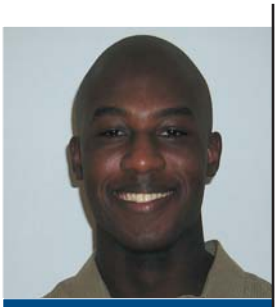
2004

DEPARTMENT OF MATHEMATICS newsletter

university of california at davis

EXCELLENCE in RESEARCH, TEACHING, & SERVICE



CONTENTS

New FACULTY

Roland Freund

Roland Freund comes to Davis from Bell Laboratories. He received his Ph.D. degree in Mathematics from the University of Wüerzburg, Germany, in 1983. He held positions at the University of Wüerzburg and at the Research Institute for Advanced Computer Science at NASA Ames Research Center. He also spent one year in the Computer Science Department at Stanford University. In 1992 he joined Bell Laboratories in Murray Hill, New Jersey, where he was a Distinguished Member of Technical Staff in the Computing Sciences Research Center until 2004. While at Bell Laboratories, he taught courses at Rutgers University, Columbia University, and Princeton University.

Roland's research interests are in scientific computing, numerical linear algebra, dimension reduction of dynamical systems, large-scale optimization, computational photonics, and algorithms for circuit simulation. He introduced the concept of quasi-minimal residual (QMR) iterations to remedy the often erratic convergence behavior and possible breakdowns of Lanczos-type methods for the solution of large systems of linear equations. The QMR method was the first Lanczos-type algorithm that successfully remedied these problems of earlier methods. Together with Peter Feldmann, he wrote the pioneering paper on Pade-via-Lanczos (PVL) reduced-order modeling and its use in VLSI circuit simulation. PVL and variants therefore have become the standard tools for VLSI interconnect analysis. Roland is included in ISI's list of the world's most highly-cited researchers in Mathematics, which is based on frequency of citation from 1981 - present. In 2004, he was elected a Fellow of the World Innovation Foundation.

Cycling is and has always been an important part of Roland's life. He has ridden double centuries in under 11 hours, competed in the annual race up Mount Washington, and won his age category in New Jersey's "Hillier Than Thou" race.

Martin Zerner

Martin Zerner was born in 1968 in the North German town of Bückeburg. As an undergraduate, he studied mathematics first at the University of Hannover and then at the University of Munich, where he graduated in 1993. Soon thereafter, he started his graduate studies at the Swiss Federal Institute of Technology (ETH) in Zürich, where he obtained his Ph.D. in 1999 under the supervision of Professor Alain-Sol Sznitman. The next two years he spent as an Aly Kaufman Postdoctoral Fellow at the Technion, Haifa, Israel, mainly collaborating with Prof. Ofer Zeitouni. In 2001 he became a Szegö Assistant Professor at the Department of Mathematics at Stanford University, where he remained until he joined us.

The bulk of Martin's work is in random processes in random environments, an exciting area of probability theory which has seen substantial developments only recently. For example, imagine a random walker on the two-dimensional integer lattice who at each step jumps at random to one of its four neighbors. To add a new twist to this well-known model, we require that, before the walker begins, the jump distribution at each site is chosen at random, independently of the other sites. In a recent paper with F. Merkl, Martin proved that the event that the x-coordinate of such walker goes to infinity has probability either 0 or 1. The fact that such an apparently simple question lay unresolved for 20 years illustrates the challenges of this field. Martin also worked on large deviations and Lyapunov exponents for walks in random media, self-interacting random walks, coagulation-fragmentation processes, and fractal dimension of self-similar sets.

Martin's penchant for difficult, but rewarding, work extends beyond mathematics. In Switzerland, he helped a farmer with milking cows at 5:30 a.m., every day for half a year. He still remembers the names of all 19 cows, but claims that he is very unlikely to be found around the department at such an early hour. At Stanford, he was one of the main volunteers in the revegetation project for the Foothills and the Arboretum. Initially, his motivation was to get an orange vest and go legally off trails, but soon he was planting oaks, buckeyes, redwoods and other trees, weeding, watering, and supervising other volunteers; by the end, he was in charge of a large irrigation system. Martin clearly prefers nature to city and heat to cold: only recently he was forced to set foot in San Francisco for the first time, he found Palo Alto too cold, and, while looking for an apartment in Davis, spent a considerable time searching for one unshaded by trees or buildings.

Dorothy Buck

Dorothy Buck received her Ph.D. from the University of Texas at Austin in 2001. Her doctoral research focused on developing a mathematical analysis of the topological changes that occur when DNA interacts with a class of enzymes, then experimentally testing her predictions. Subsequently she held a Postdoctoral Fellowship at the Johns Hopkins Medical Institute, where she immersed herself further in computational biology. She recently had an NSF Postdoctoral Fellowship which enabled her to visit UC Davis to build ties with Professor Craig Benham of the Mathematics Department, and with the new UC Davis Genome Center. She was an Assistant Professor at Brown University when she was offered and accepted her position at UC Davis.

Dorothy's broad experience in mathematical molecular biology has guided her in formulating her current research agenda. She is extending her work on the geometry and topology of DNA, and how these affect cellular regulatory processes. She also is analyzing the topological structures of the intricate networks of interactions involved in coordinately regulating large numbers of genes.

Dorothy is an experienced and gifted teacher. In their course evaluations her students consistently make highly positive comments regarding her course organization, teaching style and enthusiasm. The quality of her teaching has been recognized with the receipt of several awards during her career to date.

Dr. Buck is spending the 2004-05 year in England at the Imperial College in London. We are looking forward to her joining us in Fall 2005.

Mark Haskins

Mark Haskins works on the problems in the area of differential, algebraic, and symplectic geometry that have deep connections with mathematical physics and string theory. His 60-page masterpiece on the geometric complexity of special Lagrangian 2-torus cones has just appeared in Inventiones Mathematicae, a top international journals in mathematics.

After completing his undergraduate studies at the University of Oxford and Cambridge University, he came to the United States for his doctoral research. He received his Ph.D. from the University of Texas at Austin in 2000. Since then Dr. Haskins has held such prestigious positions as the J.J. Sylvester Assistant Professor at Johns Hopkins University (2000-03) and the Sir William Hodge Fellowship at IHES, Paris (2003-04). This year he is on leave from Davis at the Imperial College London to collaborate with Professor Simon Donaldson on complex Floer theory, aiming at extending the celebrated Donaldson-Thomas theory.

In addition to geometric problems, Dr. Haskins has also worked on problems in mathematical physics, focusing on particle-like solutions (solitons) of both discrete and continuous nonlinear systems.

While at Johns Hopkins and University of Texas, Austin, he taught a wide range of courses from precalculus to graduate Riemannian geometry. He was recognized for his innovative teaching by being awarded a Kenan Grant.

Professor Haskins will join us in 2005, when we start fresh in the new building.

