UCDAVIS 2006
newsletter
DEPARTMENT OF MATHEMATICS

In Celebration of Evelyn Silvia



by Jessica Utts, Dept of Statistics, UC Davis
Angela Cheer, Dept of Mathematics, UC Davis

Our friend and mentor Evelyn Silvia, Professor of Mathematics at the University of California, Davis, passed away on January 21, 2006 of ovarian cancer, just a few weeks before her 58th birthday. We are delighted to have this opportunity to share with you our reflections on her life.

It would be a tribute to anyone's life to be able to say that she or he made a difference to someone at some point in life. But there are very few people who made a difference in so many different ways, to so many different people, as did Evelyn Silvia. She actively sought to correct injustices, to encourage the best in everyone, to provide financial help to students and family when needed, and to serve her many communities in a myriad of ways. Although she advised everyone else to say "no" to requests for their time and energy, she was unable to keep herself from contributing generously to worthy endeavors — from learning sign language to help deaf children learn mathematics, to serving the local community as a rape-crisis counselor.

The diversity of stories we have received illustrate Evelyn's influence, and the passion contained in them, convinced us to share some of the writers' original words. The following are examples of the many legacies Evelyn Silvia leaves behind, illustrated through the words of friends, family and colleagues. Not only did she help many, many people, but she did so in creative ways that would be worthwhile for all of us to emulate. In reading about some of Evelyn's good deeds, feel free to initiate them in your own life! Imitation is the form of sincerest flattery.

She was a strong advocate for women's issues on campus. She organized a support group to which all women faculty at UC Davis were invited. She continued to be the mainstay of this group for over a decade. Here are two first-hand accounts of the difference her work on behalf of women made in the lives of women faculty.

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In Celebration of Evelyn Silvia

"Evelyn changed the face of our university. I first met her when I arrived in 1977 with a mandate to develop a program in quantitative analysis of plant-environment interactions. As the first woman hired into a tenure track professorship in my department of 40, I felt somewhat isolated and uncertain of my place in the university. Evelyn had organized the "Faculty Women's Research Support Group" to meet monthly in our homes, talk about our research, and provide encouragement in our academic endeavors. While I was not aware of feeling oppressed at work, I found it amazingly comforting to have the opportunity to walk into a room full of women, as a complement to the all-male faculty meetings of my department. Evelyn campaigned energetically to have women represented on the important university committees; she counseled us individually and cheered on the group support network; she remained vigilant in protesting any gender-based inequities that surfaced. Her demands for fair treatment gradually improved the status of women at the university and contributed immeasurably to our self esteem."

Wendy Silk, Professor of Land, Air and Water Resources

"Evelyn was a warrior. There are always many battles to be fought, and in each and every battle, Evelyn tirelessly championed the side of justice, tolerance, and equal opportunity. She was very active in recruiting those less motivated, like myself, into those battles, and in doing so effected important changes on our campus. I always marvel at Evelyn's apparent ability to be in two places at once, both leading the charge and gently lashing us from the rear. Perhaps this amazing feat was possible because of her expertise in geometrical transformation."

Maureen Stanton, Professor of Evolution and Ecology

Evelyn was equally passionate about mentoring assistant professors, male and female. She wrote a pamphlet entitled "Collegial Advice for Assistant Professors" that is now available online, linked to the Vice Provost's Helpful Policies at UC Davis:

http://academicpersonnel.ucdavis.edu/

Evelyn routinely held Thanksgiving and Easter dinners at her home, and invited a myriad of people who had no family in the area, especially newly-hired faculty members. As noted by one of her colleagues:

"It has been mentioned that Evelyn truly cared about the success of junior faculty, but let me say some more about this. She wrote some wonderful notes with very sensible advice and suggestions. Even more, I was truly moved by the attention she gave to young faculty. When I first arrived on campus it was not an easy time for me. When one is a newcomer to a strange place, it is hard and if on top of that one is an assistant professor it is even harder. It makes a difference to receive a friendly handshake. She was the first person to come into my office and introduce herself and offer a welcome. That quarter Evelyn and [her husband] Doyle had us over for our first Thanksgiving dinner in Davis."

Jesus De Loera, Professor of Mathematics

It is no surprise that Evelyn won the UC Davis Academic Senate Distinguished Teaching Award, as well as the Deborah and Franklin Tepper Haimo Award for Distinguished College or University Teaching of Mathematics. She was constantly praised for her tough, but caring approach to teaching.

"I am so deeply saddened today to learn of Dr. Silvia's passing at far too young an age. She was one of the most difficult teachers of my life however; she was a teacher in every sense of the word. She was truly inspiring. I loved to watch her teach. She always seemed to be bounding all over the place. Her amazing positive energy and enthusiasm, even at 8am, was truly contagious. She was always there to help me. I remember how disappointed she would be when she thought I did not make enough of an effort at something. In years since I have often thought of those wonderful days when it seemed like I could feel my brain stretching through my skull, while her class and those of a few others were taking me to another level of being a student. She continually encouraged me and genuinely cared that I succeeded at UC Davis and in my life."

Riad Steven El-Bdour, B.S. in Mathematics, UC Davis, 1997

One of the many passions in Evelyn's life was the Master of Arts in Teaching (MAT) Program, which she directed during many of her years at UC Davis. Staff and students were awed by her energy and devotion to the success of the Program and its students. She was awarded a large National Science Foundation grant to help bring together students in the Program and public school teachers.

"Evelyn poured her soul into the MAT students. After taking over that program, she seemed to be in perpetual motion. Math education was very important to her, and she wanted to assure that the next generation of math teachers was well prepared. Not only did she spend every waking hour (seemingly)

working on issues for and with the MAT students, but she worked with current teachers at workshops during the summer to help them better their math teaching skills as well. Her passion for math and teaching was obvious.

Nancy Davis, Undergraduate Coordinator, UC Davis Math Dept, 1999-2005

"Describing Dr. Silvia as selfless would be an understatement. As Principal Investigator she was entitled to remuneration [from the NSF grant]. She refused to accept it. Instead, the money was used to support graduate students as they endeavored to become mathematics teachers. In so many ways, Dr. Silvia tried to help others with every tool she had. Her noble deeds and good work have affected countless people who were touched by her strong and caring voice.

Al Mendle, Supervisor of Teacher Education, UC Davis

In addition to her devotion to mentoring and education, Evelyn found time for research, which she once said was "the one thing I do for myself." She loved mathematics, and her expertise was in classical analysis, with much of her research concerning univalent analytic functions in one complex variable. An anonymous reviewer of her work commented that "Professor Silvia is a well-regarded and highly respected researcher in her chosen field, with high visibility and national and international recognition."

Evelyn's service to the university was unparalleled in its quantity and quality. In Fall 2000 as part of the review of Evelyn for a high level advancement, the Department of Mathematics counted the number of Administrative and Academic Senate committees she had served on from the time she was promoted to Professor in 1984. The astounding result was that she had served on more than 220 of these committees, and had served as chair or head of 40 of them! In addition, she served as the Director of the UC Davis Teaching Resources Center, Secretary of the Faculty Senate and Head Advisor for the Math Department during that time period. Anyone who served on a committee with her quickly learned that she was not there to add another name to her list of committees. She was always completely prepared for meetings. She read and analyzed all committee materials and always had constructive input. Many of us learned how to be good committee members by watching Evelyn in action.

