UC**DAVIS**

MATHEMATICS NEWSLETTER
2009

Celebrating 100 years of Research and Service

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UC**DAVIS**
CENTENNIAL

New Arrivals

Faculty Romik

Dan Romik received his Ph.D. from Tel-Aviv University in 2001, under David Gilat. He spent 2002-06 as a postdoctoral researcher at Paris VI University, the Weizmann Institute of Science, the Mathematical Sciences Research Institute (MSRI) and UC Berkeley. After a stint at the Mathematical and Algorithmic Sciences Center of Bell Laboratories, he joined the faculty of the Einstein Institute of Mathematics at the Hebrew University of Jerusalem in 2007. He now joins the Department as an Assistant Professor.

Dan's research is mostly in the fields of probability theory and combinatorics. He studies various families of combinatorial objects in a probabilistic setting. Combinatorial objects appear in many different settings in algebraic and enumerative combinatorics, representation theory and statistical physics, and Dan's results shed new light on these fields by combining their ideas and techniques with methods of probability theory. One of his favorite results, the "limit shape result for random square Young tableaux," can be whimsically described as the process of the growth of a square wall of bricks under the assumption that the wall is built with a maximum amount of randomness.

Dan is moving to Davis with his wife Sarah, an aspiring economist who will be starting her graduate studies at UC Davis, and their two cats Trillian and Tigris.

Krener Asst Prof Sammis

Ian Sammis received his Ph.D. from UC Berkeley in 2009, as a student of John Strain. His research focuses on numerical methods for elliptic PDEs and moving interface problems. He will be working on acoustic simulation and classification problems with James Bremer and Naoki Saito.

Ian has previously published papers in Solar Astronomy. During a brief nonacademic career he was an editor at *MacAddict* magazine. He has two children who are very jealous of his train trips to Davis from his home in Hayward.

Krener Asst Prof Strychalski

Wanda Strychalski received her doctorate from the University of North Carolina at Chapel Hill in 2009. Her main research interests are in mathematical biology, specifically in computational cell biology. She is also interested in numerical partial differential equations and stochastic simulation methods. Wanda's postdoctoral adviser is Professor Robert Guy. She also plans to collaborate with Professor Alex Mogilner's group.

An avid skier, Wanda is looking forward to exploring the Sierra Nevada. She also enjoys traveling and ethnic cuisine.

Krener Asst Prof Latini

Emanuele Latini received his Ph.D. in theoretical physics from the University of Bologna in June 2008; his Ph.D. adviser was Fiorenzo Bastianelli. Emanuele's scientific interests are in gauge theories. In particular he has focused his attention in deciphering complicated mathematical concepts arising from string theory and supergravity, using the language of physics and geometry. He has solved problems on path-integral and BRST quantization of supersymmetric quantum mechanical model and higher spin gauge theory.

Outside of mathematics and physics, Emanuele enjoys listening to music, snowboarding and travelling.

Emanuele is teaching differential equations and calculus this year. At the University of Bologna he taught classical dynamics and electromagnetism, and he developed a clear and funny personal teaching style, receiving excellent feedback from students in his classes. In addition Emanuele is a patient and approachable person, and for all these reasons he feels sure about his success in the classroom.

Krener Asst Prof
Bachmann

Sven Bachmann received his Ph.D. in Physics from the Eidgenössische Technische Hochschule Zürich, Switzerland, in May 2009 under the supervision of Professor Gian Michele Graf. In his thesis, he studied mathematical aspects of quantum transport and the statistics of transferred charge in mesoscopic systems. More generally, Sven is interested in various problems of mathematical physics, with an emphasis on algebraic methods of quantum statistical mechanics and condensed matter applications. Moreover, he recently turned his attention to random matrix theory as an effective description of disordered conductors. He is looking forward to broadening his research spectrum through collaborations with Professor Bruno Nachtergaele and other Department members.

In other areas, Sven is a passionate hiker who often pairs walking with photography. He is thrilled to discover Californian nature and trails. He enjoys all kinds of sports, from badminton and beach volleyball to cycling, and he is a Swiss snowboard instructor. In quiet hours, he likes listening to jazz.
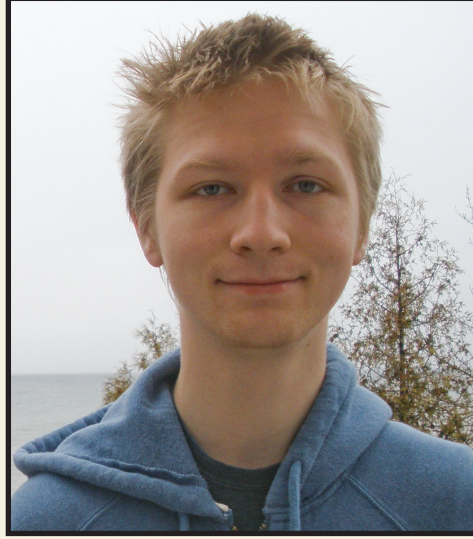
VIGRE Fellow
Berget

Andrew Berget received his Ph.D. from the University of Minnesota in 2009 under the advisement of Professor Victor Reiner. His research is in algebraic combinatorics, and touches on areas of representation theory, commutative algebra, discrete geometry and matroid theory. His thesis studied the smallest symmetric group representation containing a fixed decomposable tensor. Currently, he is working on describing a matroidal analogue of the tensor algebra of the exterior algebra of a vector space. His faculty mentor at UC Davis is Anne Schilling.

In addition to studying mathematics, he enjoys reading, traveling and hiking in the mountains.

100 years of history

North Hall, with a field of freshly mown hay, during its early years as a student dormitory when UC Davis was the University Farm.

The first female students arrived on campus from UC Berkeley in 1914. Pictured above is some "homework" being done by women students in the summer of 1918.

Wild West Days started in Fall of 1964, featuring a rodeo, dance and a country fair.

Celebrating 100 years of Research and Service

UC DAVIS CENTENNIAL

by Jessica Potts, Department Manager

The 2008-09 academic year was marked by the UC Davis Centennial, which was celebrated across campus. The California State Fair provided a 6,000 square-foot pavilion which featured UC Davis on the leading edge of innovation in agriculture, health, energy, environment, healthy food, information technology, quality of life improvements and education. This exhibit gave UC Davis the unique chance to celebrate and build awareness among the Fair's nearly one million visitors. The State Fair event was followed by the Fall Convocation which was held September 24, 2008. College specific celebrations were held, with The College of Letters and Science celebrating on October 10, 2008. The L&S Open House featured over 100 books authored by L&S faculty and was a great success with over 300 guests attending. For more information about the UC Davis Centennial visit:

http://centennial.ucdavis.edu/

In light of this occassion, we thought it would be nice to take a look back at the history of the Department. Professor Edward B. Roessler, who had been with UC Berkeley since 1929, was sent to Davis in 1933, where he was given the task of developing the Division of Mathematics and Physics at Davis. In 1936, he recruited Professor Albert C. Burdette as the second faculty member in mathematics. In 1937, Professor George A. Baker became the third faculty member.