Timothy Lewis

Timothy (Tim) Lewis joins the department this year as an Assistant Professor. Tim received his Ph.D. in Mathematics from the University of Utah in 1998. Professor Jim Keener, one of the founding fathers of modern mathematical physiology, was his advisor there. Tim is coming from the Center for Neural Science at New York University, where he spent the last five years working with Professor John Rinzel in the field of mathematical neuroscience. In New York, Tim was supported by the prestigious Swartz Foundation Research Grant, and by NIH-NRSA and NSERC (Canada) postdoctoral fellowships.

Tim published a dozen papers in both applied mathematical and biological journals about modeling electrophysiology of heart and nerve cells. Here at UC Davis, Tim will be joining the Mathematical Biology group and pursuing his research interests in Theoretical Electrophysiology and Applied Mathemaics.

In his leisure time, he enjoys cross-country skiing and biking. Tim comes to Davis with his wife Svenja — they got married last winter in Colorado on a ski vacation. Their first child, Aviva Kadegge Lewis, was born in Davis not long after their arrival, on October 13, 2004.

LIFE AFTER DAVIS

By Brons M. Larson
Ph.D. 2002

As a child I reveled in puzzles, mysteries and games. As I grew older, I came to view science as an arena filled with the ultimate mysteries, games and puzzles to be solved. I loved any and all scientific disciplines and I knew that mathematics was the language that defined the rules and guidelines within which all scientific puzzles were defined. This knowledge, and my love of science, eventually led to my Bachelor's, Master's and Ph.D. degrees in Applied Mathematics.

What drew me to the UC Davis Mathematics Department for my Ph.D. studies, besides their solid reputation for quality teaching and high-caliber research, was the strong interaction of their Applied Mathematics department with other disciplines as well as with outside industry. Although I had taught college math courses prior to coming to Davis, and I had enjoyed the challenges and rewards of teaching, I always knew that I wanted to have a career in industry. UC Davis was pivotal in helping me achieve this goal. With the department's solid strength in scientific computation and modeling, and with its strong ties to other sciences, my transition into industry was very natural.

"...mathematics was the language that defined the rules and guidelines within which all scientific puzzles were defined."

Although I began my studies at Davis with Dr. Gary Ford at the Center for Image Processing and Integrated Computing (CIPIC) studying inhomogeneous diffusion techniques for image enhancement, I eventually homed-in on a computational harmonic analysis project with Dr. Naoki Saito. The project focused on novel, computationally efficient techniques for data representation, data analysis and data synthesis, and was funded by NSF and ONR grants. Together we developed new libraries of basis functions upon which to project data. The motivation for the project was tied to the development of better image processing techniques, and the algorithms were based on observations from neuroscience. Their applicability,

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MATHEMATICAL SCIENCES BUILDING

The Mathematical Sciences Building will be located off of California Avenue between Academic Surge and the Crocker Nuclear Lab. It is estimated to cost $18.8M and will provide 38,271 assignable square feet (ASF) over four stories to the three occupying units: Mathematics, Statistics and Computational Science & Engineering.

For Mathematics, we will occupy the second and third floors, plus a small portion on the first floor of the new building. We will acquire 23,187 of the 38,271 ASF, which represents a 30% increase in ASF over our current space in Kerr Hall. This is a much needed—and much welcome—improvement that will aid us immensely as we continue to grow! Many of the 120 offices will be occupied by faculty, graduate students and staff, but aside from individual offices, there will be four scholarly activity rooms, three seminar rooms, several computer labs, and adequate work space for all Department Members. The estimated completion and move date is Fall 2005. With the building underway, the next phase in planning will involve personalizing the space, so that it represents Mathematics of yesterday and today. Besides assigning offices, this will involve a room naming effort to acknowledge our immediate supporters and extended Math family. We are very interested in your ideas about potential candidates for whom the rooms could be named. Anyone interested in contributing to this effort should contact Tracy Ligtenberg, MSO of Mathematics at

mso@math.ucdavis.edu.

July 2, 2004

August 2, 2004

September 29, 2004

Mathematical Sciences Building Groundbreaking, April 28, 2004

A groundbreaking ceremony for the building was held on April 28, 2004. The speakers, as depicted by the photo at the left, were Rudy Beran, Chair of Statistics; Peter Rock, former Dean of Mathematical & Physical Sciences; Virginia Hinshaw, Provost; Winston Ko, Dean of Mathematical and Physical Sciences; John Hunter, former Chair of Mathematics; and John Rundle, Director of CS&E. Among the attendees were faculty, staff and emeriti from the occupying departments.

For more information about the Mathematics Department and updates about the new building, look for updates on the Mathematics departmental website at

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

James Diederich

James Diederich retired on July 1, 2004

Professor James (Jim) Diederich retired on July 1, 2004. A year after joining our Department in 1970 as a Lecturer, Jim became an Assistant Professor. During his tenure in Mathematics, he rose to the rank of Professor. Throughout his career, Jim Diederich was an enthusiastic contributor to all aspects of the University's mission.

Professor Diederich received his Bachelor's degree and Doctorate from UC Riverside. His doctoral work and initial research program were in the areas of analysis and partial differential equations (PDEs). Later, in the 80's when technology was coming to the forefront of science, his research focus changed from PDEs to mathematical theory of databases, database design, and fuzzy systems.

Throughout his career, Professor Diederich was highly regarded as an out-going, thoughtful, and caring teacher who was equally successful at all levels. This was acknowledged with consistently excellent student evaluations as well as two nominations for the campus Distinguished Teaching Award. For almost every year during his tenure in the Department, Professor Diederich was an undergraduate advisor and/or member of the Undergraduate Program Committee in the Department. During his term as the first "head advisor," Jim made significant contributions towards simplifying the advising process and improving important lines of communication. His study of our majors and interactions with other faculty made him aware of the need to revise the structure of our majors. Once aware of the need, Jim Diederich did a masterful job of overseeing the redesigning of the Department's majors.

Jim Diederich served the University in many capacities from program reviews to service on the General Education (GE) Steering Committee. Some of his career highlights include: service as Undergraduate Vice Chair of Mathematics for three years, creation of two new majors in the Department, re-organization of the existing majors, upgrading of all upper-division courses to 4-units, introduction of Math 17ABC — a calculus course for biology students, and modification of the Math Placement Requirement. He was a trusted colleague and all in all, he had a full and productive career as Professor in the Department of Mathematics.

Starting in 1996, Jim became a very active contributor to the UCD Mathematics Project. In addition to serving as co-faculty advisor, he taught in the first Algebra Math Professional Development Institute and in two subsequent Summer Institutes. His work with teachers of secondary school generated great enthusiasm. Jim's Math Survivor challenge was especially intriguing and motivated many of the teachers to reflect more deeply on algebra and functions.