Evelyn's love and compassion extended beyond her professional work. One friend correctly described her as "fiercely loyal" to her friends and family. Although she had no children of her own, she played a major role in the lives of her two stepchildren, as well as her many nieces and grand-nieces and nephews. Her nieces all lived on the East Coast, and when they were 11 years old, Evelyn would fly them to California and spend a few weeks showing them around. She explained that at that age they were old enough to appreciate it, but young enough to be willing to leave their friends for two weeks. She was a tremendous influence in their lives. One of her nieces wrote:

"My Aunt Ev was an amazing woman. As a child, to me, she seemed so much larger than life. She was my idol. I remember learning sign language with her so she could teach deaf children math. I remember how proud I was watching her be honored as teacher of the year. I remember how beautifully she sang and signed 'Bridge Over Troubled Water' for the gift of music at a church service we attended. I remember the summer my cousin Dorothy and I spent humiliated as she chased us through Disneyland in bright red Coca Cola pants. I remember the morning we made her hamburger and toast for breakfast in bed and she actually ate it. One day she stood in line for hours to buy me concert tickets to the Who when she didn't even know who the Who were. I am so grateful for every moment I spent with her."

Tammy, Evelyn's niece

As we reminisced over Evelyn's influence in our own lives, we realized that we shared a common bit of good fortune. Evelyn had paved the way for both of us as the first tenure-track woman in the Math Department at UC Davis, and the only other woman in the Department when each of us started; Jessica joined the Math Department in 1978 and moved to the newly formed Statistics Department in 1979 and Angela joined the Math Department in 1984. There could not have been a more dynamic, compassionate and wise mentor than Evelyn to greet us when we arrived. We are both sure that our experience at UC Davis would have been radically different had she not been there first.

The true measure of one's worth is not found in the number of committees chaired or the number of publications one leaves behind, but in the number of lives one has touched in a positive way. By that measure, and many others, Evelyn Silvia leaves a legacy that will affect many generations to come. She has truly made the world a better place, and everyone who knew her, a better person. We feel blessed to be counted among them.

Dr. Silvia's family, friends, colleagues and students have established an endowed scholarship in her name, which will support juniors or seniors majoring in math, or statistics who plan to teach mathematics at K-12 grade levels. Anyone wishing to donate to the fund can send checks payable to the UC Davis Foundation, Evelyn M. Silvia Scholarship Fund, c/o UC Davis Department of Mathematics, One Shields Avenue, Davis, CA 95616.

Letter from the Chair

by Motohico Mulase

This was a year of celebrations and departures. We celebrated our move to the Mathematical Sciences Building and bid a reluctant good-bye to a dear colleague, Evelyn Silvia. We applauded our many achievements from grants to awards, yet we struggled with revamping our major and adjusting to online teaching tools. Throughout these trials and tribulations, the core of what is Mathematics at UC Davis, perseveres.

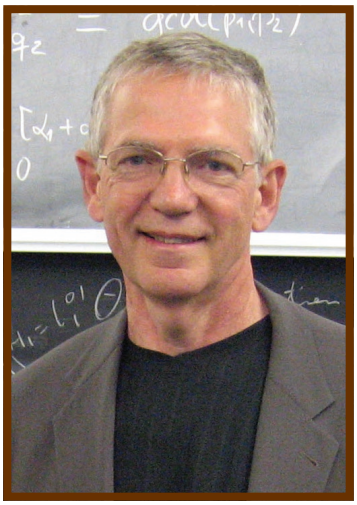
Certainly, one component that makes us unique is the people who are a part of the Department. I am pleased to welcome our new faculty members, our new Krener Assistant Professors, our new graduate students, and our new staff. Having an influx of new faces, ideas, and energy provides the ongoing fuel to keep our Department hitting new milestones. I anticipate the upcoming year to be one of many successes as well.

It is important to us to have our extended Math Family, that is YOU, stay abreast of our various activities throughout the year. We want to encourage your goodwill in our endeavors and we welcome your feedback at any time. Please do share with us your "Life after Davis" information so that we may continue to stay in contact and share in the news of Mathematics at UC Davis.

Visitor Kaminker

Jerry Kaminker is a Visiting Professor from IUPUI, one of the few universities whose name is a palindrome. His research is in index theory of elliptic operators and operator algebras, along with applications of these topics to topology and geometry. One of his current projects involves studying the topology of families of self-adjoint elliptic operators in terms of their spectrum and eigenspaces. In another direction, he is looking at secondary invariants of elliptic operators from various points of view—some using C*-algebras. This is all part of the broader subject of Noncommutative Geometry. Professor Kaminker visited last year in the fall quarter. He will be here all year this time, teaching 16A in the fall and 210C in the spring. He said that he enjoyed the mathematical environment at UC Davis very much and is extremely happy to have the opportunity to be back here again.

Craig Tracy elected to the *American Academy of Arts & Sciences*



The American Academy of Arts and Sciences announced the election of Professor Craig A. Tracy as a Fellow of the Academy in April 2006. Among the 175 newly elected fellows are six other mathematicians and such familiar names as former presidents: George Herbert Bush and William Jefferson Clinton, Chief Justice John Roberts, Jr., and Michael Tilson Thomas of the San Francisco Symphony.

The election recognizes Craig's long lasting impact in mathematics and mathematical physics through his numerous research accomplishments, including his joint work with Harold Widom of UC Santa Cruz on *random matrix theory* that started in the early 1990s. One can easily see how widely his work is known to the world by simply typing "Tracy-Widom" into Google search. An astonishing number of Web documents on *Tracy-Widom distributions* will show up on your screen. This research topic was also featured in three different plenary talks delivered at the quadrennial *International Congress of Mathematicians* held in Madrid in August 2006.

Just to illustrate where we encounter one of the Tracy-Widom functions even without noticing it, let's recall your last airplane trip. Airline companies are struggling to shorten the time to board all passengers into an aircraft. When we consider a large number of passengers going into a single long aisle, the time it takes to finish boarding obeys the *Tracy-Widom law* as the number of passengers approaches to infinity. Indeed this kind of unexpected appearance of the Tracy-Widom functions is the striking nature of their work.

Nobel physicist Eugene Wigner first introduced random matrix theory about half a century ago to model the spectral behavior of a large nucleus, such as that of uranium. Mathematically the problem is to study the behavior of eigenvalues of a large Hermitian matrix whose entries are randomly given. Computer simulations show that this model for a large nucleus works strikingly well. Later the mathematics community got excited when we learned that the distribution of nontrivial zeros of the Riemann zeta function on the critical line also resembled the distribution of eigenvalues of such random matrices.

Nobody was able to determine even how the largest eigenvalue of a random Hermitian matrix behaves. It was Craig Tracy and Harold Widom who discovered in 1992 the existence of the limiting distribution as the size of the matrix tends to infinity. Furthermore, they identified the exact shape of the distribution function in terms of the Painlevé transcendent of type II. Only because the concrete expression of the distribution functions is determined by Craig and Harold, researchers in other areas, including combinatorics, probability, statistics, mathematical physics, and statistical physics, are able to explain newly observed phenomena using the Tracy-Widom distributions.

We also note that one of the most striking works of 2006 Fields Medalist Andrei Okounkov is to explain why the eigenvalues of a random Hermitian matrix and the time it takes to board a large number of passengers exhibit the same statistical distribution, from the point of view of topological cell decomposition of moduli spaces of Riemann surfaces. It is fair to say that the work of Craig and Harold published in over 30 papers has attracted many young talents of the world to the field of random matrix theory. Okounkov's Fields Medal is a clear testimonial of this effect.

Craig Tracy received his Ph.D. in Physics from SUNY at Stony Brook in 1973. Since 1984 he has been a Professor of Mathematics in our department. He served as Chair of the department from 1994 to 1998. In 2003 he received the title of Distinguished Professor by campus administration.

New Faculty

Benjamin Schlein joins the department as an Assistant Professor. Ben received his Ph.D. in 2002 from the Institute for Theoretical Physics at the Swiss Federal Institute of Technology (ETH) in Zürich, Switzerland, where he graduated with a thesis in mathematical physics under the supervision of Jürg Fröhlich. After graduating, Ben moved to the United States; he spent one year at the Courant Institute in New York, where he was hired as a Courant Instructor. In New York, Ben started to work with Horng-Tzer Yau on problems of quantum statistical mechanics. He continued this collaboration, first at Stanford University (2003-2005) and then at Harvard University (2005-2006). In 2004 Ben was awarded an NSF postdoctoral fellowship in mathematical sciences, which has supported him during the last two years.