In 1950, the College of Letters and Science was formed at UC Davis, and the Department of Mathematics and the Department of Physics were created from the former combined division.

The Department was first housed in the Computer Sciences Service Building followed by Everson Hall, Voorhies Hall, Sproul Hall, Kerr Hall, and finally the Mathematical Sciences Building, where we occupy part of the first floor and all of the second and third floors.

The M.A. program was approved in 1952 followed by the Ph.D. program in 1961. The Masters in Art and Teaching (M.A.T) program was approved in 1979 and the Graduate Group in Applied Mathematics (GGAM) began in 1981 with the M.S. and Ph.D approval following in 1982.

Our Department has flourished over the years and now consists of 43 faculty, 8 Krener Assistant Professors, 3 VIGRE Fellows, 4 Continuing Lecturers, 7 Postdoctoral Researchers, 121 Graduate Students, 341 Undergraduate Majors, and 13 Staff.
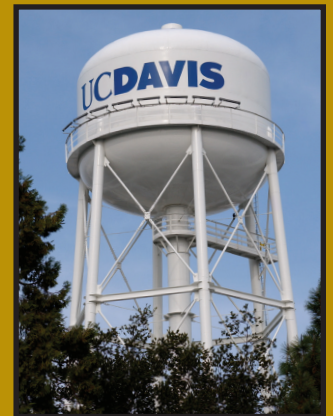

The Department moved into it's new building in December of 2005.

The vintage London double-decker buses first arrived in 1968.

Kerr Hall was built in 1969, and was the fifth home for the Department.

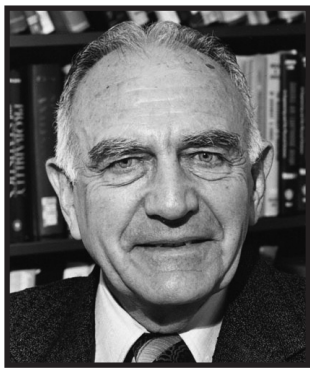The UC Davis logo was added to "Domestic Water Tower No. 1" in 1995.

Founding *Math*

Edward Biffer Roessler (1902-1993), a distinguished scholar and highly respected administrator at UC Davis, was born in Redlands, California in 1902. Excelling in mathematics, he spent his first two years at UCLA, then transferred to UC Berkeley, where he earned a Ph.D. specializing in geometry. At the same time, he also obtained an American Institute of Architects certificate. Upon finishing his doctoral work in 1929, Ed was hired by the University Architect to work in his private firm.

Edward Roessler. Photograph courtesy of Univ. Archives, Special Collections, UC Davis General Library.

In 1933, he was charged to establish the Division of Mathematics and Physics at UC Davis. He chaired the division—and later the Department of Math—for thirty of its seventy-odd years. Recognizing an agricultural campus needed a strong statistics component, he placed major emphasis in this area. He also contributed his own expertise in statistics to many research projects.

Ed served in his administrative positions with great distinction, including that of acting dean of the College of Letters and Science. In 1961, he came to University Hall in Berkeley as director of the northern area of University Extension, thus beginning nine long years of commuting without complaint from Davis to Berkeley. In 1964, Ed became associate dean for academic affairs of Extension and later was named first acting dean. He served as University Dean of University Extension until retiring.

Ed authored several textbooks, including *Problems in Agricultural Mathematics*; *Principles of Sensory Evaluation of Food*, co-authored with Amerine and Rose Maire Pangborn; and *Introduction to Probability and Statistics*, co-authored with his UCD colleague Henry L. Alder. The last, published in 1960, became one of the most widely adopted introductory texts in statistics in the United States, going through six editions. Ed's lifelong interest in wine also led him to co-author a well-received book with professor emeritus Amerine (deceased), a world renowned authority on wine. Few among us would claim intellectual diversity on a front as broad, spanning from statistics to wine.

Ed was recognized as a superb teacher, recognized at UC Davis for Distinguished Teaching in 1978, eight years after his retirement (the award did not exist prior to his retirement in 1970), the only member of the UC Davis faculty to receive this prestigious award after retiring.

Equally distinguished was Ed's service to the community, serving as city assessor, on the UC Davis planning commission, and on the city council.

At Ed's retirement, the UC Regent's remarked, "However difficult his task, he has accomplished it willingly and well... . And in his devoted service to innumerable administrative, academic, and civic committees, he has approached each problem not only with a firm grasp of its complexities, but also—to the warm appreciation of his colleagues—with humor and humanity."

In 1972, the UC Regents commemorated Ed's contributions to UC Davis by naming the campus' newest physics building Roessler Hall. In recognition of his fifty year association with UC, Ed was cited as a "gifted student, master teacher and skillful administrator, and a builder of the UC Davis campus."

Ed continued to teach on a part-time basis until 1989, participating in many University activities. Until his death in 1993, he directed the local activities of the Junior Science Fair and the Symposium for the Humanities, a national program with the aim of identifying high schoolers with a scientific bent and encouraging them to pursue a career in the sciences.

Those who knew Ed will never forget his warmth, his sense of humor, his concern for others, and his integrity.

Letter from the *Chair*
by Bruno Nachtergaele, Department Chair

Setting Priorities

A centennial anniversary is a good time to briefly reflect on an institution's priorities. What UC Davis has made of itself in a mere 100 years is a remarkable achievement. The Department is much younger than the campus but we also have every reason to be proud of its trajectory. The Department teaches more mathematics majors than ever before (434, to be precise); in the last three years, 47 students received their Ph.D. from the Department (almost as many as in the six years prior to that); and faculty brought in over $4M in research grants in the past 15 months alone. Our staff has introduced several on-line tools to cope with the increasing administrative workload and record keeping.

The UC Davis Department of Mathematics is a center for scholarship in mathematics and its applications, humming with quiet activity. We focus on creating, teaching, learning, and applying mathematics. Everything else either supports these activities or directly follows from them: we recruit, reach out, advise, and consult.