Professor Diederich spent many years improving the Mathematics undergraduate program

While it seemed strange not to be spending September in preparation for another school year, Jim notes that retirement life is full and exciting. He and his wife Paula are enjoying the opportunity to spend more time doing the things they have always liked. This includes sports (hiking, biking, running, golf), travel literature and travel (Costa Rica, Scotland, and China in the next year), cooking, music (playing the flute, writing songs, being a supernumerary in San Francisco Opera productions — La Traviata the most recent). He is also looking forward to continued participation in the UCD Math Project and some other special projects.

LIFE AFTER DAVIS

By Brons M. Larson

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though, was widespread and is currently in use on a number of programs with which I am currently involved. Overall, the signal and image processing techniques that I learned while working with Dr. Saito were instrumental in my securing a position in industry, and they are put to use on a daily basis in my current research.

As I finished my Ph.D. work, I accepted a position at Science Applications International Corporation (SAIC) in San Diego. Having grown up in San Diego, I was aware of SAIC's reputation as a scientific powerhouse, as well as its strong ties to the government and private industry. What excited me the most were the many diverse scientific projects with which they are involved. As the largest employee-owned company in the United States, SAIC has a unique atmosphere where creativity and entrepreneurial spirit are highly encouraged and handsomely rewarded. On a regular basis I pitch new scientific ideas to various parties, I write white papers and proposals to gain funding for these ideas, and I also work on and manage some of the projects throughout their various phases. In addition, some of my scientific work has caused me to be named on company patents. On a daily basis, I work with other Ph.D.s from every scientific discipline in academia, government labs and private industry. I have even had the opportunity to collaborate with a Nobel Laureate. So although SAIC is a large company with over 41,000 employees, it has an atmosphere that resembles a small startup company. SAIC has provided me with many of the freedoms usually associated with academia, but with the resources of private industry.

Although I have been involved with many different programs at SAIC, my primary research has been tied to biosensor design. In the DARPA funded TIGER program, I helped develop a sensor capable of detecting and classifying any bacteria, virus, or toxin even if it is newly emerging or bioengineered. In a different program funded by HSARPA, I am helping to develop a faster and cheaper version of TIGER, capable of constantly monitoring all airports for biohazards. In addition I am currently researching

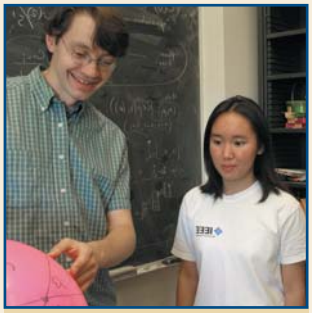
More Life After Davis, p14

Mathematics, at the Frontier of the University

by Motohico Mulase, Department Chair

Clark Kerr, former UC President and emeritus of UC Berkeley, passed away in 2003 at the age of 93.

Kerr Hall has housed the Mathematics Department since 1969. The department plans to move out in 2005.



Undergraduate research opportunities have increased in number and area.

"Department leadership is the key to the success of a university," Clark Kerr (1911-2003) told a small group of 'future leaders' at UC Davis in November 2001. After the meeting, remembering that I was from Mathematics, he approached me and said, "In Berkeley I started with the History and Mathematics Departments. Foreseeing the future direction of the university was much easier 40 years ago. Now you have a difficult job because of the great uncertainty in front of you." The vision of Kerr determined the course of the University of California. Although we are leaving Clark Kerr Hall for a new building, we like his idea that in the era of uncertainty, departments — where research and teaching take place — should lead the university. We are proud of our contribution to the success of the Davis campus through our dynamic vision, research accomplishments, participation in the University service missions, and aggressive implementation of the academic plans.

In many ways 2004-05 will be a transitional year. The biggest physical change will be our move to a new building that is scheduled for Fall 2005. In recent years we have significantly increased our faculty research and graduate programs in quality, but due to the space limitation the increase in quantity has been slow. Now that the obstacle is removed, we wish to achieve the overdue growth wisely, swiftly and boldly.

The Department currently houses 40 permanent faculty members (38.5 FTE), one faculty fellow, 10 visiting research assistant professors and VIGRE postdoctoral researchers, 10 lecturers, and 12 staff. Our programs have 425 undergraduate major students and 109 graduate students. The total annual enrollment of all mathematics courses we offer exceeds 16,500. These enrollment figures show a large increase over the last decade. We are slated to grow even further. An increase in the faculty size proportional to the expansion of operation is our most urgent need.

"...in the era of uncertainty, departments — where research and teaching take place—should lead the university."

As early as 1989, the total allocation of permanent FTE to Mathematics reached 38, although not all positions were filled. As of today, the allocated FTE is 40.5 with two unfilled positions. This change, a 6.6% increase or a total of 2.5 new FTE allocation after retirement replacements during the past 15-year period, explains the wide gap in the Davis Mathematics faculty size and the other large UC campuses.

The Department is internationally recognized by its research output, nurturing environment and strong commitment to diversity. We have been extremely successful in identifying young talent and nurturing them into world-class stars. Among those appointed as assistant professors in the Department, two have become Guggenheim Fellows (Krener, Temple), seven have become Sloan Fellows (Barnette, Hass, Thompson, Quastel, Kuperberg, Shkoller, Soshnikov), two von Humboldt Fellows (Schilling, De Loera), and one AMS Centennial Fellow (Fannjiang). Furthermore, two have become long-term members of the editorial board of the top journals in their fields: Gravner (Annals of Probability) and Mogilner (Journal of Theoretical Biology). Many other awards and prizes are given to our former assistant professors. The most recent one is Krener's remarkable recognition: the 2004 W.T. and Idalia Reid Prize in Mathematics from SIAM.

In our Department, 50.0% of tenure-track assistant professors, 28.6% of associate professors, and 11.1% of full professors are women. These numbers are more than twice as large as the national average among the top 50 mathematics departments. Geographically, more than 25 nations and political territories of the world are represented in the Department.

This year 31 faculty members, or 88.6% of the faculty who joined the Department before 2004, are serving as the lead PI of a federal grant. The total budget of currently active federal grants under the control of these PIs exceeds 14 million dollars. This represents a more than five fold increase over the last five years. The variety of funding agencies, NSF, DOE, ONR, NIH, NASA and the US Department of Education, represent a healthy diversity of mathematical research and graduate training conducted in the Department.

Every year new research grants are awarded to Mathematics faculty. This year Kapovich, Khovanov, Mulase, Rains, Saito, Soshnikov, Temple, and Vershynin received new NSF-DMS research grants, substantially increasing their award amounts over the previous ones. Cheer received a new research grant from NASA. Although housed outside the Department, Benham was awarded a $1,113,860 research grant from NSF-DBI and Silvia received a $1,500,000 grant from the NSF-DGE as a lead PI.