In his research, Benjamin applies methods from mathematics, mostly from analysis, to the study of problems of physical relevance. In particular, he is interested in the study of the dynamics of quantum mechanical systems. For instance, in collaboration with László Erdös and Horng-Tzer Yau, he recently obtained a rigorous mathematical derivation of the so called Gross-Pitaevskii equation, which is extensively used in physics to describe the time evolution of Bose-Einstein condensates.

After a year at Harvard as a postdoc, Ben is now happy to come back to Northern California, where he particularly enjoys the nice weather and the beautiful landscapes. During his spare time, he likes to relax reading novels or going to the movie theater.

Eric Babson joins Davis faculty as a full professor in 2006. He received his Ph.D. in Mathematics from MIT in 1993. Since then he held several prestigious postdoctoral positions at Cornell University, MSRI Berkeley, and IAS Princeton. He was also awarded an NSF Postdoctoral Research Fellowship. He became an assistant professor at the University of Washington, Seattle, in 1998, and received the tenure promotion to associate professor in 2003.

Eric works in the area of algebraic and topological combinatorics, utilizing powerful tools from algebraic geometry, algebraic topology, homotopy theory, and other areas of mathematics. He is well known for his solutions to numerous longstanding open problems in these areas.

The most famous work of Dr. Babson to date is his solution, obtained jointly with Kozlov, to the celebrated conjecture of László Lovász about the chromatic number of a graph that appears in the Annals of Mathematics.

Robert D. Guy received his Ph.D. from the University of Utah in 2004. His doctoral thesis research was devoted to a continuum mechanics model of blood clotting. After completing his graduate work he stayed at Utah to do a postdoc with Jim Keener and Aaron Fogelson. As a postdoc he has been working on developing models of gel formation, designing algorithms for simulating viscoelasitc fluids, and modeling the mechanics of slime molds. Besides modeling biological problems, his research interests include computational fluid dynamics and complex fluids.

Bob will be coming to Davis in 2007. This year he is on leave to complete his postdoctoral work at Utah where he is part of an ongoing project on mathematical modeling of biogels.

Bob enjoys spending time in the kitchen whenever possible, and his wife Oksana enjoys collecting wines. They are looking forward to living in Northern California where they can get fresh local produce year round and will be a short drive from one of the world's best wine regions.

Evelyn

"If we focus on the wrong things, it won't work," she added, emphasizing that students need to understand the language of math and to see math in all aspects of their lives.

Evelyn Silvia

New Krener Assistant Professors

Lucas Sabalka received his Ph.D. this past May from the U. of Illinois at Urbana-Champaign. He received his undergraduate degree from the U. of Nebraska-Lincoln, with majors in the fields of mathematics, computer science and history and minors in physics and psychology. His areas of interest include geometric group theory and low-dimensional topology. He plans to work with mentor Misha Kapovich as well as several other faculty members and postdocs in related areas.

Outside of mathematics, Lucas has a passion for ultimate frisbee, badminton, cards, and movies with his wife.

Fu Liu received her Ph.D. in Mathematics from MIT in June 2006. Her research interests are in enumerative and algebraic combinatorics. Her work has focused on Ehrhart polynomials and enumeration on trees, but she is also interested in work connected to representation theory and algebraic geometry. She will arrive in the department in Winter 2007 and work with her mentor Professor De Loera.

Outside of math, her personal interests include playing basketball and ballroom dancing.

Linh Lieu received her Ph.D. from UCLA in the Spring. Her research is in applied mathematics, specifically digital image processing. Her doctoral research focused on applications of calculus of variations and pde's to image processing. She is now working with Naoki Saito and Hong Xiao on image and signal processing.

Aside from work, Linh enjoys learning Hangul (Korean language), reading, exploring restaurants, walking through downtowns, and visiting national parks.

Linh is very afraid of cold weather and likes food of different varieties. Davis' generally hot weather and ethnic diversity have made it top on her list of favorite places.

Mark Opmeer received his Ph.D. in mathematics from the University of Groningen, the Netherlands in September 2006. His research interests are control theory, functional analysis and linear partial differential equations. He is especially interested in the intersection of these three areas. Since professors Krener and Bai will serve as his mentors, nonlinear and computational aspects of control theory will probably receive his increased attention while at UC Davis.

Besides mathematics Mark likes reading and cycling. Back in his home country he is involved in an organization of teachers, parents, and students that is fighting a battle very similar to the 'math wars' in the United States.

Visitor Araki

Professor **Huzihiro Araki** of Kyoto University will be visiting us in Fall Quarter 2006. He is well known for his pioneering and lasting contributions to both mathematics and physics, in particular in quantum field theory, statistical mechanics, and operator algebras.

The numerous awards bestowed on him include Japan's prestigious Asahi Prize in 1996 and the 2003 Henri Poincaré Prize awarded at the International Congress in Mathematical Physics held in Lisbon. The Poincaré Prize is the highest international honor in Mathematical Physics. The citation reads:

> "For his lifetime contributions to the foundations of quantum field theory, quantum statistical mechanics and the theory of operator algebras. His outstanding achievements at this interface of physics and mathematics are exemplified by his work on the structure of the algebra of local observables and its representations, collision theory, the variational principle in statistical mechanics and the notion of relative entropy for infinite quantum systems."

Professor Araki has published over 170 papers to date, and a well received book "Mathematical Theory of Quantum Fields" (Oxford University Press, 2000). He is the Founding President of the International Association of Mathematical Physics, on which Professor Bruno Nachtergaele currently serves as an Executive Committee Member. Dr. Araki served as Director of the Research Institute for Mathematical Sciences, Kyoto University, in the 1990s, and on the IMU Fields Medal Committee in 1982. He also served as editor of ten journals, including Communications in Mathematical Physics (1973-2001) and JMP (1996-2000).

During his stay in Davis, Dr. Araki will teach a graduate course, MAT 280, on operator algebras, and give both a colloquium talk titled "Dynamics and Potential," and a Mathematical Physics seminar talk on "Equivalence of Various Characterizations of Equilibrium States."

Benjamin Morris Wins Sloan Fellowship

Let us consider a problem of card shuffling: How many times do we have to shuffle to ensure that cards are sufficiently random? A very simple random shuffling method was proposed by Thorp in 1973. We start with a deck of an even number of cards. First separate the cards into two equal decks by dividing it at the middle, and hold one in the right hand and the other in the left. Now flip a coin. If the coin shows the head, then drop one card from the right deck, followed by a card from the left. If the coin shows the tail, then drop the first card from the left deck, followed by a card from the right. Flip the coin again, and continue this process. After all cards are dropped, put them together into a single deck. This completes one shuffle. The goal is to quickly achieve a random permutation of cards in this way, and the problem is to find the upper bound of the mixing time (the number of times of shuffling needed), as a function of the number of cards.

Because it is quite easy to formulate, the ***Thorp shuffle problem*** has become one of the most notorious, longest-standing, open problems in card shuffling. The numerous literature testify that several very prominent researchers from mathematics, computer science, and other fields worked on this problem, in vain, for the last 30 years. It has been conjectured that the mixing time is a power of the logarithm of the number of cards. Previously, however, no one has come even close to a fractional power of the number of cards itself.

In 2005, the problem was finally solved by Dr. Morris! It is quite understandable to see the excitement and enthusiasm in the discipline.

Solving a well-known problem that has been open for over three decades requires exceptional talent and extraordinary creativity. Dr. Morris has developed a new concept he calls "evolving sets" to attack the Thorp shuffle problem. The idea has been proven to be useful for many other problems in mathematics, including isoperimetric inequalities and heat kernel estimation. On these latter subjects, the previous results were based on hard analysis techniques. Dr. Morris's new approach enabled him to go beyond what was established before.

