

“All the v’s that’s fit to print”



Department of Mathematics

Newsletter

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Outstanding Student Awards

During "end of year awards ceremonies" in May 2005, these three mathematics students were honored for academic achievements during Academic Year 2004/2005.

Ginger Anderson and **Robert Miller** were named the Outstanding Undergraduate Students in Mathematics

Adam Krenelka was named the Outstanding Graduate Student in Mathematics.

Congratulations to Ginger, Robert, and Adam for jobs very well done !!

Around the Department

Radu Cascaval will remember 2005 for two major conferences he helped organize. The SIAM Front Range student research conference took place in March on the CU Denver campus and was a major

success. **Sanghui Lee** and **Shane Kirkbride** (the current and former presidents of the UCCS Math Club) presented nice research talks. Kris Marcus and Greg Morrow also participated in the conference. A nice photo of the UCCS delegation appeared in the national SIAM magazine, <http://www.siam.org/news/>. Organizing this conference was a good warm-up for the huge conference which followed in June: The International Conference on Nonlinear Waves, Integrable Systems and Their Applications, June 4-7 on UCCS campus and June 8 on the Boulder campus. The conference was great fun, and brought close to 100 famous mathematicians in the field of solitons from 16 countries around the world to UCCS. A video archive of all the talks is now being compiled and will be posted on the conference website. (This type of conference archiving is thought to be a world premier! More info about the conference is given in a related article below.)

Radu's research was enhanced during 2005 through a CRCW grant from the UCCS Office of Research. Teaching a *MathOnline* class during Fall 2005 with over 25 remote students was a golden opportunity to experiment with new online technologies. Lectures in the Calc III class were videotaped and streamed live and also posted on the web for later viewing. This successful experiment will be repeated during Spring semester in the Math Modeling class.

Department chair **Rinaldo Schinazi** attended the first annual Probability School at Cornell University in July 2005. "The mathematics were good, but the heat was unbearable!" At that conference Rinaldo met Jason Schweinsberg (U.C. San Diego), with whom he is now collaborating on a joint research project on models for the human immune system. Rinaldo gave a talk on his work at U.C. San Diego in September, and another talk in Boulder in November. He is writing a book that is designed to help students bridge the gap between calculus and classical analysis. Six chapters are already written; a total of 8 or 9 are planned.

Bob Carlson is in the midst of two publishing adventures. His undergraduate text, entitled *A Concrete Introduction to Real Analysis*, which is sometimes used at UCCS for Math 341 and 431, will be published by CRC Press in 2006. In addition, Bob is part of a group of editors working on the proceedings of a conference on Quantum Graphs and Their Applications that was held at Snowbird, Utah in June 2005. (Bob reports that people were still snowboarding at Snowbird in June!) In addition to the meeting at Snowbird, Bob went to Eugene, Oregon for an American Mathematical Society regional conference in November.

Jim Daly continued his ongoing research collaboration with Professor Sandor Fridli of Elte University, Budapest, Hungary. Jim and Sandor published the paper *Trigonometric Multipliers on the Hardy Space on the Circle*, and had the paper *Multipliers for Multiple Walsh Series* accepted for publication. The two coauthors are working on a project concerning multipliers for multiple Fourier series. Jim was an invited speaker at last June's international conference in Eger, Hungary. The conference honored the birthdays of the Hungarian mathematicians Fejer and Riesz. In addition to his research work, Jim was grant coordinator and co-principal investigator on a \$800,000 grant from the Colorado Department of Education for the training of middle school math and science teachers. Jim is also the principal investigator on a \$1.2 million National

Science Foundation proposal for graduate fellowships in math, science, and engineering.

K.M. Rangaswamy gave an invited talk at an international algebra conference in Antalya, Turkey during May 2005. In addition to the research interactions afforded by the conference, Ranga was also able to do some sightseeing while on this trip. "I learned that 70% of places mentioned in the Bible are in Turkey. We visited the place where the Virgin Mary was supposed to have spent the last years of her life, and we also went to ancient (ruined) city of Troy, where I saw a model of the Trojan horse used in the battle for the Helen of Troy." (As Homer wrote in his epic *Iliad*, "Was this the face that launched a thousand ships?") During Fall 2005, Ranga started the first year of his three-year phased retirement, under which he will be teaching half-time during each of the next three academic years before completely retiring.