The Department was well known for its unique excellence in undergraduate teaching for many decades in the 20th century. The Department's success in Putnam Competitions and extraordinary

presence in the MAA are long remembered. Under the leadership of Art Krener and Craig Tracy as Department Chairs and leading researchers themselves, the Department transformed from its old glory to the present mainstream international research institution. They created the culture of the Department that recognizes each faculty member's contribution in his or her own way of accomplishment, and started the tradition of encouraging a younger generation and newcomers to the faculty to participate in the most important decision-making processes of the Department.

Following in this tradition, this year Anne Schilling (who joined Davis in 2000) has been appointed as Department Vice Chair for Undergraduate Matters, and Michael Kapovich (who joined Davis in 2003) is now Vice Chair for Graduate Matters. Steve Shkoller (who came to Davis in 1999) will lead the Search Committee. The new generation, those who joined Davis in the last 10 years, represents 60% of the faculty today.

This past year, three faculty members took on unusually heavy campus assignments. Angela Cheer, the recipient of the 2004 Chancellor's Award for Excellence in Mentoring Undergraduate Research, served as Chair of the Academic Senate Committee on Academic Planning and Budget Review. Abigail Thompson served as Chair of the L&S College Personnel Committee. Her service was highly appreciated by all three Deans she served. Evelyn Silvia was appointed Chair of the Personnel Committee in the School of Education. This is an unusual assignment because she does not have any faculty appointment in Education. One must understand that since the permanent FTE allocation is so small compared to the magnitude of our operation, it has become increasingly difficult for our faculty to participate in University services. A few exceptionally capable senior faculty members are stretched thin because they are asked to do all kinds of work continuously every year. We are truly indebted to Cheer, Silvia and Thompson for their selfless contributions.

The Department is well aware of the students' outcry for reducing the class size of MAT 16ABC series. Everyone wishes to take the short calculus sequence for non-engineering majors in a small classroom. When there are 7,500 students taking the MAT 16 series annually, teaching everyone in a small classroom is impossible. Because of the emergence of the need of mathematical competence in biology, medicine, and other areas, our lower-division enrollment is expected to grow further. By restructuring our course offerings, however, we believe we can provide, within two to three years, an option to a total of about 2,000 students to take either MAT 16 or MAT 17 (Calculus for Biological Science Majors) series in a small classroom setting with an enrollment of 50.

Another urgent need of the University is to increase the graduate programs in size while maintaining the quality. With the large growth of extramural funding in research and graduate training, the Department is ready to increase our graduate programs. The success of the GAANN and VIGRE programs, accomplished by the continuous efforts of De Loera, Hass, Hunter, Nachtergaele, and Thompson, demonstrates our exceptionally strong competitiveness. We need to keep our programs competitive by enhancing and enriching the graduate offerings.

The Department has launched multiple major programs to better serve our undergraduate students. This transition was planned and designed under the direction of Jim Diederich, who devoted his last five years before retirement to this project. To implement the new programs, we need to offer more diverse courses.

In all, much faster FTE allocation to Mathematics, if only to catch up the other large UC campuses, is absolutely necessary.

When the Department had 25 faculty members in 1994, we planned a focused growth. We identified five areas of excellence and started our aggressive journey. In 1999, we added a new area, Combinatorics, in our growth target, seeing the need for and an exceptional opportunity to build this discipline. The outcome of our vision is truly remarkable. The Davis group has grown into a representative powerhouse, with internationally renowned core faculty members consisting of De Loera, Kuperberg, Rains, Schilling, Vazirani, and Vershynin. Our old slogan, 'build on the existing strength,' will no longer be in place. Although coordinated recruitment is always necessary, our prime concern will be the excellence in research quality, rather than the limitation of expertise. We will utilize all opportunities to recruit the very best faculty to our Department.

The Department has shown its ability to identify future needs in our growth plan and to implement this plan in an effective and wise manner. We are committed to continue our efforts to better serve the students and this campus, believing that our leadership leads to further success of the University.

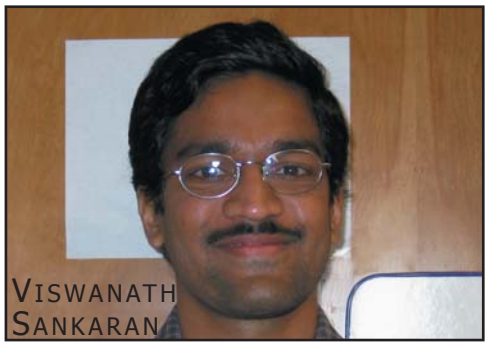
Angela Cheer, in addition to her teaching, served as Chair of the Academic Senate Committee on Academic Planning and Budget Review.

Evelyn Silvia, with an interest in furthering future educators, was appointed Chair of the Personnel Committee in the School of Education.

Abigail Thompson, as Chair of the L&S College Personnel Committee, was lauded by the three Deans she served.

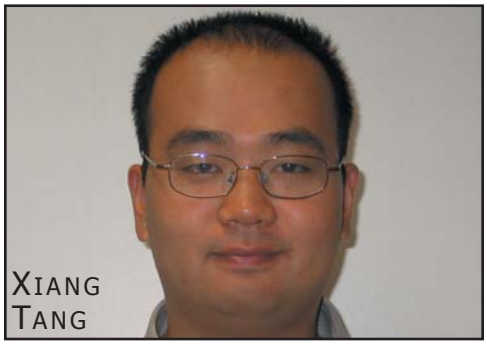
Class sizes for the Math 16 series will be reduced with restructuring to handle incoming undergraduates.

New VISITING RESEARCH ASSISTANT PROFESSORS



Viswanath (Vish) Sankaran received his Ph.D. from UC Berkeley in May 2004 and prior to that, his Masters from the Indian Institute of Technology in Kanpur, India. His impression of Davis is, "The weather here is so much like the weather at Kanpur, that it makes me feel like I'm back in the good old days again." While here, Vish will be working with two faculty mentors: Anne Shilling and Monica Vazirani. His main research interests are Representations of Kac-Moody algebras, especially their algebraic and combinatorial aspects. He will be teaching three courses for 2004-05: 21A, 16B, and 21B.

And when Vish is not immersed in his work and teaching duties, he'll be hiking, bicycling, and listening to Indian classical music.



Xiang Tang recieved his Ph.D. in Mathematics from UC Berkeley under the supervision of Alan Weinstein in May 2004. He wrote a thesis on quantization of noncommutative Poisson manifolds.

Xiang's research area is noncommutative geometry, symplectic geometry and mathematical physics. Now he is working with Albert Schwarz, his faculty mentor, on properties of a "Q-algebra." He also has an interest in topology, functional analysis, representation theory and quantum groups, and deformation theory.

Xiang graduated from Peking Universtiy as an undergraduate in China. Before coming to Davis, he spent three months in Paris visiting *Institut Henri Poincaré*.

Carol Gwosdz Gee received her Ph.D. in Mathematics from Rice University in May 2004. Her research interest is low-dimensional topology, in particular, classical knot theory.