Benjamin Morris was born in 1973. He received his Ph.D. in Statistics from UC Berkeley in July 2000. From 2000 to 2003, he was an NSF Postdoctoral Fellow and visited Stanford in the first year and then Berkeley for the next two years. He taught a few courses at Berkeley in this period. In 2003, he was appointed to a tenure-track Assistant Professor in the Department of Mathematics at Indiana University, Bloomington. In 2004-2005, he took a leave of absence and joined Microsoft Research as a Visiting Researcher. He was appointed to a tenured Associate Professor in our Department on July 1, 2005.

Dr. Morris is the 10th Sloan Fellow of our faculty. Former recipients are: David Barnette, Craig Benham, Greg Kuperberg, Joel Hass, Jeremy Questel (now at Toronto), Steve Shkoller, Alexander Soshnikov, Abigail Thompson, and Roman Vershynin.

Evelyn

"I have just accepted an Associate Professor position in the Mathematics Department at Southern Oregon University, one that will involve teaching and supervision of students intending to be teachers. I will strive to follow in Evelyn's footsteps, taking much of what she taught me and passing it on to the next generation of math teachers. If I can positively impact a single student in as significant a way as Evelyn impacted me, I will consider it a tremendous success. Without a doubt, Evelyn's impact on me was life-changing."

Irving Lubliner
M.A.T. student at UC Davis from 1974 to 1976

Math Upfront

by Bruno Nachtergaele,
Professor of Mathematics &
Editor, Journal of Mathematical Physics

"Publish or Perish!" is the essential advice for a successful career at a leading research university such as UC Davis, and the members of the Department of Mathematics have been publishing prolifically. We proudly display our annual crop of research articles written by department members on:
http://www.math.ucdavis.edu/research/preprints/

If you click on the link for any of the titles on this page you are pointing your browser to another website of the department: the famous "Front," developed and maintained by Professor Kuperberg. The Front is a user friendly front end for the mathematics preprint archive, the ArXiv, hosted by Cornell University.

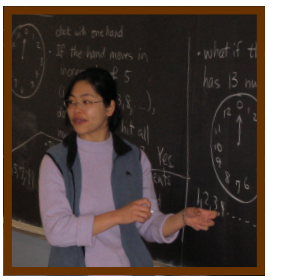
And what about books? Yes, we write books too. On your next visit to the Mathematical Sciences Building, stop by the vitrines in the entrance hall and have a look at the books published by mathematics faculty.

Another item you will find on display there is the Journal of Mathematical Physics (JMP), published by the American Institute of Physics (AIP). New articles are typically posted on the ArXiv (or the Front) before they have been peer reviewed. Most of them are simultaneously submitted to a peer reviewed journal, of which JMP is an example. Since January 2006 the Editorial Office of JMP is housed in the department. Its main function is to coordinate the screening of articles submitted for publication in the journal through AIP's online submission system. Associate Editors Alexander Soshnikov (Davis) and Manfred Salmhofer (Leipzig) assign referees for the approximately 1100 articles submitted to JMP every year. Based on their recommendations I make the editorial decisions (publish, revise, reject) and handle appeals by authors who argue that their paper was unjustly rejected. The most important person in the entire process, however, is Assistant Editor Karen Beverlin (aka the Hub) who runs the daily show in the JMP office. She is responsible for getting every issue of the journal out on time and so far she hasn't missed a beat!

JMP is only one of the many mathematics journals that have department members on their editorial boards. For a complete list see:
http://www.math.ucdavis.edu/honors/

In addition, all faculty participate in the peer review process by writing referee reports on articles in their area of expertise that editors send to them from all over the world. Just one more thing your busy professor is doing outside the classroom. Now, get back to work and write that paper!

Explore Math!



Graduate students bringing cutting-edge research into the classroom to share with undergraduate and high school students.

Explore Math is a year-long math enrichment program for high school and undergraduate students that was created last year by department graduate students Yvonne Lai, Spiros Michalakis, Brandy Wiegers and Sarah Williams. Explore Math has added to the COSMOS summer course with three new programs which allows the department to offer opportunities to do math year round! The Fall Math Modeling Experience prepares students for the COMAP high school mathematical contest in modeling (HiMCM). Math Circle is a winter program where students explore topics from cryptography to geometry, from chaos and combinatorics to game theory, from knot theory to tilings. Lastly, there is the American Regions Mathematics League (ARML) Competition Training in the spring. These three new programs are directed and taught by UCD math department graduate students with help from department faculty and UCD undergraduates.

In the year since Explore Math has been created, we have had some wonderful achievements:

The Explore Math Coordination Team received a UCD Kaplan award for their teamwork in creating the Explore Math program.

The ARML Team, coached by Spiros Michalakis, Rohit Thomas and Sonny Mohammadzadeh, ranked in the top 20 nationwide and achieved 2nd place in its division in the Western Site of the competition, one place below the national champions, Colorado B.

Nineteen participants of the Math Modeling Experience competed in the High School Mathematical Contest in Modeling, coached by Sarah Williams and Brandy Wiegers. Teams received ranks of Honorable Mention (2), Meritorious (2), and Regional Outstanding (1) (top 8% out of about 250 teams).

Six participants of the Math Modeling Experience competed in the Mathematical Contest in Modeling, coached by Sarah Williams and Brandy Wiegers. Undergraduate team Mary Lash (chemical engineering '06), Nicholai Linesch (math '07) and Luis De La Torre (math '07) received the rank of Meritorious. Undergraduate team Yaroslav Gelfand (biomedial engineering '06), Bryan Bell (math '06) and Simpson Wong (math '06) received the top rank of Outstanding (top 2% out of about 1000 teams).

Explore Math has already kicked off the new school year with a running start. During the first week of October, 9 undergraduates and 30 high school students have signed on to participate in the MME program with Sarah Williams and Eva Stawbridge. Soon we will be recruiting for the Winter Math Circle program. If you are interested in participating, helping or finding out more about our program, check out our webpage http://explore.math.ucdavis.edu/ or feel free to contact us:

Brandy Wiegers, Explore Math Coordinator,
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Sarah Williams, MME Director,
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Yvonne Lai & Hillel Raz, Math Circle Directors,
mathcircle@math.ucdavis.edu
Spiros Michalakis & Rohit Thomas, ARML Directors,
arml@math.ucdavis.edu
Tim Lewis, Explore Math Advisor,
tlewis@math.ucdavis.edu

Good News!

Misha Kapovich delivered an invited address at the International Congress of Mathematicians held in Madrid.

At the same ICM-2006, four faculty members are mentioned in the plenary talks: Jesus De Loera, Eric Rains, Steve Shkoller, and Craig Tracy (in three different lectures).

Joseph Biello received an NSF grant. Also, he has established a wave laboratory (through VIGRE, with REU and RFG) in the new Mathematical Sciences Building.

Bruno Nachtergaele now chairs the Academic Senate Committee on Academic Planning and Budget. This committee also assists Provost Hinshaw with her decision on FTE allocation in the round 2007-09.

Arthur J. Krener was selected as the winner of the 2006 Hendrik W. Bode Lecture Prize of the IEEE Control Systems Society. This award recognizes distinguished contributions to control systems science or engineering.

Motohico Mulase gave a plenary talk at the London Mathematical Society Durham Symposium on Methods of Integrable Systems in Geometry.

Graduate Jesse Johnson received a National Science Foundation Postdoctoral Research Fellowship.

Robin Wilson, Ph.D. graduate student, was selected for the Office of the President's Postdoctoral Fellow for the 2006-07 academic year. One of the primary goals is to honor students with a "record of mentoring or outreach activites that promote access and opportunity in higher education." Robin will be employed by the University of California, Santa Barbara, under the supervision of Martin Scharlemann in the Department of Mathematics.