Greg Morrow traveled to Beijing, China in July. He delivered a talk on "Moments for the lowest crossing, pioneering, and pivotal sites in critical percolation". Greg sponsored Math Club President Shane Kirkbride for a talk on Quantum Chaos at the SIAM Student Conference in Denver. (This is the previously mentioned conference which was co-organized by Radu Cascaval.) Greg gave a talk in the CU-Boulder probability seminar on recent work he has done with Yu Zhang on the distribution of cut points in the Stochastic Loewner Evolution. This evolution is an exciting development in mathematics that is currently attracting much research attention! Greg also gave a talk at the UCCS math colloquium (which he continues to organize). Greg continued this past year in his role as Associate Chair of the math department.

Gene Abrams was coauthor of two research articles on Leavitt path algebras. These articles were written jointly with Gonzalo Aranda Pino of the University of Málaga (Spain) while Gonzalo was visiting UCCS during Fall 2004. Gene and his wife Mickey had the opportunity to visit Spain in June, where he gave talks in both Málaga and Granada. Gene continued his ongoing work with the Colorado Springs Sky Sox *Math Youth Days*. This past April and May, a number of UCCS students and faculty had the opportunity to participate in the in-game activities (by reading various math questions over the p.a. system while standing on top of the dugout!) An article about this combination math / baseball venture appeared in the Aug. / Sept. 2005 issue of FOCUS, the Newsletter of the Mathematical Association of America.

Seung Son continued his research efforts in the areas of Rogers-Ramanujan functions, elliptic curves, computational methods, and some higher order solvable equations. Seung taught courses through MathOnline during both Spring and Fall 2005. In addition, he offered a special *MathOnline* course for Gulf Coast students affected by the recent hurricanes. Seung shouldered a huge part of the technical / computer needs that the department and faculty members encountered, including support for the International Soliton Conference in June, file recovery, virus removal, and equipment evaluation.

Shannon Michaux spent much of the summer developing review material for Calculus 1. The review is intended to help students brush up their Algebra and Trigonometry skills to prepare for the Calculus series. It is posted online at <http://www.math.uccs.edu/courses/refreshers/>. In response to Hurricane Katrina, Shannon had the opportunity to run a *MathOnline*-supported class for survivors of the storm. The students are spread across the U.S. from Arizona to Georgia, with one residing in the Caribbean. "It's been an amazing opportunity to watch the students' perseverance to tackle this difficult class in the midst of all that's going on around them." Shannon was featured in an October Denver Post article about this online course, it's posted on the UCCS MathOnline server at <http://www.math.uccs.edu/mathonline/Sloan/>

Math Learning Center director **Shannon Schumann** reports that the M.L.C. is continuing to see students in record numbers. The Center has added small group tutoring for Math 135 and Math 104. Students need to find a "study buddy"; once they do, they can sign up for a full hour with a tutor in a quiet spot. "The purpose of this study buddy idea is to help students form collaborative study groups. Such groups, modeled on the work done by Uri Triesmann of the University of Texas, have been shown to be very effective vis-à-vis student success." The Center has also added some evening tutoring sessions in the Housing Village (students do not need to be a resident to attend). With support from the Vice Chancellor for Student Success, a graduate assistant position was created for the MLC. The VCSS provides tuition assistance for the grad student, and the MLC provides salary via internship and mentorship. "Dionisia DeLaCerde is our first grad assistant in this position, and is doing a fabulous job!" (Dionisia is spotlighted in an article below.) In MLC-related work, Shannon presented a paper at the first ever "Math Labs" conference, which was held at Bowling Green State University (Kentucky) this fall. In addition, Shannon is serving as the web developer

for a new national organization of Math Learning Center Directors.

Yu Zhang continued his research work on various topics in probability theory, including percolation and random walks. Yu was invited to give a talk at the joint meeting of the Institute of Mathematical Statistics and the Chinese Society of Probability and Statistics. In addition, during Summer 2005 Yu gave a short course, titled "First Passage Percolation" at Beijing University.