As a VIGRE postdoc at UC Davis, Carol looks forward to working with her faculty mentor, Professor Abigail Thompson. She will also continue her investigation of algebraic and geometric relations between ordered links.

In her free time, Carol enjoys travelling, trying new recipes, and cycling.

Ilya Shapiro graduated with his Ph.D. from the University of Chicago in June 2004. His advisor was Alexander Beilinson. His most recent work experience was as a lecturer and a College Fellow at University of Chicago, where he developed his teaching style and where he was assigned to teach calculus to non-math majors. For 2004, he will be teaching a large section of 16A each quarter. Dr. Shapiro's math interests are geometric methods in representation theory, and he will work with Dmitry Fuchs. According to Ilya, his non-math interests include: "reading, swimming (splashing around in the pool is more accurate), biking (as accurate as swimming), and lying on the couch while staring at the ceiling (very accurate)!"

ROBERT SIMS

Robert Sims received his Ph.D. in Mathematics from the University of Birmingham in August 2001. Since his graduation, he has held positions as a Visiting Assistant Professor at UC Irvine, Lecturer at Princeton University, and most recently an NSF Postdoctal Fellow at Princeton. His research interests include Mathematical Physics, including Random Schrodinger Operators and Spin Glass Models. Professor Bruno Nachtergaele will be serving as his research mentor.

VISITOR: HYAM RUBINSTEIN

Visiting the Department from January to June will be Professor Hyam Rubinstein, a Professor and Head of Mathematics Department at the University of Melbourne in Australia. Professor Rubinstein is a past president of the Australian Mathematics Society. Along with Professor Rubinstein we will be hosting two of his graduate students from down under, Belinda Trotta and Loretta Bartolini.

Professor Rubinstein is a member of the Australian Academy of Sciences, the highest honor given to Australian Scientists and comparable to the National Academy of Sciences in the United States. He spoke at the *International Congress of Mathematicians*, Zurich, 1994. He became a Fellow of the Australian Academy of Sciences, 2003. He won the Hannan medal of the Australian Academy of Sciences, 2004.

He works in low dimensional topology, minimal surfaces (combinatorial and smooth) and also applied math, in the area of shortest network design. Together with Abby Thompson of UC Davis he developed the breakthrough algorithm to recognize the 3-sphere among 3-manifolds. He developed the theory of PL minimal surfaces with Jaco, and showed the connection between minimal and normal surfaces which is being widely explored today. See

http://www.ms.unimelb.edu.au/~rubin

for more on his work: how work on networks is being used for on optimal design of underground mining systems.

At Davis he will be hosted by Joel Hass, Jennifer Schultens, and Abby Thompson. He will teach a graduate course in low-dimensional topology in the spring quarter.

News from the GRADUATE PROGRAMS

By:
Joel Hass, Outgoing Vice Chair for Graduate Affairs
Bruno Nachtergaele, Outgoing Chair, Graduate Group in Applied Mathematics

The past year showed continued recognitions for the Mathematics Ph.D. programs. Several of our students won prestigious fellowships or competitions. Brad Safnuk won a UC Davis Dissertation Fellowship. This is a very competitive fellowship, open to all disciplines, with only six fellowships awarded each year. Jim Zhao, Jiadong Xu, Tyrrell McAllister, and Kei Nakamura each won campus Summer Research Fellowships awarded by the office of the Dean of Mathematical and Physical Sciences, thanks to Dean Ko. Kamila Larripa was awarded a Fulbright grant and will be at the Ecole Polytechnique Federale de Lausanne in Switzerland starting July 2004. Momar Dieng earned a Chancellor's Achievement Award for Diversity and Community. We now have over one hundred graduate students (109 to be precise) in our various graduate Mathematics programs, including 14 new students in Mathematics and 14 in the Graduate Group in Applied Math.

The level of activity around the graduate program continues to increase, with many research seminars organized each week, some based on the VIGRE activities and some based on other topics. New students will find four new VIGRE programs to participate in. Our preliminary examination preparation workshops, in which students arrive on campus three weeks early to prepare for Fall courses and exams, also continue this year. The VIGRE program runs annual Research Focus Groups in which graduate students play central roles. Over the last year the programs and organizers were

- Combinatorial Methods in Representation Theory, Anne Schilling
- Applied and Computational Harmonic Analysis, Thomas Strohmer
- String Theory and Geometry, Andrew Waldron
- Random Matrices and Statistical Mechanics, Alexander Soshnikov

In 2004-2005 the VIGRE programs will be

- Quantitative Biology, Alex Mogilner
- Partial Differential Equations and Applications, Albert Fannjiang
- Probabilistic Aspects of Convexity and Combinatorics, Roman Vershynin
- Hecke Algebras and Orthogonal Polynomials, Monica Vazirani

Finally, this year sees the end of our terms as Chairs of the Graduate Programs in Math and Applied Math. Starting this Fall, Misha Kapovich will be the Department's Vice-Chair for Graduate Affairs and Blake Temple will be chair of the GGAM.

As always, we would like to hear from former Davis graduate students about what they are presently doing and how they are applying their mathematical skills. Please email our student services manager Celia Davis with your news:

gradc@math.ucdavis.edu

JOIN US IN CONGRATULATING THE DEGREE RECIPIENTS FOR 2003-2004

Maya Ahmed, Ph.D., Math
Advisor: Prof. DeLoera
Dissertation: Algebraic combinatorics of magic squares

Brad Ballinger, Ph.D., Math
Advisor: Prof. Thompson
Dissertation: Length-preserving transformations on polygons
Current Position: Lecturer, UC Davis - Dept of Mathematics

Scott Beaver, Ph.D., Applied
Advisor: Prof. Strohmer
Dissertation: Banach algebras of integral operators, off-diagonal decay, and applications in wireless communications
Current Position: Teaching Postdoctoral, University of New Mexico

Ricky Burnett, M.A., Math
Advisor: Prof. Fuchs
Current Position: Computer Programming Consultant, Self-employed

Erin Cuarenta, M.A.T., Math
Advisor: Prof. Silvia
Current Position: Mathematics teacher, River City High

Thad Edens, Ph.D., Math
Advisor: Prof. Temple
Dissertation: A new large tool variation stability result for the quadratic nonlinear system associated with the compressible Euler equations
Current Position: NSF Postdoctoral, University of Michigan

Denis Grishin, Ph.D., Applied
Advisor: Prof. Strohmer
Dissertation: Fast and efficient methods for multi-dimensional scattered data approximation
Current Position: Lecturer, UC Davis - Dept of Mathematics

Jeffrey Housman, M.S., Applied
Advisor: Prof. Hafez
Current Position: Continuing as Ph.D. student

Isaiah Lankham, M.A., Math
Advisor: Prof. Tracy
Current Position: Continuing as Ph.D. student

Peng Li, M.S., Applied
Advisor: Prof. Fannjiang
Current Position: Transferring to UC Berkeley to pursue Ph.D. in Industrial Engineering & Operations Research