Joel Thomas, a math undergraduate, won a CWEA Kirt Brooks Scholarship.

Concerning grants, our people had a good year with 21 new awards and total budgets over $3.8 million. The largest award was Joel Hass' GAANN renewal of over half a million dollars.

Roland Freund and Jesus De Loera received a 2006 IBM Faculty Award.

We also had a wide range of funding agencies: NSF, NIH, NASA, ONR, DOE, USDE, IBM, NSA, and the Sloan Foundation.

Schlein wins *Sofja Kovalevskaja* Award!

Professor Benjamin Schlein has been selected as one of the recipients for the Sofja Kovalevskaja Award. It is only the third round of this ambitious program of the Alexander von Humboldt Foundation of Germany. Its aim is "to ensure that, right at the beginning of their promising careers, internationally sought-after young researchers are involved in collaboration with academics in Germany." The award totals up to 1.2 milion Euro to support the recipients research for four years.

Benjamin has done ground breaking work on the Gross-Pitaevskii equation which describes the dynamics of Bose-Einstein condensates. His work shows how this equation can be derived starting from microscopic many-body quantum dynamics. The new tools developed by Benjamin and his collaborators H.T. Yau from Harvard and L. Erdös from the Ludwig-Maximillian University in Munich, open up new roads to further our understanding of the dynamics of interacting quantum systems.

The Sofja Kovalevskaya program emphasizes that the competition for talented young academics is worlwide and that Europe has joined the United States as an aggressive competitor in this global market. It is wonderful that the only mathematician among this year's winners is an assistant professor at Davis!

Visitor Peche

Sandrine Peche obtained her Ph.D. in Probability in 2003, under the supervision of Professor Gerard Ben Arous at the Swiss Federal Institute of Technology at Lausanne (EPFL). She then joined the University of Grenoble as an Assistant Professor and for 2006-07 is a visiting professor in Mathematics at UC Davis.

Her research interests concern random matrices and their applications, including mathematical physics, statistics and finance. In particular, applications of random matrix theory to statistical data is a main point of interest. In her Ph.D. thesis, Sandrine proved a remarkable result about the universality in the bulk and at the hard edge of the local distribution of the eigenvalues for a sufficiently rich class of sample covariance matrices. The result has been published in the Communications in Pure and Applied Mathematics. More recently, in a joint work with Professor J. Baik and Professor G. Ben Arous, she has obtained some important results on the spectrum of large sample covariance matrices, opening a way to reconstruct the population covariance from the sample covariance matrix. Two of her other papers have been accepted for publication in prestigious journals Communications in Mathematical Physics and Probability Theory and Related Fields.

While at Davis, Sandrine plans to work on some combinatorial problems related to Random Matrices with Professor A. Soshnikov. In her spare time, she is exercising (jogging, walking, martial arts) and reading. She's also interested in nutrition and home design.

Evelyn

"I am so sad to hear of her passing. She was a very important part of my education and one of the reasons I enjoyed my time at Davis so much. She taught the first class I attended at Davis and was wildly energetic at 8 in the morning. I took three more classes from her, and her enthusiasm for mathematics and teaching was unequaled in my experience."

Edward "Ted" Jenvey
B.S. Mathematics, 1985

"Evelyn has been one of the most successful, influential, respected and beloved university teachers of the nation. Her love of mathematics and care for all her students are the treasures she shared with everybody."

Professor Motohico Mulase
Department Chair of Mathematics, UC Davis, 2006

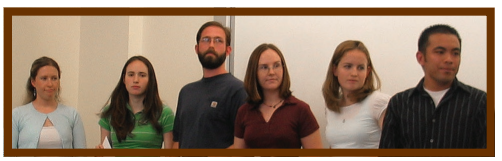
2005-06 Annual Awards Ceremony

The Department's Annual Awards Ceremony was held on June 6, 2006. On this occasion, the Department honors its best undergraduate students and its best teachers among the faculty and graduate students. The awards aside, the Department also awarded 63 undergraduates degrees this past academic year. Of those 63 students, one graduated from the Department with highest honors and another graduated with high honors. Congratulations again to all of our degree and award recipients.

Outstanding Teacher of Lower Division Mathematics

Duane Kouba

Recipients of this award are drawn from instructors who have taught the department's lower-division courses over the past year (MAT 12, 16ABC, 17ABC, 21ABCD, and 22AB as well as the honors sections). Associate instructors, visiting instructors, lecturers, and regular faculty are eligible. Interim Vice-Provost Fred Wood presented this year's award to Lecturer **Duane Kouba**, who was selected by the department's Awards Committee after having reviewed course evaluations and student comments.



Left to right: Katherine Stalder, Sarah Kraemer, Spencer Krautkraemer, Jennifer Healey, Jessica Harris, and Lawrence Austria

Departmental Citations

These citations recognize the very top graduates of our undergraduate program, who have taken a very strong selection of mathematics courses, distinguished themselves with exceptionally high grade point averages, and received enthusiastic endorsements from the faculty. Professor Anne Schilling, Vice Chair of the Undergraduate Program, presented this year's citations to **Lawrence Austria, Jessica Harris, Jennifer Healey, Ashish Hingrajia, Spencer Krautkraemer, Sarah Kraemer,** and **Peter Rankenberg,** with high honors to **Katherine Stalder** and highest honors to **Alex Torgovitsky**.

William Karl Schwarze Scholarship in Mathematics

William Karl Schwarze excelled in mathematics in high school. He received his bachelor's degree in Mathematics at UC Davis and went on to graduate school at Berkeley before starting his career as a mathematics teacher in San Francisco.

This award is given to graduate students in Mathematics who have demonstrated outstanding mathematical scholarship and exceptional promise of making a strong professional contribution as a mathematics teacher and educator at the pre-college or college level.

Dean Winston Ko presented this year's award to **Yvonne Lai**, who exemplifies the goals of the Schwarze award. The faculty praised her great mathematical strengths and her superb teaching skills, but her contributions to education go far beyond that. Yvonne has devoted herself to an extremely wide set of activities all designed to improve education for a diverse range of students.

Yvonne Lai

She was the founder and a moving force behind the UCD Math Circle, an outreach program to students in Davis and the surrounding area. She not only conceived the program and recruited others to teach in it, she also took on all of the organizational details that such an enterprise requires. In her Saturday classes, her "lecture was clear and concise and promoted participation, active thinking and excitement." She also took the lead of combining the Math Circle with two other graduate student-run activities, The Math Modeling Experience and ARML, under the single umbrella program, "Explore Math."

And she has done so much more. For six years, she has taught at a Canada/USA Math Camp for five weeks during the summer. She worked with six undergraduates as part of the Geometry/Topology REU last summer, has taught in the COSMOS program and has been an invited panelist at the annual meeting of the National Council of Teachers of Mathematics.

The committee was impressed as much by her accomplishments as by her extraordinary efforts to learn more about teaching. Moreover, she has taken it on herself to travel to Boston to work with their Math Circle, and to Rutgers to work with their new MetroMath program for two weeks.

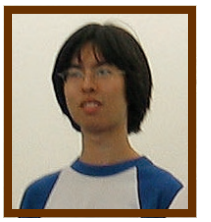
Yvonne's life dream is to create "a program that will foster mathematical creativity in all ages, inspiring my students to share their mathematical appreciation with their peers and the next generation."

Robert Lewis Wasser Prize

Robert Lewis Wasser began his studies at UC Davis in 1991. His academic achievements are numerous and impressive. He was one of the few students who had taken as a sophomore some of our most challenging courses such as Math 127. One of his instructors, Professor Don Chakerian, said how much he was inspired by the discussions he had with Robert, and that Robert's presence made the whole class so much more lively and spirited.