Sarbarish Chakravarty co-chaired a session at last April's 4th IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory, at the University of Georgia. Sarby received a National Science Foundation grant to organize the Conference on Nonlinear Waves, Integrable Systems and their Applications (held at UCCS in June; more info in a related article). The grant was joint with Radu Cascaval of UCCS and William Kath of Northwestern University. Sarby hosted two research visitors over the past year: Gino Biondini from SUNY Buffalo, and Kenichi Maruno from Kyushu University, Japan.

In the Spring **Keith Phillips** taught Complex Variables, and in doing so gained 10% on the long delayed revision of his book "Foundations of Analysis in the Complex Plane." Most of the rest of Keith's year was devoted to teaching calculus, probability, and linear algebra. His compulsion for writing class notes has not abated!

Congratulations to All 2004/2005 Graduates!

Here is the list of the Academic Year 2004/2005 graduates from each of the department's degree programs. An impressive list, to be sure!

B. A. Mathematics:

Ginger Anderson	(with Special Honors)
Candice Brandon	(with Special Honors)
Benjamin Schoonmaker	(with Special Honors)
Connie Kalina	(with Honors)
Tina Gray	(with Honors)
James Willetts	
Dionisia De La Cerda	
Rachel McFerran	
Jeffrey Schurz	
Jeanette Knizevski	
Jacob Kunze	
Dustin Schmidt	
Justin Kukowski	
Travis Spero	
Jason Baker	

B.S. Mathematics:

Robert Miller (with Special Honors)
Jonathan George (with Special Honors)
Jennifer Cox
Adrian Samson
Matthew Mandarich
David McAllister

M.S. Applied Mathematics:

Alex Krolik
Adam Krenelka
Lisa Willoughby

Master of Basic Science, Math Emphasis

David C. Jones

Congratulations to all the AY 2004/2005 graduates from the Department of Mathematics!

Solitons Make Waves

Soliton Conference at UCCS

by Radu Cascaval and Sarbarish Chakravarty

The year 2005 marked the 40th anniversary of the discovery of solitons by Kruskal and Zabusky. This, along with subsequent development by Gardner, Greene, Kruskal and Miura in 1967, have provided the catalyst for an explosive development in the theory of nonlinear waves and its application to problems in physics, engineering and related areas. Such studies have been highly interdisciplinary, with theoretical results motivating experiments, and vice-versa.

On this occasion, the Department of Mathematics at UCCS and the Applied Math Department at CU Boulder organized a major international conference on "Nonlinear Waves, Integrable Systems and Their Application". The conference was held on the UCCS campus during June 4-7, and on the CU Boulder campus on June 8. As the title of the conference suggests, this was a gathering of the major international figures in both theory and applications. The conference featured 80 invited speakers from 16 countries, approximately half of them given by leading scientists from Europe, Canada, Japan and Australia.

Among the key speakers were the 2001 Nobel Prize winner in Physics **Eric Cornell** (NIST and University of Colorado) and **Martin Kruskal** (Princeton and Rutgers, the 1993 National Medal of Science and 1994 John von Neumann Prize winner). **Peter Lax** (of Courant Institute, NYU) had also confirmed his participation as a keynote speaker. But Lax was announced as the winner of the 2005 Abel Prize early in the year, and so was in Norway to

receive his prize during the time of the conference. (The Abel Prize is the most prestigious award in mathematics, instituted in 2002 by the Norwegian Academy of Science and Letters.) The list of participants also included **Mark Ablowitz** (Boulder), **David Kaup** (Central Florida), **Alan Newell** (Arizona) and **Harvey Segur** (Boulder) (the parents of AKNS system) and many more key players in the field.

The conference speakers reported on the latest theoretical and experimental results in nonlinear waves, integrable systems and related applications. Because of the cross-disciplinary nature of the conference, experts became aware of the latest work in fields related to but different from their own. In addition, students and young scientists had the unique opportunity to gain key insights in their respective fields of research.

For more information about the conference, including the video archive of all lectures and a brief historical perspective on solitons, please visit the conference website <http://www.math.uccs.edu/soliton>.