Larry Pack, M.A., Math
Advisor: Prof. Fuchs
Current Position: Volunteer, Peace Corps (Africa)

James Peirce, Ph.D., Math
Advisor: Prof. Shkoller
Dissertation: Well-posedness of the three-dimensional Lagrangian averaged Navier-Stokes equations
Current Position: Assistant Professor, University of Wisconsin - La Crosse

Damien Pitman, M.A., Math
Advisor: Prof. Gravner
Current Position: Continuing as Ph.D. student

Nigie Shi, M.S., Applied
Advisor: Prof. Nachtergaele

Cyril Williams, M.A.T., Math
Advisor: Prof. Silvia
Current Position: Head golf coach, UC Davis

Lech Wolowski, Ph.D., Applied
Advisor: Prof. Fannjiang
Dissertation: Noise induced dissipation in discrete-time classical and quantum dynamical systems
Current Position: Postdoctoral Research Assistant, University of Bristol

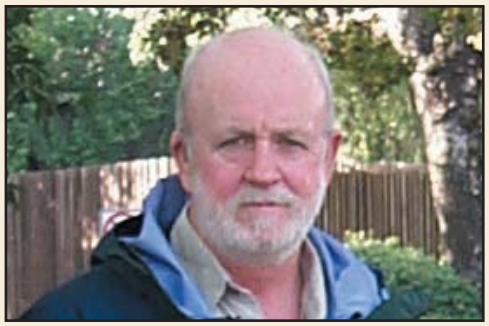
Ruriko Yoshida, Ph.D., Math
Advisor: Prof. DeLoera
Dissertation: Barvinok's rational functions: Algorithms and applications to optimization, statistics, and algebra
Current Position: Assistant Research Professor, Duke University, Dept. of Mathematics

Kudos!

Cheer selected for mentoring distinction

Angela Cheer was selected for the 2004 Chancellor's Award for Excellence in Mentoring Undergraduate Research at a June 4th Award Ceremony. Angela has served as a superb role model and mentor for undergraduates in mathematics for over a decade. She has devoted an enormous amount of time and energy to mentoring undergraduates in research, and the results of this mentoring have been spectacular. It should be noted that all of the students she has mentored are either women, underrepresented minorities, or persons who have overcome hardships.

To qualify for this prestigious award, recipients must submit documentation of mentored undergraduates, listings of publications with undergraduate co-authors, and letters of support from undergraduates and alumni.



Arthur Krener awarded Reid Prize

Arthur (Art) J. Krener, Professor of Mathematics, was awarded the 2004 W.T. and Idalia Reid Prize for fundamental contributions to control and estimation of nonlinear dyanmical systems and stochastic processes. This annual prize, $10,000, was awarded to Professor Krener at the *SIAM 2004 Annual Meeting* in Portland, Oregon. The prize was established to recognize outstanding work in the broadly defined areas of differential equations and control theory.

Celia Davis awarded Excellence in Service to Graduate Students

The 2004 GSA Award for Excellence in Service to Graduate Students was awarded to our very own Celia Davis. Each year the Graduate Student Association (GSA) recognizes those who work diligently to advance the status of graduate students throughout UC Davis by presenting this award to a member of the staff, faculty, or administration. Celia's nomination was supported by graduate students and faculty from throughout the Department who felt Celia had demonstrated her commitment and resolve in pursuing graduate student interests. She was evaluated by the GSA assembly according to her merit against eight other candidates and as the winner was presented with a plaque recognizing her hard work and a gift from the Association.

Please take time to congratulate Celia and also stop and realize that you are proof that her job is a success.

Kamila Larripa Awarded Fulbright

Kamila Larripa was awarded a Fulbright grant to work with Alexander Verkhovsky, a collaborator of Alex Mogilner, at the *École Polytechnique Fédérale de Lausanne* in Switzerland starting July 2004. This is a national competition and provides opportunities for students to study abroad. She'll be modeling actin dynamics in the leading edge of a crawling cell.

For more information about Verkhovsky's work, visit this website:

http://ipmc.epfl.ch/page8755.html

Jesus DeLoera awarded Humboldt Fellow

Jesus DeLoera, Associate Professor of Mathematics, was nominated for and awarded a research fellowship from the Alexander von Humboldt Foundation. Fellows are chosen based on the quality and feasibility of their research projects as well as their international publications. Professor DeLoera will live in Germany for a year while conducting research on recent developments in discrete mathematics. Only the most highly qualified scholars receive Humboldt Research Fellowships—500 are awarded per year.

Momar Dieng awarded Chancellor's Achievement

In January 2004, Momar Dieng was one of four recipients of the Chancellor's Achievement Award for Diversity and Community. These awards were established to honor achievements that contribute in substantial ways to the development and well-being of the UC Davis community. In presenting the award, Chancellor Vanderhoef pointed to Momar's work in the Black Graduate Student group, as well as his role as a mentor in the McNairs Scholar program. Locally, Momar has been quite active in the Galois Group, where he just finished his term as President. Momar Dieng is currently a fifth year graduate student in Mathematics. Momar, who is from Dakar, did his undergraduate work at Macalester College. Congratulations Momar.

2003 2004 ANNUAL AWARDS CEREMONY

The Department's Annual Awards Ceremony was held on June 9, 2004. On this occasion the Department honors its best undergraduate students and its best teachers among the faculty and graduate students.

Outstanding Teacher of Lower Division Mathematics

This yearly recognition of exceptional lower division teaching in our Department was presented by Vice Provost Pat Turner to Oscar Bolina.

During his four years of teaching mathematics at UC Davis, Dr. Bolina has established a reputation among students here as an oustanding lecturer. He is an especially enthusiastic, well-prepared, and entertaining teacher, who is well known for his ability to inspire and motivate students to learn and enjoy calculus.

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.

Jonathan DeValentine has an overall GPA of 3.897 and an upper division math GPA of 3.98. His professors agree that he is an outstanding student. One of our faculty writes that "he is quiet, but his work is top notch—he always presents carefully argued solutions to all the problems." In addition to his class work, Jonathan has participated in our undergraduate research program.

Peter Huggins has an overall GPA of 3.987 and an upper division math GPA of 4.0. He has received the most enthusiastic support from our faculty. Among the quotes: "Peter is very talented," "Peter is very smart and original, [and also] extremely able with computers. He is almost as impressive with a computer in his hands as when proving theorems." In fact, Peter was a member of the UC Davis team for a statewide programming competition.

Peter has also been an active participant of our undergraduate research program, and contributed to a paper which has been accepted for publication. This year, Peter will be a graduate student in mathematics at UC Berkeley.