After his tragic death just prior to his Junior year, his grandmother, Vera May Wasser, initiated the Robert Lewis Wasser Endowment. Its goal is to benefit promising mathematics students at UC Davis.

Karina Summers



Nicholas Nguyen

Interim Vice-Provost Fred Woods presented this year's award to **Karina Summers**.

Award of Prizes in the Spring Mathematics Contest

Held annually and funded through a specialized endowment, the Spring Mathematics Contest is open to all undergraduate students enrolled at UC Davis. This contest was started many years ago to help identify our better students in mathematics. Winners are determined after having completed an exam designed by the department's Mathematics Contest Committee.

Professor Anne Schilling presented this year's prizes to **Andrey Goder** and **Nicholas Nguyen**.

Henry L. Alder Prize for Excellence in Teaching

Professor Henry Alder was an active member of our Department from 1948 to 1994. Even in his retirement, Professor Alder continued to teach and be a strong advocate for quality teaching almost until his death in 2002. Part of Professor Alder's legacy is an endowment that provides support for our graduate students through the Henry L. Alder Prize for Excellence in Teaching. This prize is given each year to the person who is deemed to be the top teacher among all graduate students in mathematics. This year the award was presented by Interim Vice-Provost Fred Wood.

Isaiah Lankham

This year's recipient was **Isaiah Lankham**. The Awards Committee was impressed by the comments made by the students he taught.

"This was the best math course and the best course I have had all year. Thank you for being so great this year, always being approachable and available for questions. This is the best teaching I've had at Davis so far."

"I thought Isaiah was the best math teacher I have ever had. Well done!"

"My best course so far at UCD. Thanks for helping me learn, and laugh in the process."

It is the qualities exemplified by these comments that Professor Alder, a superb teacher in his own right and someone who worked hard to improve teaching at all levels, had in mind when he established this award.

Jesse Johnson

Alice Leung Prize

Alice Siu-Fun Leung received a Masters in Mathematics in 1975 from UC Davis. She spoke very highly of her experience at UC Davis. In her will, Ms. Leung generously provided an endowment to award scholarships annually to graduate students in Mathematics. This award is given to students who have shown exceptional promise in all aspects of mathematics, including research, scholarship and teaching.

Dean Winston Ko presented this year's award to **Jesse Johnson**, who has compiled an extraordinary list of research accomplishments in his time at UC Davis and is a sterling example of a future researcher in the making. As one of his recommenders said "Jesse Johnson is in the top one percent of all mathematics graduate students I have seen in 17 years at Davis, and is comparable to the best I have seen anywhere."

These are heady words, but they're supported by his accomplishments. He has published three papers on Heegaard decompositions of 3-manifolds on ArXiv and a fourth will be there shortly. Martin Scharlemann remarks, "this paper would be very good work even for a seasoned mathematician. Produced by a graduate student, it's pretty remarkable." Finally, J. H. Rubinstein, of the University of Melbourne, says that "Johnson has superb potential as a researcher in geometric topology."

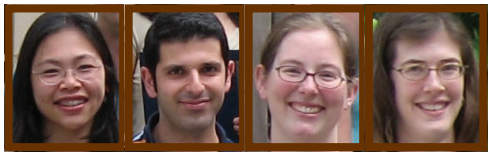
Jesse Johnson's accomplishments in his research point him to a promising future career.

Eric C. Ruliffson Scholarship in Mathematics

Eric Canady Ruliffson attended UC Davis from 1964-1968, loved the study of math and excelled in it. He was a problem solver, which helped him to achieve life-long personal and professional success. He achieved the status of Fellow in the Society of Actuaries. He was also elected to the Board of Partners for Coopers and Lybrand, the first actuary to be so honored, and served on the Board of Partners for PricewaterhouseCoopers, the world's largest consulting firm.

Interim Vice-Provost Fred Wood presented this year's award scholarships to **Amanda O'Rourke** and **Kurtis C. Keller**.

Amanda O'Rourke



Left to right: Yvonne Lai, Syridon Michalakis, Brandy Wiegers and Sarah Williams

Special Awards in Recognition of the UC Davis Math Modeling Experience and Explore Math Program

Professor Abigail Thompson presented these awards to **Yvonne Lai**, **Spyridon Michalakis**, **Brandy Wiegers** and **Sarah Williams**. She explained, "The Explore Math program has been dreamed up, developed and run by an extraordinary group of graduate students for the last two years. It is a collection of programs designed to reach out to high school students, to show them topics in math and its applications that they would never get to see in a standard school curriculum. The long-standing American Regional Math League team has been joined by the newly formed UC Davis Math Circle and the fantastically successful Math Modeling team. The dedication and enthusiasm of the graduate students has been met with equal enthusiasm on the part of the many high school (and some undergraduate) participants, who have spent Saturdays, Sundays and evenings puzzling through math problems."

News from the Graduate Programs

Our graduate students were again active, productive, winning awards and honors, completing their degrees, and beginning their new careers in academia and industry. Several students won prestigious fellowships: Diana Needell won a UCD & Humanities Research Award as well as Graduate Student Research Mentorship Fellowship; Eva Strawbridge won the Professors for the Future Award; Brandy Wiegers won the UC Davis Dissertation Year Fellowship; Sarah Williams won the Dissertation Year Fellowship and Zhihua Zhang won the Zolk Fellowship. In addition, Carlos Barrera-Rodriguez won a CONACYT Fellowship and Lola Muldrew won an NSF Fellowship.

No doubt they were invigorated by our new environment in the Mathematical Sciences Building! In addition to more meeting spaces, we are able to provide a graduate computer lab, scholarly activity rooms and other amenities which enhance the lives of our students. The Applied Mathematics group was able to host its first annual "mini conference" which was designed to acquaint our graduate students with the cutting-edge research of our faculty. We graduated students in Ph.D., MA, MS and MAT graduate programs in Mathematics and Applied Mathematics (see the list below). And this year, we once again expanded our student ranks by welcoming 35 new students, 17 in Applied Math and 18 in Mathematics, for a grand total of 139 graduate students.

Join us in congratulating the degree recipients for 2005-2006.

Degree Recipients *for 2005-2006*

Chris Algieri, M.S., Applied Mathematics : Working at Lawrence Livermore National Lab while continuing his Ph.D. studies

Joseph Caputo, MA, Mathematics : Adjunct Faculty, American River College

Arthur (Ching-hsiao) Cheng, Ph.D., Applied Mathematics : Postdoc at UCD

Cathleen Alexander Chu, MAT, Mathematics : Continuing as Ph.D. in Education

Lipika Deka, Ph.D., Mathematics : Assist. Professor, CSU-Monterey Bay

Galen Ferrell, MA, Mathematics

Johannes Eberharter, MA, Mathematics (also completed Ph.D. in MAE) : Returned to his homeland, Austria, for a job in industry

Rebecca Honeyfield, Ph.D., Applied Mathematics : Sr. Consultant, Navigant Consulting

Jesse Johnson, Ph.D., Mathematics : NSF postdoc at Yale

Jessica Kuang, Ph.D., Applied Mathematics : Research associate in Botany and Plant Science at UC Riverside.

Kami Larripa, Ph.D., Applied Mathematics : Lecturer, UC Davis

Tyrrell McAllister, Ph.D., Mathematics : Eindhoven Institute of Technology, The Netherlands

Brandon Muranaka, MAT, Mathematics : Assist. Professor at American River College and continuing Ph.D. in Education

Brad Safnuk, Ph.D., Mathematics : Postdoc, McMaster University

Pamela Sheehan, MAT, Mathematics

Noel Smith, Ph.D., Mathematics : Lecturer, UC Davis

Barbara Villatoro, MA/MAT, Mathematics

Robin Wilson, Ph.D., Mathematics : Postdoc Fellow at UCSB; for 2007-08, tenure-track at Cal Poly Pomona

Jerry (Zhe) Xu, MA, Mathematics : Continuing Ph.D. at UC Santa Cruz

Jim (Jucheng) Zhao, Ph.D., Applied Mathematics : Quantitative Analyst, Prescio Consulting

Evelyn

"The challenge of teaching is finding ways to get students to have that vision, to dig deeper so that they can reach higher," said Silvia, summing up her teaching philosophy. "If we don't believe that students are capable of more than they think they can do, we will never help them achieve all they can."

