problems for our own courses; created our rigorous Departmental Teaching Guidelines and otherwise encouraged effective teaching in multiple ways, especially during his seven year tenure as Associate Chair; and, as a service to math students everywhere, created the #1 google-ranked site for "understanding mathematics."

Thank you and congratulations, Peter!

Korevaar Receives MAA Teaching Award
by Peter Alfeld

We are proud to announce that Nick Korevaar won this year's "Award for Distinguished College or University Teaching of Mathematics in recognition of extraordinarily successful teaching" from the Intermountain Section of the Mathematical Association of America. Congratulations, Nick! Many of us are of course well aware of Nick's deep involvement in our teaching operation in many capacities over many years. In Nick's nomination, there are several pervasive themes in comments that students made about Nick's teaching. One is that he is a demanding teacher who has high expectations, who assigns difficult home work problems (referred to by some of our tutors as notorious "Korevaar Problems"), and who conducts long and hard exams. Another theme is that he explains things clearly. The most pervasive theme, however, is that Nick takes a great personal interest in his students and goes to extreme lengths to make himself available, and to make sure that his students understand the material. He is truly passionate about our students, their learning, and their well being, and the award is well deserved. Nick is now being considered by the MAA for a national award.

Kitchen and Shtylla Win University Awards
by Andrejs Treibergs

Blerta Shtylla was awarded the 2009-2010 Graduate Research Fellowship. She is one of fifteen graduate students selected campus wide for excellence in research. Blerta is studying an area of mathematical cell physiology where little mathematical work is known. She is modeling the molecular mechanisms used by chromosomes to move and align in a dividing cell with the help of microtubules. Blerta developed mathematical descriptions which involve partial differential equations that are implemented into nonlinear systems of ODE's and analyzed numerically. The models accurately capture experimental data and make a series of predictions which aid in understanding of the mechanisms driving chromosome motility.

Sarah Kitchen was awarded the 2009-2010 University Teaching Assistantship. Sarah is one of fifteen graduate students selected campus wide for excellence in teaching as well as research. In addition to excellent reviews from her classes, Sarah taught in the departments' teacher training seminar given to entering graduate students. As part of her assistantship, she will develop and teach an undergraduate research projects course on Representations and Symmetry. For her dissertation, Sarah studies unitary representations of real reductive groups which is a generalization of Fourier analysis of the circle or the line. Sarah has extended geometric realizations of algebraic representations as cohomology groups of flag varieties to more general projective quotients of a given complex group.

Undergrads Win at MAA Integration Bee
by Robbie Snellman

$\int$ The MAA Integration Bee, held on the Brigham Young University campus, was all but monotonous. Participating schools ranged from Utah State University to Brigham Young University Idaho. The format for the integration bee went as follows:

Round 1: Each individual would be given two minutes to solve a "relatively straight-forward" integral.
Round 2: Same as round 1 except the integrals supposedly got harder.

Following the second round the field had been narrowed to eight contestants, three of which were from the University of Utah. We were divided into two groups of four and the competition proceeded

with each group having two minutes to solve the same integral. Following this procedure, Quishi Wang from the University of Utah was the only one standing and was thus crowned champion of the MAA 2009 Integration Bee.

To determine the rest of the cash prizes the seven contestants who had not solved the integral correctly were reinstated into the competition. One group was narrowed to two contestants and it was now our turn to solve an integral. We three approached the board to solve the integral $\sin(x)\cos(x)/(\sin(x)^4+\cos(x)^4)$. When time was called we were allowed to finish writing out our answers, then came the judging. Supposedly all of us had failed to solve the integral, with one of the judges telling me that the negative sign in front of my answer was the only fallacy in my solution. I sat down and started working on the integral to ensure their solution was correct. Quishi and I noticed that the judge had been incorrect and that my solution was originally correct. We brought it to their attention and I was reinstated to the competition. I then entered the lightning round with a contestant from BYU. The integral was ridiculously simple and I solved it within twenty seconds. I tried to check my solution but I was preoccupied with the thought of my opponent submitting his solution before I did. I circled my answer and waited for him to finish. Needless to say, I almost solved the integral correctly except for the ridiculous 2/3 constant, which had been multiplied by the integral in the beginning, that I forgot to input into my solution. Therefore, the 2009 MAA Integration Bee podium went, 1st: Quishi Wang, University of Utah, 2nd: Some guy from BYU, 3rd: Robbie Snellman, University of Utah. All in all it was a very interesting experience.

Utah Teacher Educators Conference
by Emina Alibegovic
On February 14th the 9th Annual Conference of the Utah Association of Mathematics Teacher Educators was hosted and supported by the Mathematics Department. About 30 participants gathered in the Loft of LCB despite the snow storm and the holiday weekend that could have been spent some place else, although probably not enjoyed more. We engaged in a spirited discussion of the state and the needs in K-12 mathematics education in Utah, and listened to several great speakers.