The financial situation of the University and the State of California makes reaffirming our priorities not just desirable but even urgent. Nobody knows more about the values of mathematics than us mathematicians. Its beauty, its universality, the excitement that comes from a new insight in mathematics, its ever-increasing power and importance in organizing knowledge is not as apparent to everyone as it is to us. And by "us" I do not just mean members of the Department, but also all our alums, emeriti, and everyone who loves and practices mathematics. We all need to speak up for mathematics. Many people feel they know something about the challenge of learning mathematics, but we know the challenges of teaching it. The public knows essentially nothing about the open problems in mathematics and certainly are unable to anticipate the potential for revolutionary applications of mathematics still in the process of creation. Therefore, it is up to use to make the case for supporting research and learning in mathematics.

Let us keep our priorities straight: we are here to teach, to learn, to create, and to apply mathematics. Our goal is to do this as best we can. Excellence is what is expected from us and excellence is our best guarantee for the future.

News from the Undergraduate Program

by Andrew Waldron,
Vice Chair for Undergraduate Matters

The Department's undergraduate students enjoyed another highly successful year. Our mathematics majors excelled both at their coursework and research endeavors, and produced several very interesting undergraduate theses. These make fascinating reading, and can be found on in the thesis section on our Undergraduate web page:

http://www.math.ucdavis.edu/undergrad/research/

All these accomplishments and more were celebrated at last June's Departmental Awards Ceremony.

The Department awarded 65 undergraduate degrees this past academic year. Of those 65 students, two graduated with "highest honors" from the Department.

As the expense of undergraduate education continues to rise, the Department has been investigating open access student textbooks. Not only does this provide lower cost options for students, it gives the instructors greater control of course materials, allowing syllabi to be continually improved, updated and customized to the needs of UC Davis students. Already several of our courses are transitioning to open access textbooks. Along a similar vein, the Undergraduate Program Committee has been working to implement open access online homework systems for many of our courses. These share many of the advantages of open access textbooks and are an important new learning tool.

Among many other issues, the Undergraduate Program Committee is focused on reviewing syllabi and assigned textbooks to ensure that our undergraduate program provides the best possible mathematics education for our students. We are expecting the 2009-10 academic year to be another great year for our undergraduates.

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News from the Graduate Program

by Thomas Strohmer, Vice Chair for Graduate Matters and
Naoki Saito, Chair of the Graduate Group in Applied Mathematics

The Mathematics graduate program was joined by 14 new students this year, who have been selected from an impressive pool of applicants. In 2008-09 we granted eight Ph.D. degrees and six M.A. degrees, listed at right. The graduate program now consists of about 60 students.

We are happy to report that Matthew Rathbun won the Dissertation of the Year Award, and Michael Schwemmer received the Floyd and Mary Schwall Dissertation Fellowship. Furthermore, the Alice Leung Award went to Mihaela Ifrim and the William K. Schwarze Award to Marion Moore.

GGAM welcomes 10 new graduate students this year. These are a distinguished group of students, including a recipient of the UCD Graduate Scholar Fellowship, Charles Brummitt. GGAM now consists of 66 students and 85 faculty members. For 2009-10, GGAM welcomed 5 new faculty members: Ian Davidson (CS); Francois Gygi (Applied Science); Alessandro Pizzo (Math); Michael Savageau (Biomedical Eng.); Burkhard Schipper (Economics).

As for the continuing students, Jia-Ming "Frank" Liou received the Henry Alder Award. In 2008-09, GGAM granted three Ph.D. and four M.S. degrees.

The fourth Annual GGAM Mini-Conference was held on January 10, 2009. According to conference coordinator Joseph Biello and GGAM Chair Naoki Saito, the conference manifests what GGAM is all about: a coming together of our students with faculty from across campus in order to facilitate fruitful collaborations. In an informal day-long forum, nine faculty members described their research interests, giving our students an opportunity to experience the broad directions available to them in applied mathematics. The departments and units represented at the conference included: Applied Science; Bodega Marine Laboratory; Center for Neuroscience; Evolution and Ecology; Land, Air, Water Resources; Mathematics; and Neurobiology, Physiology and Behavior. Like last year, a large number of guests (about 60) attended the dinner afterward, held in our large colloquium room, which provided another opportunity for faculty and students to get to know each other.

Catching Up With Alumni

Debra J. Hill, B.S. in Ch.E. 1979 and M.A. in Math 2001, lives in Rocklin, California. From 1979 to 1986, she worked for Chevron's Richmond Refinery. After receiving her M.A. in Math, she became faculty at American River College, later moving to Sierra College. She was recently tenured at Sierra College, and has been the Engineering Department Chair since 2006.

Brian J. Shay, M.A. 2000 and M.A.T. 2002, has taught high school math since graduation at UC Davis, first in West Sacramento, then Encinitas, and presently at Canyon Crest Academy in San Diego, where he also Chairs. During evenings and summers, he teaches at San Diego Mesa and Grossmont Colleges. Brian teaches mostly Algebra and AP Calculus, and has been speaking at local and regional math teacher conferences on fun methods to improve teaching these subjects. In 2008, he received the Fulbright-Hays Award, and spent the summer in India with 15 other math and science teachers from across the US to learn about their schools and culture.

Brian finds he regularly uses the skills he learned at UC Davis to improve not only his teaching and students, but also to improve and help other teachers. He feels Davis is a special place, and will always remember it fondly.

2008–2009 Degree Recipients

Shinpei Baba, Ph.D., Math : Postdoc. Researcher, Univ. of Bonn-Hausdorff, Center for Mathematics
"Decomposition Theorems for Complex Projective Structures," thesis adviser Kapovich

Chris Berg, Ph.D., Math : Lecturer, UC Davis, Dept. of Mathematics
"Combinatorics of (l, 0)-JM Partitions, l-cores, the Ladder Crystal and the Finite Hecke Algebra," thesis adviser Vazirani

Karl Hallowell, Ph.D., Math
"Higher Spin Approaches to Quantum Field Theory and (Pseudo)-Riemannian Geometries," thesis adviser Waldron

David Haws, Ph.D., Math : Postdoc. Fellow, Univ. of Kentucky, Dept. of Statistics
"Matroid Polytopes: Algorithms, Theory, and Applications," thesis adviser De Loera

Adam Miller, Ph.D., Applied Math : Postdoc. Researcher, Pennsylvania State Univ., Dept. of Biology
"How Disturbance Creates the Storage Effect and Promotes Maintenance of Species Diversity," thesis adviser Chesson