Evelyn Silvia, January 2001

Life After Davis

Shawna Bynum

MA in Teaching
June 2003

Since graduating from Davis in 2003 I have been teaching full time at Napa Valley College. And I love it! For as long as I can remember I have enjoyed mathematics, and since high school, I knew I would like teaching. What I learned from Dr. Silvia while I was at UCD was that learning to teach will be a lifetime commitment.

The students at NVC are differently diverse than any group I taught at Davis. Not so different in culture and language, but in socioeconomic status, family situation, and preparation. Many of these students did not ever graduate from high school and have never been taught how to study anything, let alone mathematics. They work 50-60 hours a week, raise kids by themselves, and still find the time for schoolwork. It is extremely rewarding to see these students succeed academically, discover the joy of mathematics and science for themselves and then transfer, some to Davis many to Berkley and Cal Poly; literally changing their lives before your eyes.

Since I've been at Napa, I've developed online math classes, advocated for a math lab to help students with their homework, enhanced the mathematics department's relationship with MESA (Mathematics Engineering and Science Achievement) and am currently working on developing a Math, English, Counseling Learning Community so students can form peer support groups and have a solid core of teachers supporting them through their first year of college. I find myself constantly revising my teaching methods, developing additional student support, and striving to find ways to make math accessible to everyone.

Tom Sallee
Teaching the Teachers

by Don Chakerian, Professor Emeritus, Mathematics, UC Davis

Tom Sallee retired on June 30, 2006, as Professor of Mathematics, after a forty year career at UC Davis, which commenced in 1966 after completion of his Ph.D. degree from the University of Washington with a thesis under the direction of Victor Klee. During his years at UC Davis he distinguished himself in all areas of academic achievement. His research has been significant and wide-ranging, including investigations in the general theory of convex sets, combinatorial geometry, and graph theory. His numerous publications include contributions to convex polytopes, the theory of valuations, decomposability of convex sets, and characteristic properties of sets of constant width and relative constant width.

Tom's service to the University, aside from an immense number of departmental and campus committee assignments, has included a stint as Vice-chair and acting Chair of the Academic Senate, and Chair of the UC Davis School of Education Graduate Group.

Early in his career, Tom became strongly interested in mathematics education and found himself giving talks not only at geometry research conferences, but also at conferences dealing with matters of mathematics education. Because of this, it soon became evident to a wider audience that an unusual force in mathematics education had arrived on the scene. He was invited ever more frequently to lecture before educators and mathematics teachers on issues such as integrating problem solving into the standard curriculum. This led Tom to extensive teaching on Problem Solving in the Northern California Mathematics Project. Soon he co-authored, with Carole Meyer, the highly acclaimed classic "Make It Simpler: A Practical Guide to Problem Solving." As a logical extension of his work with teachers at the K-12 level, he began work on a revamping of the high school mathematics curriculum, leading to his monumental joint project, with Judy Kysh (Director of the NCMP) and Elaine Kasimatis, the College Preparatory Mathematics project. This has grown into a widely popular program in the United States and was named by the U.S. Department of

Education in 1999 as one of five exemplary programs in Mathematics Education. Tom's commitment to K-12 education earned him in 1999 the UC Davis Academic Senate Public Service Award.

Tom has been honored in a variety of ways for his own superb classroom skills. He has been given the Campus Distinguished Teaching Award, the Northern California Mathematics Association's Award for Distinguished College Teaching, and won our annual Departmental award for Outstanding Teacher of Lower Division Mathematics. In fact, in keeping with the unique contributions he has made to teaching in our department, there has now been established the G. Thomas Sallee Mathematics Teaching Endowment to provide an annual award to the instructor named as best teacher of lower division mathematics, and also to fund the upper division Mathematics Contest and name the winner's prize the G. Thomas Sallee Prize.

Tom's involvement with mathematics and mathematics education has not ceased with his retirement. He has agreed to serve, along with Jim Diederich, as one of the Principal Investigators for the UC Davis Mathematics Project.

Many thanks to Joan Sallee, family members, and friends for their contributions to the G. Thomas Sallee Mathematics Teaching Endowment fund.

Art Krener
A Man of Vision

by Motohico Mulase, Department Chair, Mathematics, UC Davis

When control theory was a young science only about 35 years old, Art Krener dived into this discipline. By then Art had established his expertise in two very distant areas: one in analysis and differential equations based on applied mathematics, and the other in modern topology, differential geometry, and Lie theory in the heart of pure mathematics.

Back in the 1970s, control theory was still in its infancy. The focus of study was *linear* control. This simple control goes like this: You push a cruise control button. When the speed of your car is low, the gas pedal is pressed. When it goes too high, the pedal is released. As a result, the speed goes up and down frequently, making you car sick. Definitely you want a more sophisticated control!

Art's vision was to construct *nonlinear* control theory, a bridging between the two columns: topology, geometry, and Lie theory on one side, and applied analysis on the other.

In 1974, when the department was considering Art's tenure, a Harvard mathematician and a National Academy member wrote: "I think he has a deep knowledge of optimal control and an excellent insight into how differential geometry can be used to clarify and deepen our understanding of the field. I consider Arthur to be one of a very small number of people in the United States who are currently doing significant work in this area. I believe he has grown considerably since his Ph.D. work was completed and at this point stands a good chance of becoming one of the most important people in the area of mathematical control theory over the next 5 – 10 years."

Indeed this prediction was fulfilled within three years. In 1977, Art published a paper, jointly with Robert Hermann, titled *Nonlinear Controllability and Observability*. Using cutting edge techniques from pure mathematics, Art laid the foundation of nonlinear control in this paper. Before this work, even the notion of having the same *controllability* was never understood. When you have two controlled systems, how do we compare them? Art's ingenious idea was to look for a Lie algebra homomorphism!

In 2000, IEEE selected this paper as one of the 25 *Seminal Papers in Control published in the 20th century*. Here Art was in good company. Among the authors of these 25 papers we find: Norbert Wiener, Lev Pontryagin, and Rudolf Kalman.

This award turned out to be the beginning of a long streak of recognition for him. In 2001, Art was awarded a John Simon Guggenheim Fellowship, a prestigious honor shared only with two other mathematicians that year. Then in 2004, the Society for Industrial and Applied Mathematics awarded Art with its highest honor, the eighth W.T. and Idalia Ried Prize in Mathematics. And in 2006, the Control Systems Society of IEEE has honored him with its highest award, Hendrik W. Bode Lecture Prize.

Art's research style was characterized by another mathematician in the field: "Krener is the initiator of the basic idea; his paper is the first paper which others generalize."

Art Krener was on our faculty for 35 years, from 1971 to his retirement in 2006. He served as Chair of the Department from 1987 to 1992. Since 2003, he has been a Distinguished Professor of Mathematics. Today his research momentum is actually rapidly accelerating. There is no cruise control on his speed! Art has published over 110 papers to date with 30 of them being produced in the last five years. Art has retired only to make his productivity even higher.

With his vision and leadership, Art has also navigated our department to the excellence we enjoy today. With his careful planning, he first established the department as a leading institution in applied mathematics. While serving as Chair, he hired many prominent pure mathematicians. As a result, the department today stands like a huge suspension bridge, spanning between pure and applied mathematics. His leadership won strong support from the campus. Art worked hard to change the course of mathematics and this department. His vision has come true.