Diana Suddreth, the mathematics specialist with the State Office of Education, gave the State of the State address in which she shared some of the work and concerns of the Mathematics Steering Committee. Of particular concern are the number of mathematics teachers in the state who do not have level 4 endorsement as well as the number of high school students who do not take mathematics beyond Algebra 2. A very interesting presentation was given by James Cangelosi and Brynja Kohler who spoke about the effectiveness of teacher preparation programs and building relationships with local schools and teachers. Utah State's preparation program is well known for the opportunities it provides to its students for collaboration with in-service teachers during their methods courses, and they shared some of the experiences they had in building the program and maintaining those relationships. Damon Bahr, from BYU, spoke about preparation of teachers from a slightly different perspective, and briefed us on the things learned from a session he and Blake Peterson led at the AMTE conference the week before. Finally, our main speaker was William McCallum, from the University of Arizona and Institute for Mathematics and Education, who spoke about an algebra course for middle school teachers that is part of a master's program at his institution.

The next year's conference will be organized by the Department of Mathematics and Statistics at Utah State University as Brynja Kohler and Dave Brown have been elected to the posts of the President and the Secretary. We thank the Department of Mathematics for their hospitality and support.

Quantitative Biology Workshop
by Fred Adler
On April 4, 2009, the soon-to-be proposed Center for Quantitative Biology hosted a Quantitative Biology workshop, designed to try to assemble people on campus interested in the wide range of biological issues to think together about the role of quantitative methods in unifying this broad and growing field. John Roth, Distinguished Professor of Microbiology at Davis and formerly of the University of Utah, kicked off the meeting with a cautionary tale and inspiring sermon about the risks and benefits of collaboration across wide disciplinary boundaries.

The three invited speakers presented highlights of their successes in collaboration. Alan Perelson, Senior Fellow in the Theoretical Biology and Biophysics Group at Los Alamos National Laboratory, showed how relatively simple models revolutionized our understanding of HIV, the virus that causes AIDS, and played a key role in designing current therapies. It is hoped that these same approaches will be similarly effective in understanding and combatting chronic infection with Hepatitis C virus. Ray Goldstein, Schlumberger Professor of Complex Physical Systems at Cambridge, showed how fundamental scaling relationships from physics can make sense of the evolution of multi-cellularity in algae, and illuminate the comparative roles of transport and diffusion in moving substances through plant cells. Finally, Simon Levin, George M. Moffett Professor of Biology at Princeton, laid out the fundamental challenges in achieving a sustainable society by focusing on how humans and other animals make decisions, and how these processes, although often short-sighted and irrational, can be modeled and perhaps guided for the good of all.

Nourished by the fine lunch provided on site, those who attended and skipped a legendary powder day came away with new questions and new connections.

MSRI Program in Algebraic Geometry
by Rob Easton

The Mathematical Sciences Research Institute (MSRI) hosted a jumbo program in algebraic geometry this past spring semester, organized by Joe Harris (Harvard), Bill Fulton (Michigan), Brendan Hassett (Rice), János Kollár (Princeton), Sándor Kovács (Washington), Rob Lazarsfeld (Michigan), and Ravi Vakil (Stanford). The goal of the program was to encourage interactions between various specialties, from classical, enumerative, and birational algebraic geometry to modern moduli theory. There were five week-long workshops over the course of the semester, each on specialized topics such as "Deformation theory and moduli" and "Connections for women." Outside of those workshops, there were six weekly seminars, including seminars organized by graduate students and postdocs.

As the number of talks might indicate, it was an enormous program, the largest of any MSRI program to date. During several workshops, the

institute was host to nearly two hundred algebraic geometers, including the likes of Tom Bridgeland (Sheffield), Carl Faber (KTH), James McKernan (MIT), and Richard Thomas (Imperial), to name just a few. The U. was well represented, with attendees including graduate students Stefano Urbinati and Davide Fusi; postdocs Arend Bayer, Rob Easton, Milena Hering, and Yungfeng Jiang; and faculty Aaron Bertram, Tommaso de Fernex, Chris Hacon, and Y.P. Lee.

Golden Chairs Math Awareness Month

Ken Golden was chosen as chair of the advisory committee for Mathematics Awareness Month (going on now!), with this year's theme being "Mathematics and Climate." You can find some very nice essays by Ken and students who've done research with him at www.mathaware.org. Ken was also recently profiled for his work on sea ice in Science Magazine and you can find this article at www.sciencemag.org. Way to go, Ken!

Graduation!

This year approximately 70 undergraduate mathematics majors will receive a baccalaureate degree. Seven students will receive a Masters degree in Mathematics, two will receive the Master of Statistics degree, and one will receive the Master of Philosophy degree. Students receiving the Ph.D. in 2008-2009 are Scott Crofts, Lyubima Simeonova, Tommaso Centeleghe, Karim Khader, Jason Preszler, Nessy Tania and Amber Smith. Congratulations graduates!!