Jaideep Mulherkar, Ph.D., Math : Assistant Professor, Dhirubhai Ambani Institute of Information and Communication Technology, India
"Some Properties of the Ferromagnetic XXZ Spin Chain and Their Applications to Quantum Computation," thesis adviser Nachtergaele

Deanna Needell, Ph.D., Math : Postdoc. Researcher, Stanford Univ., Dept. of Statistics
"Topics in Compressed Sensing," thesis adviser Vershynin

Hillel Raz, Ph.D., Math : Postdoc. Researcher, Univ. of Cardiff, Wales
"Lieb-Robinson Bounds in the Anharmonic Lattice," thesis adviser Nachtergaele

Cheryl Sershen, Ph.D., Applied Math : Postdoc. Researcher, Genome Center, UC Davis
"A Dynamic Model of DNA Structure and Function," thesis adviser Benham

Alice Stevens, Ph.D., Math : Lecturer, St. Mary's College
"Knots in Heegaard Surfaces," thesis adviser Schultens

Eva Strawbridge, Ph.D., Applied Math : L.E. Dickson Instructor, Univ. of Chicago, Dept. of Mathematics
"Mechanics, Dynamics, and Structures of DNA and an Elastic Rod," thesis adviser Benham

Karl Beutner, M.S., Applied Math : Junior Specialist, IDeA (Imaging Dementia and Aging) Lab

Ezra Gouvea, M.A., Math : Lecturer, Learning Skills Center, UC Davis

Joseph Hopper, M.S., Applied Math

Keith Merrill, M.A., Math : Pursuing Ph.D. at Cambridge University

Arpy Mikaelian, M.S., Applied Math

Matthew Register, M.A., Math : MESA Coordinator, American River College and Supplemental Instructor, Solano Community College

Ritesh Sood, M.A., Math

Vivian Zhang, M.S., Applied Math

100 years of tradition

Freshman beanies appeared at UC Davis by the 1930s. Frosh rule no. 1: "Thou shald wear thy Frosh hat at all times while on campus, unless accompanying a lady to a campus social tradition."

In UC Davis' early days, all students had to pass Examination A: milking a cow, handling plow and harness, driving a horse, and other farm work.

The women's athletic program was started in 1947, and with it, the first Squacade. Synchronized swimming and a poolside variety show featured at Picnic Day, and continued yearly until the early 1990s.

DONATIONS

Your gift is welcome! The Department of Mathematics wishes to thank all alumni, parents, students, faculty, staff, and friends who support the Department. For a complete list of all our endowed funds, please see our web site:

http://www.math.ucdavis.edu/contact/donation/

Your gift to the Department is tax deductible, and you can choose to have your name published, or remain anonymous.

Your gift will be used to support the Department's greatest needs. These may include undergraduate and graduate support, research support, or departmental initiatives. Many thanks to all our donors in these days of difficult budget cuts. Your gifts ensure our future success.

Looking Back, Looking Forward
A Discovery in Mathematics
by Greg Kuperberg

In 1987, during my undergraduate years, I was asked to read a paper by Bourgain and Milman about the volumes of high-dimensional convex shapes for my senior thesis project at Harvard. Every convex shape has a partner shape, called its polar; for example in three dimensions the polar of a dodecahedron is an icosahedron. The Bourgain-Milman paper showed that if a high-dimensional convex shape has very little voulme, then its polar must have a lot of volume. The proof was long and complicated, and the conclusion was only interesting in trillions of dimensions or even more. Nonetheless it was a celebrated result. In fact, when Bourgain won the Fields Medal in 1994, this result was praised in The New York Times by Charles Fefferman, another Fields medalist.

As I studied this paper, I came up with a wild conjecture, related to the geometry of special relativity, whose proof would lead to a much shorter proof of the Bourgain-Milman theorem. It would establish a much stronger version that would be interesting in four or more dimensions rather than trillions. In 2006, I found a proof of this question that I had "kept in my pocket" for 19 years, almost exactly half of my life. I completed some of the last steps when I was in a hospital with a broken ankle; somehow my mind was focused on this question. The proof that I found involved a high-dimensional variation of two geometric laws of magnetism: Ampere's Law and the Biot-Savart Law.

This is a result in pure mathematics that answers a basic intellectual question rather than having any direct applications to science or technology. It says that in some important ways, all high-dimensional convex shapes are roughly similiar. But it has implications for other questions in mathematics, some of which are applied. These include computer algorithms for approximate counting, some questions in quantum information theory, and questions about discrete approximation of continuous data.

A Festival for Fuchs

To honor Professor Dmitry Fuchs' 70th birthday, the Department hosted the Algebra and Topology in Interaction Conference on September 11-13. Researchers came from as far as Israel and France to celebrate Fuchs' accomplishments and his impact on the field. The speakers were mathematicians of the highest caliber, holding awards and honors such as membership in the National Academy of Sciences, a Fields medal, etc.

Most talks began with the stories of when the speakers first met Mitya; often from his time in Moscow, before his arrival at UC Davis. One memorable story was of a young man arriving in Moscow in the 70s, having been warned that he would be seduced by Russian spies looking to learn government secrets. Following these warm introductions were talks on cutting-edge research, research often started in Moscow over 40 years ago.

Topics discussed included topological applications of cohomology of infinite-dimensional Lie algebras (such as the Gelfand-Fuchs cohomology), contact homology, Chekanov-Eliashberg differential graded algebras, symplectic field theory, and conformal field theory. Sergei Tabachnikov gave a public lecture, "Flavors of Bicycle Mathmatics," in which he discussed the trajectory of a bike's wheels. More details can be found on the conference website:

http://math.ucdavis.edu/~ekim/fuchsalgetopcon/

The conference was supported by the Department of Mathematics, Dean Ko, MSRI, and NSF. The organizers wish to thank them for their financial support, and especially thank the staff and the dedicated graduate students who helped run everything.

Math Fest
The Coming of Enigma

On July 29, 2009, UC Davis held its third annual Math Fest. The event demonstrated both the fun and relevance of mathematics to the public, in particular to high school students. "We really want to get youngsters and their parents interested in math, and how it comes up in so many different things," said Professor Monica Vazirani. "There's much more to math than you see in the classroom." Professor Jesús De Loera added, "It's a great subject with great career opportunities."

The event kicked off with a captivating presentation, "The Coming of Enigma" by Dr. David Perry, a cryptologic mathematician with the Department of Defense. He talked about the history of codes and code-breaking and especially the "unbreakable" Enigma code machine used by Germany in World War II. We learned what design principles went into the Enigma and how it operated, plus some on the intriguing history and stories of espionage. His talk was part of the COSMOS Distinguished Lecture Series.