When Art came to Davis in 1971, he was a prize to the department. Thirty-five years later, this department, enjoying an exceptionally high reputation in the world, is his prize.

Evelyn

"I had the pleasure of working with Evelyn on many things in the Department throughout most of the 33 years she was here. She exhibited a supreme level of dedication and integrity in everything she did. She always put the interests of her students, the Department, and the Campus above her own."

"Her reputation as a teacher was not based on just being nice to the students. She didn't coddle them at all. She was very demanding, yet the students responded positively to the enormous effort that she herself put into her classes. She always inspired us to work harder at our teaching."

"I was fortunate to see some of her presentations in the UCD Math Project and I was more than impressed with her insights into teaching. She had a depth of understanding of mathematical pedagogy that went far beyond anything I had ever seen. And it had her unique stamp on it and it was clear that there was a tremendous amount of effort and thought that had gone into it."

"Yet, in spite of all of the work Evelyn did in teaching, research, and committee work, Evelyn maintained a great sense of humor. She also used it effectively in the classroom and in all of her presentations. She had a beautiful smile and a great laugh. Her laughter still resonates in my mind, and always will. We are all so grateful that she touched our lives in such positive ways."

Professor Emeritus Jim Diederich's memories of Evelyn Silvia

Life After Davis Joseph Teran

BS in Mathematics, June 2000

I started at UC Davis without declaring a major, but was initially leaning towards chemistry. After developing a strong dislike for lab work, I started to think otherwise. I continued taking the Math 21 series and after briefly considering history took the plunge and chose math.

Initially, I really enjoyed my real analysis classes with Professor Krener, algebra with Professor Fuchs and topology with Professor Kuperberg. I liked the material and my interactions with them so much that I started to think seriously about continuing on with math in graduate school. In an effort to prepare for graduate school, I decided to look for a summer research program for undergrads to get a better idea of what graduate life would be like. I eventually came across the NSF Research Training Group on Nonlinear Dynamics in Biology (via web search) and contacted Professor Angela Cheer and Dr. Carole Hom. I had never met either of them, but Dr. Hom's reputation preceded her as someone to take a class from if you had the chance. Upon meeting them, we arranged for a summer project with Professor Cheer looking at blood flow dynamics in regions with intravascular stents as part of the biofluids branch of the RTG. The experience was really great and exposed me to applied math and scientific computing. My work with Angela was very influential on my future research paths. Angela was at ease working with undergrads and there was a great spirit and excitement for research amongst the undergrads in her group.

My work with Angela continued on past the summer and eventually became a senior thesis. She encouraged me to take the PDE and numerical analysis series to get a better background for the fluids simulations we were running. Angela was always a great source of inspiration and advice and really helped me to get a sense of where I wanted to take my career at an early stage.

Eventually it came time to choose a graduate program and I ended up in the Scientific Computing and Computational Mathematics program at Stanford where I was lucky enough to get an NSF Graduate Research Fellowship. After completing my exams and required course work I eventually joined Professor Ronald Fedkiw's lab. Most of my work was focused on algorithm development for finite element simulation of skeletal muscle and soft tissue. My initial emphasis was on robust performance in the face of extremely large tissue deformation. Hyperelastic constitutive models often have stiff penalties to enforce that the deformation map be invertible everywhere and these stiff terms can cause numerical difficulties. We worked to develop a modified theory that alleviates a lot of these problems especially when used with the finite element method. Our method allowed us to robustly simulate most of the skeletal muscle in the upper limb. I also worked on generalizing our technique to quasi-static and implicit time stepping. In developing a simulation framework suitable for testing and developing our algorithms for musculoskeletal simulation, I also worked and wrote papers on tetrahedral mesh generation and articulated rigid body dynamics. Professor Fedkiw works as a consultant at Industrial Lights and Magic and much of our work went into creating computer generated characters like the Hyde monster in Dr. Jeckyl and Mr. Hyde as well as more recently Davy Jones in the Pirates of the Caribbean.

After finishing at Stanford in 2005, I moved to the Courant Institute of Mathematical Science at New York University as an NSF Mathematical Science Postdoctoral Research fellow. I came to the institute to work with Professor Charlie Peskin and Professor Mike Shelley on biofluids related simulation. I have just finished up my first year and have had success developing a semi-implicit version of the immersed boundary method for simulating fluid-structure interactions with Professor Peskin and am finishing up a project using the immersed boundary method to model peristaltic pumping of non-Newtonian Oldroyd-B fluids with Professor Shelley. I've also started working with Dr. Court Cutting, a plastic surgeon in the NYU medical school working on simulating cranio-facial reconstructive surgery. We are using my soft tissue model from Stanford along with a new efficient algorithm for changing lagrangian mesh topology during the simulation to model surgical cuts.

After I finish up another year at the institute I will be heading back to California to start as an assistant professor in the UCLA Applied Mathematics Department. I am excited about the prospect of teaching and working with graduate and undergraduate students soon, but it seems like just yesterday I was a UC Davis math undergrad. I really enjoyed those days and am grateful to all those who helped me develop the strong mathematical background that has been so important to my success.

Emeriti News

Jim Diederich has been active in the UCD Math Project. He served as the Faculty Advisor and Principal Investigator this year and taught in two summer institutes. The UCDMP works with K-12 teachers in various counties in Northern California. He is also working on a book of the mathematical modules he has developed while working in the project over the past seven years. He continues to enjoy various aspects of retirement including travel, sports, and the arts with his wife Paula.

Sherman Stein remains active in mathematics and education. His paper with co-author Sandor Szabo (and with contributions from Dean Hickerson), "The Number of Distinct Symbols in Sections of Rectangular Arrays", appeared in Discrete Mathematics. Also he continues to review a fourth grade math text that is near publication. In addition, he is preparing the sixth edition of Calculus and Analytic Geometry.

Don Chakerian is presently working with Jerry Klotz (University of Wisconsin, retired) on a short monograph giving detailed data for the regular and Archimedean polyhedra, and R-code programs for generating their pictures. His paper with Murray Klamkin, "The Product of the Distances of a Point Inside a Regular Polytope to its Vertices", will appear in a forthcoming issue of the Journal of Geometry. A note coauthored by Klamkin, "Maximum Area of a Triangle Subject to Side Constraints," appeared last year in Crux Mathematicorum.

Staff News

by Tracy Ligtenberg, Department Manager

This was an important year for the Mathematics staff: we orchestrated the department's move from our long-occupied space in Kerr Hall to the new Mathematical Sciences Building. We took up ownership of our new space in January 2006 and spent the next two quarters working out the bugs and settling in. Staff's commitment and dedication to the department were the lynchpin in making this move a success!

We were lucky to not have any turnover in the staff during the year, making at least one aspect of the unit, feel the same. However, change is inevitable—people's lives evolve and staff move on. Therefore, just as this edition of the newsletter was being readied for publication, we filled several staff positions in the administrative area. Joining us are: **Tina Garcia** in payroll and academic personnel; **Phuoc La** in purchasing and textbook support; and **Lisa Schwieso** in graduate student support. We are pleased to have these new staff be part of our successful team!

Two other newsworthy feats: **Marianne Waage** celebrated a five-year service award July 2006; and Math staff were recognized for winning the campus "Thank Goodness for Staff" logo contest for the second year in a row.

All in all, 2005-06 was a momentous year. Taking ownership of the beautiful Mathematical Sciences Building was the capstone and this has given us a feeling of pride that is palpable whenever you enter our space. This feeling extends to all members and visitors to Math. We've always known we work in a great department, now the whole campus knows!

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The University is grateful for the support it receives from alumni and friends. One of the ways our thanks is expressed is through listing the names of donors in various publications. Should you wish that your name not appear as a donor, please notify us if you have not already done so.

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We will do our best to include it in the next newsletter.

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