Math Club News

by **Sanghui Lee**

President of the UCCS Math Club

The past year for UCCS Math Club has been an eventful one. Last spring we had the MCM/ICM math modeling competition, as well as participated in and co-organized the first Front Range Applied Mathematics Student Conference. Later in the semester we volunteered at the Sky Sox Math Youth Days. This fall we elected some new officers – actually, all the officers this semester are new! We have a new president, secretary and treasurer, and created a position called the “publicist” (whom as you’d guess handles all our publicity stuff). The large focus this semester, though, has been on the Senior Seminar course, Math 495. **Kristopher Marcus** talked about his experience with the senior seminar, and Dr Greg Morrow and Dr James Daly presented their research highlights for students who may be doing their senior seminar in near future. Besides discussion of the senior seminar, Dr Radu Cascaval gave a presentation on the mathematics of hurricanes (just in time for the natural disasters which occurred earlier in the fall), and **Rebecca Gressler** talked about Topology and the Shape of Space.

If you are an aspiring mathematician who wants to hang out with others who have the same interest, or just want to make friends who can help you with your math homework, swing by the Math Club meetings. They are usually on Fridays at lunchtime.

Information about the math club, meeting times and events can be found at

<http://www.math.uccs.edu/mathclub/>

We promise we won't make you solve complex math problems...unless you want to!

Department Focus **Dionisia De La Cerda**



In this issue of the UCCS Department of Mathematics Newsletter we spotlight **Dionisia De La Cerda**, a Spring 2005 graduate of our department.

Dionisia was born in Houston, but moved with her family to Colorado Springs at a young age. When asked about which local high school she graduated from, she replied "Coronado ... barely". By her own admission, Dionisia was not a model student in high school. Married at 17, a mother at 19, and divorced at 21, things were definitely tough post-high school. She did land a job at the Colorado College cafeteria, which in retrospect was somewhat of a turning point in her life.

"Even though I didn't very much like high school, working at Colorado College put me in constant contact with kids my age who had some goals and aspirations for what they wanted to do with their futures. Being in that environment got me thinking that I had better refocus my energies and set some goals for myself."

So Dionisia enrolled at Pikes Peak Community College in 1998, where she spent 4 1/2 years prior to enrolling at UCCS in Spring 2003. She had earned enough transferable credits at PPCC that she would be able to get her UCCS B.A. Mathematics degree by Spring 2005. During her undergraduate enrollment Dionisia was the recipient of Karen Possehl Scholarship. (This scholarship fund is offered to 'non-traditional' female students at UCCS. As part of the scholarship program, the recipients receive help with tuition, books and day care if needed and work one-on-one with mentors from the community.)

During her years as a UCCS undergraduate, Dionisia spent much time working with students as a tutor and mentor. While she had originally thought

about becoming a high school math teacher, she began to realize over the past two years that she preferred to work one-on-one with people. Of course that meant helping students with mathematics. But, based on her own experiences, it also meant helping people understand what opportunities are available to them in trying to achieve their own goals. So, rather than pursue a traditional classroom teaching career, Dionisia has decided to pursue a career in which she can play an 'advocate' role for people in this regard.

With that as motivation, Dionisia decided to pursue a master's degree in Public Administration through UCCS. The eventual goal is to work with a non-profit organization (her own??) to further her goals for student advocacy. Of course, finding a way to pay for graduate studies is not easy. But Mathematics Learning Center Director Shannon Schumann wanted very much to have Dionisia continue to work in the MLC. And when Shannon approached Vice Chancellor for Student Success (and mathematics department faculty member) **Jim Henderson** to describe the situation, Jim was able to put a scholarship package together which would allow Dionisia the opportunity to attend graduate school while working in the MLC. As part of her duties, Dionisia is also working with Barb Gaddis to help find ways of increasing student retention, especially in freshman level mathematics courses.

From a less than stellar high school experience, to a university mathematics degree, to a bright future in helping others ahead of her, Dionisia De La Cerda is certainly making an important contribution to our school and community. We congratulate and applaud Dionisia on her accomplishments!

New logo, new shirts !!

The new UCCS Math Department shirts are on the way! They will be ready in early Spring 2006, and will cost \$15. The front will have a "mathematically interesting" design incorporating the words **UCCS Mathematics**; on the back it will say "Don't drink and derive, or you will not be able to differentiate when you have reached your limit". Contact Joanie joanie@math.uccs.edu for ordering info.