Earlier that day, Dr. Perry also treated the graduate students to a more in-depth lecture describing the mathematics of permutations used to make Enigma seemingly unbreakable by a brute force attack, but in fact how the invariance of cycle structure of a permutation under conjugation gave Polish mathematicians the edge in cracking it.

Dr. Perry received his doctorate in mathematics from the University of Illinois at Urbana-Champaign in 1999 and taught at Ripon College in Wisconsin for two years before joining the National Security Agency. Every summer, he teaches a three-week course in cryptology for the Johns Hopkins' Center for Talented Youth (CTY) program. During the course, Perry says he spends at least 15 minutes trying to convince his teenage students that he is not trying to recruit them, does not in fact have a chip in his head, and that the black helicopters that seem to appear daily above the campus are a coincidence.

It was standing room only: over 450 people attended the presentation, which was followed by mathematical puzzles and games and information about careers in mathematics. Kids and parents alike played mathematical games, constructed interesting polytopes and geometric surfaces, and wrestled with brain-teasers until darkness fell. As a special treat, two of the COSMOS Clusters set up demonstrations: one on robotics showing the amazing Lego robots they'd built, and one on cryptography, complete with laptop demonstrations of their codes and codebreaking.

People use encryption every time they enter a password or a credit card number on a computer. By revealing the math that lies behind everyday life at Math Fest, we demonstrated that there are many career opportunities open to graduates with a mathematics degree. Dr. Perry was interviewed on the Insight radio show on July 29, 2009, hosted by Capital Public Radio's Jeffrey Callison, and available on their archives here:
http://www.capradio.org/programs/insight/

The event also had coverage in several local papers and even local television station Channel 13 turned up to talk with Dr. Perry.

This event was sponsored by the National Science Foundation VIGRE grant, COSMOS (the California State Summer School for Mathematics & Science), and also supported by the NSA.

Many thanks to all those who attended (notable attendees included Dean Ko). A special thank you to the impressive turnout of volunteers from faculty (especially Jesús De Loera), staff, MAST, the graduate and undergraduate math students, and COSMOS.
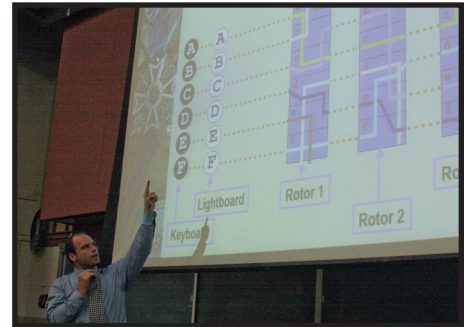
Departmental Awards

Dr. Lawrence Marx

On June 2, 2009, the Department honored its best undergraduate students and its best teachers among the faculty and graduate students. Congratulations to all of our award recipients.

G. Thomas Sallee Mathematics Teaching Award

This award was named in recognition of Professor Emeritus Tom Sallee's 40 year career with the Department. Recipients are drawn from instructors who taught the Department's lower division courses over the past year. Associate instructors, visiting instructors, lecturers, and regular faculty are eligible.

This year's award went to Dr. Lawrence Marx, who was selected by the Department's Awards Committee after reviewing course evaluations and student comments.

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. David Attkisson, Jaime Bushi, Trevor Jha, Kurtis Keller, Shannon Ko, Sebastian Ng, Allison O'Hair, Matthew Reed, Dido Salazar-Torres, Eric Seubert, Spencer Shepard, Christopher Van, Ying Wang, and Adam Zimmerer were among this year's winners.

Departmental Citation Winners

William Karl Schwarze Scholarship in Mathematics

In honor of William Karl Schwarze, a Mathematics student with the Department and a lifelong humanitarian, 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.

This year's award went to Marion Moore, who encouraged her students to seek hands-on learning experiences to explore elegant, relevant, and exciting mathematics. Her teaching began in 2003, when she was an undergraduate student at UC Santa Cruz. As an outreach tutor, she developed varied teaching methods that were appropriate for students struggling in their studies because of different backgrounds, circumstances, language skills, and math skills.

Mihaela Ifrim

Since coming to UC Davis, Marion's efforts have been varied and meaningful, whether she's helped to improve a student's performance or changed the way the Department looks upon itself and the outreach programs it offers.

With an eye towards the future, Marion does not plan to stop looking for ways to share her experiences with others. "I feel strongly that everyone deserves a good math education," she says. "I can imagine noth-

Marion Moore

ing better than spending my days exploring math with my colleagues and looking for ways to bring everyone else in on the secret."

Alice Leung Scholarship in Mathematics

Alice Siu-Fun Leung received a Masters degree 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.

This year's award went to Mihaela Ifrim, who began her graduate studies at UC Davis in 2007. From that first day, she has sought for ways to improve her understanding of mathematics as well as gain valuable experience in teaching mathematics. She noted, "I have always been a hard working student, and I have obtained very good results due to my perseverance and intelligence."

Among Mihaela's academic goals, she hopes to enhance her knowledge in partial differential equations under the guidance of her current faculty mentor, Professor John Hunter. She has learned many valuable "tools of the trade" with each teaching endeavor and engages students by providing simple problem-solving techniques to stimulate critical thinking. "I learned that teaching must be tailored to different class audiences. Providing students with the tools and concepts that will enable them to learn will generate enthusiasm in their study of mathematics."

Next year marks Mihaela's third year with the Department, and she is already very excited about the opportunities that lay ahead.

Robert Lewis Wasser Prize

Robert Lewis Wasser was born in 1973 in Sacramento. He excelled in all that he did and was selected as a National Merit Scholar in 1991, and was a participant in the Academic Decathlon. In 1991, Robert began his studies at UC Davis, where he quickly became one of the few students in our Department who had already taken as a sophomore some of our most challenging upper-division courses.

After his tragic death in an automobile accident in 1993, his grandmother initiated the Robert Lewis Wasser Endowment in his memory. Its goal is to benefit promising mathematics students at UC Davis. The Department was pleased to award this year's prize to George Barnett.