William Karl Schwarze Scholarship in Mathematics

This scholarship is made possible by a bequest in the amount of $10,000 annually made to the Department by William Karl Schwarze, who received his bachelor's degree in our Department and subsequently became a high school teacher of mathematics in San Francisco. Mr. Schwarze remembered his studies in the Department with such fondness that he decided to leave funds for students in our Department who demonstrate outstanding mathematical scholarship and exceptional promise of making a strong professional contribution as a mathematics teacher at the pre-college or undergraduate college level.

The recipient of the award, presented by Dean Winston Ko, was Emil Sargsyan.

Emil Sargsyan already had a very good teaching record before coming to UC Davis. He was quite successful in teaching at various levels including elementary school from one side and Center For Talented Youth from the other side. He enjoys teaching and the students enjoy his way of teaching.

Emil also has been very successful in studying graduate level mathematics. This was clear not only from his GPA, but also from the opinion of his instructors who considered him as one the most active students in their classes.

Nicholas Nguyen (left) and Joshua Burkart (right) with Vera May Wasser.

Oscar Bolina, outstanding lower division teacher.

Joshua Burkart, Chung Kwan Pong and Nicholas Nguyen won the Spring Math Contest.

Jonathan DeValentine and Peter Huggins, top graduates.

Chris Jerdonek receiving the Alder Prize from Benne Alder.

Emil Sargsyan, recipient of the Schwarz Scholarship.

Momar Dieng and Ching-Hsiao Cheng, Leung prize recipients.

Robert Lewis Wasser Prize

The Robert Lewis Wasser Memorial Fund is named in honor of Robert Lewis Wasser, a very promising young mathematician, who tragically died in an automobile accident in 1993 just before the beginning of his junior year at UC Davis. The endowment's goal is to benefit promising mathematics students at UC Davis through the annual Robert Lewis Wasser Memorial Mathematics Contest for freshmen and sophomore students at Davis.

Vice Provost Pat Turner and Robert's grandmother, Vera May Wasser, presented this year's award, which, in the amount of $500, went to two students who tied for top honors — Joshua Burkart and Nicholas Nguyen.

Award of prizes in the Spring Math Contest

Each year some very talented students participate in the Spring Mathematics contest, which is open to all undergraduates. This year's first prize, in the amount of $500, went to Chung Kwan Pong; Joshua Burkart and Nicholas Nguyen shared the second prize and received $200 each; while John Hamilton received the third prize and $100.

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 be a strong 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 to 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 Vice-Provost Turner and Benne Alder, Professor Alder's widow.

This year's recipient was Chris Jerdonek. Chris was a highly engaging and successful instructor in several undergraduate mathematics classes. The students' opinions and ratings regarding his teaching were unusually favorable. In one of his classes, the overall evaluation of Chris' teaching was a perfect 5.0 — all of the students regarded his teaching as excellent.

Alice Leung Prize

Alice Siu-Fun Leung received a Master's degree in Mathematics in 1975 from UC Davis. In her will, Ms. Leung generously provided an endowment to award annual scholarships 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 Dean Ko presented the award to two graduate students, Ching-Hsiao (Arthur) Cheng and Momar Dieng.

Arthur works in mathematical fluid dynamics under the guidance of Professor Shkoller. He is considered one of the best graduate students in the Department of Mathematics. According to a quote from one of recommendation letters: "I believe he works at the level of very good postdoc, even though he is only a third year graduate student. I expect his thesis to be outstanding when completed."

Momar studies random matrix theory and its applications. He recently obtained quite interesting results in random matrix theory generalizing the well known Tracy-Widom distribution. He already has a published paper devoted to some questions of noncommutative geometry; the results of this paper have already been used not only in mathematical papers, but also by physicists. Momar combines the excellent qualities of a young scholar with great potential for teaching and community leadership.

SPREADING THE GOOD NEWS

Naoki Saito gave the keynote lecture at the *Second International Conference on Computational Analysis* held at Vanderbilt University in May. He is also one of the principal organizers of the program, Multiscale Geometry and Analysis in High Dimensions, at IPAM, UCLA.

Motohico Mulase gave an invited address at the *2004 International Workshop in Algebraic Geometry and Physics* in Lisbon.

Anne Schilling was a plenary speaker at the international conference *Formal Power Series and Algebraic Combinatorics*.

Jesus DeLoera received the Alexander von Humboldt Fellowship for 2004-2005 as well as the Chancellor's Fellow Award for 2003-2008.

Roman Vershynin gave plenary lectures at *Mathematical Aspects of Learning Theory* in Barcelona and at the *IV International Hahn's Conference* in Chernivci, Ukraine. In addition, Professor Vershynin participated in the Research in Pairs program at the *Mathematisches Forschungsinstitut Oberwolfach*.

Mark Haskins gave a series of three lectures at the *Centro di Ricera Mathematia Ennio De Giorgi* at the *Scuola Normale Superiore* in Pisa.

Roland Freund's paper, *Structure-Preserving Reduced-Order Interconnect Macromodeling*, will receive the IEEE/ACM William J. McCalla ICCAD Best Paper Award this coming November.

Roger J-B Wets gave the year's keynote address at the *International Conference in Stochastic Optimization* held in Tucson.

Jessica Kuang, an Applied Math graduate student of Peter Chesson (Professor of Evolution & Ecology and GGAM member), presented a paper at the Ecological Society of America ESA 89th Annual Meeting in Portland, Oregon in August 2004.

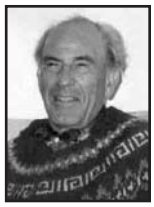
John Hunter gave a presentation at the XXI International Congress of Theoretical and Applied Mechanics in Warsaw, Poland in August 2004.

Elizabeth Kloginski, a second year VIGRE VRAP, has been selected to be a Project NExT Fellow for 2004-2005. Dr. Kloginski will attend several workshops that address all aspects of an academic career.

Craig Tracy gave the 2004 LAA Lecture at the University of Wisconsin and an invited address at the AMS Western Sectional meeting in Albuquerque.

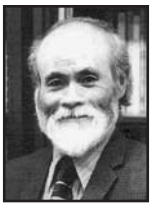
EMERITI UPDATE

Don Chakerian gave invited lectures at the Sonoma State and Sacramento State University Mathematics Departments. He worked for a week in June with Kurt Kreith's DMCAS project for high school teachers. His research in geometry continues, with three papers jointly authored with Murray Klamkin submitted over the past year. His article, *The Rule of False Position*, appeared in *Mathematical Adventures for Students and Amatuers* (MAA).



Sherman Stein's survey of equidissections of polygons appeared in *Mathematical Intelligencer* and an exposition of Archimedes' investigation of the equilibrium of floating bodies in the same MAA book that contains Chakerian's essay. A study of the gravity equation f(x+h) - f(x-h) = 2h f'(x) by algebra and analysis was accepted by the *Monthly*. In August he gave a luncheon lecture to the math instructors of the three community colleges of the Los Rios District.