G. Thomas Sallee Prize

This award is given in recognition of Professor Emeritus Tom Sallee, and again reaffirms his life goal of developing and supporting talented individuals in
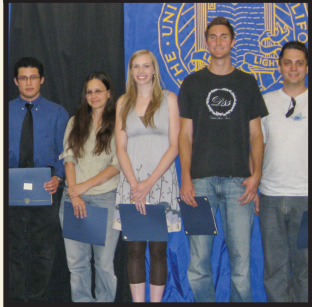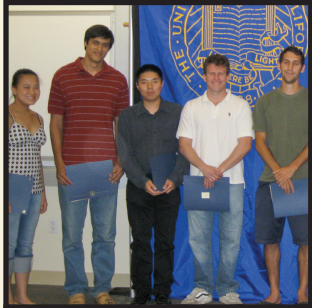
mathematics. All undergraduate students enrolled at UC Davis are eligible to receive this prize, and winners are determined after having completed an exam designed by the Department's Mathematics Contest Committee. The Department was pleased to award this year's prize to Jianqiu Wu.

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 to advocate for quality teaching almost until his death in 2002. Part of Professor Alder's legacy is an endowment known as The Henry L. Alder Graduate Fellowship in Mathematics, providing 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's recipient was Frank Liou, who taught his first course for the Department in 2008, a section of 21B. You wouldn't have guessed this given his performance evaluation, earning a rating of 4.8 for overall teaching knowledge and 4.8 for overall quality of the course.

But what also impressed the Awards Committee were some of the comments left by his students. One remarked that Frank was "the most knowledgeable teacher I've had in math so far. He was always available during office hours and has a strong drive to see all students excel." Another comment simply said that "Frank is the best!"

These qualities certainly embody the very reasons why Professor Henry Alder established this award.

Eric C. Ruliffson Scholarship in Mathematics

Eric Ruliffson attended UC Davis from 1964-1968, loved the study of math, and excelled in it. As an undergraduate, Eric worked as a summer intern in the actuarial department of Pacific Mutual Insurance (PMI) in Los Angeles, who later hired him upon graduation. After serving in the Navy, Eric attended graduate school in demography at UC Berkeley. In 1973 he resumed his actuarial career at PMI and worked as a benefits consultant in the San Francisco office of Coopers and Lybrand. He became a partner with the firm and 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. The Department was pleased to award this year's prize to Jessica Doolittle.

Evelyn M. Silvia Scholarship for Future Mathematics Teachers

This scholarship was established through generous donations from family and friends of the late Professor Evelyn Silvia. Evelyn was hired by the Department in

1973, just following receipt of her Ph.D. from Clark University. She was extremely generous with her time whether it was as a campus committee member or an adviser assisting a student needing help.

This scholarship honors Professor Silvia's memory by recognizing a junior or senior with a major in mathematics, applied mathematics or statistics who has shown an interest in teaching mathematics through their academics and application materials. This year's prize went to Sara Cohen.

Galois Group Award

Known as "the official voice of the graduate students in Mathematics," the Galois Group is how graduate students in mathematics collectively communicate with the Department faculty and staff. Every year, the Galois Group presents an award to recognize outstanding service and/or sustained commitment to graduate students. This year's award went to Tina Denena, one of the Department's business managers.

Departmental Acknowledgements of Other Campus Awards

These awards were given in recognition of extraordinary achievements by very special individuals or groups on campus.

2008 Hellman Family Foundation Awards — On August 18, 2008, UC Davis informed 13 of its up-and-coming scholars that they won individual grants from the Hellman Family Foundation in San Francisco. These grants are earmarked specifically to newer professors who show the capacity for great distinction in their research. Recipient — Robert Guy

2009 Distinguished Teaching Award — Confirmed annually by the Representative Assembly of the Davis Division of the Academic Senate, this award recognizes any member of the academic community who exemplifies excellence in a broad range of teaching activities, including mentoring, course organization, innovation, and student advising. Recipient — Motohico Mulase

2009 Dissertation Year Fellowship — This fellowship provides a research and travel allowance in addition to a stipend and fees to international and domestic graduate students demonstrating strong potential for university teaching and research. Recipient — Matthew Rathbun

2009 Floyd and Mary Schwall Dissertation Fellowship — This one-year fellowship is aimed at continuing students who are U.S. citizens and are engaged in medically related research. Recipient — Michael Schwemmer

Mathematical Contest in Modeling, Team Distinction Awards — Sponsored and hosted by the Consortium for Mathematics and its Applications, this competition hosts as many as 500 institutions around the world and challenges teams of students to clarify, analyze, and propose solutions to open-ended problems. Honorable Mention Recipients — Rex Cheng, Andy Huang, and Justin Sunu

George Barnett

Jianqiu Wu

Sara Cohen

Tina Denena

Mathematical Contest in Modeling Honorable Mention Recipients

Wetsfest
An Optimization
for Roger Wets

On October 10th, 2008, the Department had a very special minisymposium in honor of colleague Prof. Roger J-B Wets on the occasion of his retirement: "Wetsfest: Optimization, Variational Analysis, and Modeling." Roger is a mathematician recognized world-wide for his important contributions to optimization, in particular for his fundamental work on the theory of stochastic optimization. We were lucky to host a large group of distinguished mathematicians who delivered wonderful lectures on mathematical optimization and shared pleasant memories and remembrances about Roger's amazing career. Lectures were given by Adib Bagh (University of Kentucky), Gerald Beer (CSU LA), John Birge (University of Chicago), Richard Cottle (Stanford University), Chuangyin Dang (Hong Kong Univ), Alan King (IBM Research), Suvrajeet Sen (Ohio State University), Terry Rockafellar (University of Washington) and William Ziemba (University of British Columbia). Many students and friends of Roger also attended the event. Afterward, we continued the celebration with a nice reception and dinner.

Life After Davis
Josephine Yu

When I think about life in Davis, cows, bicycles, eggheads, and Unitrans inevitably come to mind; so do countless hours learning and thinking about mathematics. But it was the people I met in Davis, including the faculty, staff, postdocs, graduate students, and my fellow undergrads in the Department of Mathematics, who made the experience the most memorable.

After graduating from UC Davis, I entered the graduate program in the Math Department at UC Berkeley and worked with Professor Bernd Sturmfels. My research interests are in combinatorics, algebraic geometry, and commutative algebra. I finished my Ph.D. in 2007 with a thesis titled "Combinatorial aspects of tropical geometry". I spent my last semester in graduate school at the Institute for Mathematics and Applications in Minneapolis. For the last two years, I have been a postdoctoral instructor in the Math Department at MIT. I am moving back to California to spend a semester at the Mathematical Sciences Research Institute in Fall 2009. I enjoy my work for many reasons. I get to work with many interesting people on topics that excite me. I also get to work with students and share their joy of understanding a new concept or solving a difficult problem.

It is impossible to list everything I learned during the four years at UC Davis. Besides acquiring new knowledge and skills in and outside of classrooms, UC Davis is the place where I learned to be a mathematician. There is no doubt that the many wonderful classes I took at UC Davis gave me the mathematical knowledge base I needed to succeed in graduate school, but also very helpful were the broad lessons about mathematics. Even though it was strange the first time I heard

it on the last day of Math 21B, I eventually understood Professor Mulase's philosophy that mathematics is the interface between human brain and the outside world. I also learned from Professors De Loera, Thompson, Fuchs, and many others the importance of good communication and amiability for mathematicians. When I teach a class, I still experiment with the MIFF techniques I learned from Rick West while tutoring at the Learning Skills Center. When I sit down to write, I get transported back to the unforgettable Math 108 class in which Professor Silvia completely transformed my mathematical writing, starting with the rule: "Every sentence must begin with a capitalized English word and end with a period."

In many ways, my education at UC Davis has prepared me for my life after Davis as a mathematician. I met mentors, role models, and friends, and was welcomed into a supportive community, including the amazing staff members who knew me by name. Every time I meet someone from the UC Davis Department of Mathematics, I am happy to learn that the Department is still a wonderful place to be, and I hope that it will continue this way for many decades to come.

Honoring *Evelyn*

The Colleges at LaRue, a student residential complex on the University of California, Davis campus, opened in the Fall of 2000, and on Thursday, April 30, 2009 five buildings in one of the courtyards, the Robert Matthews Court, were named. We are delighted to announce that one of the honorees was mathematics professor Evelyn Silvia, who contributed in multifaceted ways to the undergraduate educational experiences of students at UC Davis.

Professor Silvia joined the mathematics faculty as an Assistant Professor in 1973 and was an outstanding member of the University Community known for her passion in championing the advancement of mathematics education. During more than 25 years of service at UC Davis, her commitment to this cause and her achievements in undergraduate education were recognized by students, fellow mathematics faculty, the University, and many national organizations.

On January 21, 2006, Evelyn sadly passed away at the age of 57 following a courageous battle with ovarian cancer. It is an inspiration to future math educators and all those that recognize the importance of those champions of education, to have an undergraduate dorm named after our dearly missed colleague.

The Evelyn Silvia student residential building is located on the northern end of the Robert Matthews Court at the Colleges of LaRue.

Emeritus Jim Diederich

Jim Diederich continues his activities in the UC Davis Math Project as a faculty adviser and principal investigator. He taught in the 2008 Summer Institute in Colusa for K-12 teachers and this past summer taught in a Summer Institute for elementary school teachers in Fairfield/Suisun as part of a new 3 year grant. Over the past several years he has introduced Unit Fractions, sometimes referred to as Egyptian Fractions, into his presentations and as a result has gained new insights into how Egyptians Fractions can motivate the teaching and understanding of fractions. As any teacher can tell you, fractions are the bane of many a student, so new approaches to a topic can enhance one's understanding of the fundamentals of mathematics. In November he will travel with his wife Paula to Egypt, Israel, and Jordan. There is no tie-in with Egyptian Fractions and as he says "No tax write-off, strictly out of interest, and I won't be crawling inside some pyramid translating hieroglyphics — that language is just too complex to tackle at my age."

Emeritus Roger Wets

Roger Wets retired in March 2008 and gave his last lecture on March 20, 2008. Since then, he prepared a revised and updated version (3rd printing, July 2009) of his book with R.T. Rockafellar on "Variational Analysis". He went on extended visits to the Center for Mathematical Modeling, University of Chile, Santiago and the Departments of Statistics and Information Sciences, University of Vienna. He participated in a number of meetings at which he gave invited lectures: "Dynamique et Optimisation" (IHP-Paris, June 2008), "Perceiving, measuring and managing risk: illiquidity, long-term risk, natural resources" (UBC-Vancouver, July 2008), "Variational Analysis", (CMM-Santiago, November 2008), "International Meeting on Engineering Risk", (U. Florida, February 2009), "Army Research Office Workshop on Decision Sciences" (West Point, N.Y., June 2009). He gave colloquium lectures at Department of Applied Mathematics of the Naval Post-Graduate School (Montery, CA), Departments of Mathematics and Industrial Engineering of the University of Chile and the Departments of Statistics and Mathematics of the University of Vienna. He also gave a series of lectures on "The management of a fixed-income portfolio" at the Banco Centrale de Chile, Santiago. But what he claims to be the high point of his year was the so-called "Wetsfest" at UC Davis, organized by Jesús De Loera. He appreciated it parcularly because of its family-type atmosphere and a significant participation by the faculty, staff and students.

Life After Davis

Tate Birnie

I arrived at UC Davis knowing that I wanted to be a math major. It was my favorite subject in school and I just assumed that I would get a B.S. in Mathematics, probably do some graduate work and then end up as the super-cool Calculus teacher at a high school, like the one that had inspired me. Though I thoroughly enjoyed studying math at UC Davis and did receive my B.S., I was wrong about the path the rest of my life would take.

During my senior year at UC Davis and for a year after graduation, I worked at an AmeriCorps program called Summerbridge. Designed as an intense summer school program, with an additional year-round tutoring component, one of the main goals of Summerbridge was to help make middle school students with limited resources ready for rigorous college-preparatory high school curriculum. A key area of focus for Summerbridge was readiness for Algebra and higher level mathematics. UC Davis had prepared me well to teach mathematics in the program and I loved my time with the students. What I wasn't prepared for, though, was how often my students' academic lives were disrupted by issues out of their control. Most of my students were recent immigrants (mainly Southeast Asia), all lived below the poverty level, and all of them needed more guidance navigating the legal world than they did with fractions.

Until that time, I had never really considered being an attorney. Though my dad is a lawyer, I didn't think his job sounded all that great. He did divorce mediation and I knew that was not something I wanted to mess with. But my Summerbridge students also needed legal advice, and they seemed like much more compelling clients.

I decided to take the LSAT and "just see." Who would have guessed just how great studying math would be for law—

the LSAT has a "games" section made up of little logical puzzles. I didn't miss any questions in that section and in fact scored so well that I ended up getting into all 5 of the top law schools in the country. (I am sure that the recommendations from my incredible UC Davis Math professors, my grades at UC Davis and being a NCAA All-American Division II swimmer and UC Davis Student-Athlete of the Year didn't hurt either.)

I decided to attend Stanford. At UC Davis I had met the woman, Amy Little (B.S. Mechanical Engineering, 1996) that would become my partner (and now wife) and she was attending UC Santa Cruz for graduate school so I didn't want to move too far away. My first summer of law school, I came back to Davis for a job with Legal Services of Northern California in Sacramento, working for low-income families on housing issues for clients much like my Summerbridge students. While in law school, though, I learned that there was a way that I could combine my love of math and my growing love of the law—intellectual property law, specifically patent litigation.

After graduation and a year as a clerk for a U.S. District Court judge, I took a job as an associate at a law firm in Menlo Park specializing in patent litigation. The first day at the job, I met Craig Compton (BS Mathemathics 1998, JD UC Berkeley, Boalt Hall, 2001) and we became good friends. The firm knew what it was doing when it hired two UC Davis math majors the same year. We were both assigned to a major computer software case. Though the technology was new to me, I thought it was an interesting challenge to try to learn it well enough that we could explain it in plain-language to a jury such that they could compare the patent to the alleged infringing technology. It always seemed to me that my professors at UC Davis were

doing much of the same thing with us—taking incredibly complex and powerful concepts and breaking them down in a way that we could understand and apply them ourselves.

After two and half years at the law firm, I made the decision that the large law firm Silicon Valley lifestyle was not for me. Craig continued on at the firm and has had great success there, becoming a partner last year. Though I found the work intellectually challenging, I was frustrated working for large companies. I had gotten too far away from working for individuals, the reason I went to law school in the first place.

My partner and I moved to Sebastopol, California, and I went into practice with my father. Five years later, I am going strong as an estate planning, probate and trust litigation attorney. These days, most of my "math" comes in the form of explaining the various IRS rules for gift and estate and income tax to my clients. I am one of the few attorneys that I have met that think the tax stuff is "fun" and it serves me well in work. Also, our family law firm has its perks; I spend 2 days a week at home running around after our 15 month old son, Lucas.

I use the problem solving skills that I honed at UC Davis every day. Every client's unique situation is like a little problem set waiting to be solved. I hope for Math 108-level problems but sometimes a 150C comes into your life and I am thankful for Professor Mulase and the many other great minds I met at UC Davis who taught me how to diligently work through even the most complex situation.

Staff Development

by Jessica Potts, Department Manager

For the first time in 11 years there is no staff turnover to report! The 2007-08 academic year was a year of expanding families rather than hunting for new jobs. In October 2008, DeAnn Ronning welcomed into the world Anika Fe. In May 2008, I welcomed into the world identical twin boys Garrett Michael and Grady Michael followed by Zach Johnson welcoming Dean Xavier.

Student Services stayed busy tackling both the undergraduate and graduate reviews. Both reviews were a great success and we thank Celia Davis and Perry Gee for all the work they put into these reviews. You can keep up to date with our undergraduate program by visiting our Facebook group:

UC Davis Department of Mathematics

The Academic Personnel office managed over 20 merit/promotion actions alone. Carol Crabill survived this cycle managing a majority of these cases. DeAnn Ronning returned in January in time to complete our recruitment cycle.

Jessica Goodall submitted over 25 new grant applications while Tina Denena managed Fiscal Close for the first time.

The technical staff is continuing to capably manage our systems as well as develop online tools. Marianne Waage rolled out phase one of the online graduate student annual review tool which has gone over very well. The Department was awarded temporary instruction money in order to put into place Webworks, an online grading module for use beginning Summer 2009.

At the June 2, 2009 Department Awards Ceremony, Tina Denena was presented the Galois Group Award given by the graduate students. This prize is in recognition of the outstanding service she provides to them on a daily basis.

Two more noteworthy news items: Celia Davis celebrated 15 years of service at UC Davis; and Leng Lai married his long time girlfriend in July.

The continuing budget cuts across campus will bring many challenges to staff in the coming years. As we prepare for furloughs, the staff have come together to form a support system to help us all get through this difficult time. As I look forward to the coming year, I am grateful to work with such an amazing staff!

News Bites

Tim Lewis was elected Program Director for the Life Sciences activity group for the Society for Industrial and Applied Mathematics (SIAM). The activity group brings together researchers who seek to develop and apply mathematical and computational methods in all areas of the life sciences. It provides a forum that cuts across disciplines to catalyze mathematical research relevant to the life sciences and rapid diffusion of advances in mathematical and computational methods.

Distinguished Professor Emeritus Art Krener has been selected as a Fellow of the Society for Industrial and Applied Mathematics. Congratulations Art! Fellowship honors SIAM members who have made outstanding contributions to the fields served by SIAM, and Professor Krener is among the distinguished members of SIAM in the initial class of Fellows.

To Gather for Conference

A new event, the joint Mathematics-Statistics Colloquium was held for the first time this year. Professor Emmanuel Candes from CalTech was the perfect inaugural speaker for this exciting occasion. In his entertaining and inspiring talk he demonstrated beautifully how mathematics leads to important new developments in science and technology.

On May 8-9th, 2009 the UC Davis SIAM Club held the second annual Davis SIAM Student Research Conference. More than 50 conference attendees from UC Davis and CSU Sacramento saw 14 student talks and 9 student poster presentations on applied mathematics related to topics ranging from atmospheric science to mathematical biology to broadcast communications. Keynote speakers Professor James Keener from the University of Utah and Professor Lisa Fauci from Tulane University gave great talks on mathematical biology. The conference was supported by SIAM and an NSF VIGRE mini-grant. More information on the UC Davis SIAM Club can be found at SIAM Club webpage: http://siam.math.ucdavis.edu/

The Department hosted a Low Dimensional Topology Conference in honor of Marty Scharlemann's 60th Birthday, on June 23-25. Called the MartyFest, the conference featured 15 speakers from Israel, Australia, England and across the US. A highlight was a performance by the mathematics rock band "The Emissaries of Misery," whose name is a word play on MSRI, the Mathematical Sciences Research Institute. The conference, supported by NSF, honored mathematician Martin Scharlemann, a professor at UC Santa Barbara. Two of Prof. Scharlemann's Ph.D. students are faculty at UC Davis.

Are You Alumni?

We want to hear from you! Please send us information about yourself so that we can stay in touch and share in your experiences outside of UC Davis.

Please complete our Alumni Questionnaire under "Contact Us" at:

http://www.math.ucdavis.edu/

or send e-mail to:

mso@math.ucdavis.edu

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

E-mail Newsletter Available!

Would you like to receive future newsletters by email? If so, just indicate your preference on the Alumni Questionaire, listed at the left.

As always, you can also view past newsletters on the Newsletter Archive located on our web page:

http://www.math.ucdavis.edu/news/archive

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