Kurt Kreith continues his work with the California Mathematics Project and serves as instructor in the California State Summer School for Mathematics (COSMOS). He also taught freshman seminars, including a new offering called "Introduction to Cryptography." With apologies to Gabriel Garcia Marquez, he published a paper in the *Boletin de la Sociedad «Puig Adam»*, entitled *Algebra in the Time of Computers*.



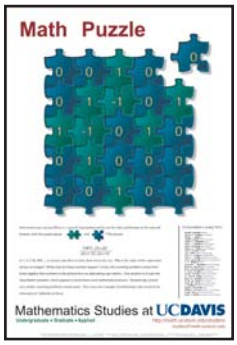
Takayuki Tamura continues his service as reviewer for Mathematical Reviews and the *Zentralblatt fuer Mathematik*. He also continues to publish poetry in Tanka monthly in the United States and Japan. He is writing a paper with the name *Mathematical Characterization of Sexagenerating Cycles*. This cycle has been used in oriental countries from ancient time but has not received mathematical attention.

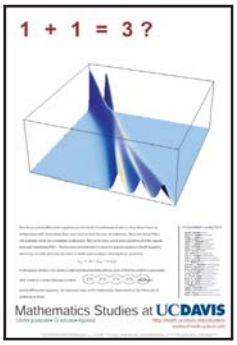
NEW MATH POSTERS

Two new posters were designed to show off the ever changing research interests of the department. *Vision* features the photos of 20 mathematics faculty eyes, averaged into one image.

The second poster, *Knots*, features a sequence of knots and their numerical relationships to each other.

These two new posters, in addition to the four posters shown below, designed previously by Greg Kuperberg, are available by request. Send email to posters@math.ucdavis.edu, or via postal mail to: Poster Request, Department of Mathematics, University of California, One Shields Avenue, Davis, CA 95616.



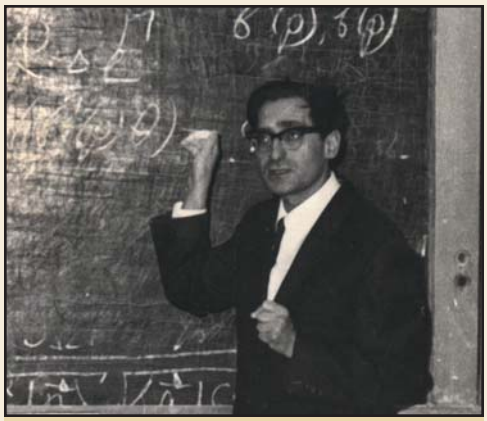


UC Davis-MSRI Conference on Mathematical Physics
in honor of
Prof. Albert S. Schwarz

What most people would have recognized as a seventieth birthday, Professor Albert Schwarz instead viewed as 50 years of research contributions to mathematics and theoretical physics. And indeed, what a tremendous 50 years those were. A list of highlights is easily compiled from the first slide of Professor Edward Witten's talk at the UC Davis - MSRI Conference on Mathematical Physics:

Instantons
Anomalies and Index Theorems
Ray-Singer Torsion & Toplogical Field Theories
Toroidal Strings & Noncommutative Yang-Mills
Supergeometry

This list represents a bridge between mathematics and physics that has dramatically enriched both fields.



Prof Schwarz has contributed 50 years to research.

Albert Schwarz with his wife, Lucy, Edward Witten, Fields Medalist, and John Schwarz.

This year, over 200 scientists from the world over, including five Fields Medalists, gathered at the Buehler Center near the shady glen of the UC Davis Arboretum to celebrate Albert's achievements. Participants heard many inspiring talks over four sunny May days with topics ranging from the "landscape" of String Theory solutions to Connes-fusion! Albert himself could not resist regaling the audience with his latest exploits in search of a solution to Supersymmetric Yang-Mills theory.

The conference emphasized our good fortune at Davis to have Albert as one of our most active department members.

Motohico Mulase also deserves sustained applause for organizing a conference that ran seamlessly. Since then, participants have been overheard relating the story of the Davis conference featuring a hike along Putah Creek to a banquet at Motohico's home.

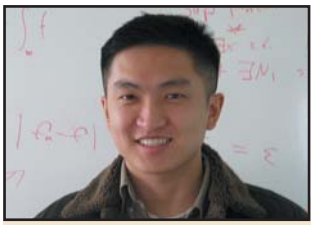
We all wish Albert many years of future successful research at UC Davis!

STAFF NEWS

Jill Allard

Catie Bull

Diana Sloan



Leng Siakkhasone

Academic Personnel
Pam Tise

Business Services
Jill Allard, Richard Edmiston, Jessica Potts

Department Manager
Tracy Ligtenberg

Student Services
Catherine Bull, Celia Davis, Nancy Davis, Diana Sloan

Technical Services
Zach Johnson, Leng Siakkhasone, Marianne Waage

The 2003-04 year brought changes and new faces to the staff arena as well. Staff departures for greener pastures or just different pastures were as follows: long-time employee Bill Broadley took a promotional opportunity with the new unit Computational Science & Engineering; and 1-year employee Brandy Skipton left the university to relocate to the Bay Area. Their departures allowed us to bring talented new staff on board: Leng Siakkhasone joined the computer systems administrative team; Diana Sloan and Catie Bull joined the student services group; and Jill Allard became our third employee in business services. Overall, our staff numbers have grown from 11 to 12, corresponding to the Department's continued growth in faculty, student enrollment, and grant administration. Every one of them is integral to creating our fine team of staff who work so cohesively and productively together to achieve the goals of the Department!

Sadly, on July 8th, 2004, there was a passing of a former staff employee, John Gehrmann. John first joined UC Davis in 1970 (as a researcher — he had a Ph.D. in Pharmacology) and came to the Mathematics Department in 1990 and retired from here in June of 2002. He was interested in everything, read extensively, was a sharp debater and had an incredible memory for the smallest detail. Entering into discussion with John, one was guaranteed to learn several new pieces of information, each and every time. It is with fond memories that we remember John and his contributions to the Department.

LIFE AFTER DAVIS

By Parsa Bakhtary **B.S. 2001**

Parsa Bakhtary completed his undergraduate work in Mathematics at UC Davis.

Bakhtary is currently a graduate student at Purdue University, shown above, in Indiana.

My academic career at UC Davis was originally geared towards the study of biology and medicine, hoping to follow my father's footsteps as a pediatrician. But halfway through my second year, I declared my major to be mathematics and never looked back. I'm currently in the math department at Purdue University in my third year of graduate school, working towards a Ph.D. and beginning a lifelong journey of mathematical research.

Upon arriving at Purdue, the incoming students were advised a regimen of preparatory classes to help prepare them for graduate level courses and the tremendous rigor involved. However, thanks to my algebra background from Davis, I sidestepped two such courses, proceeded immediately to the respective qualifier courses and passed two of the four required qualifying exams after one semester. This shaved off a full year from my Ph.D. program. I am one of two Americans from my incoming class to pass all four qualifier exams in two semesters without failing a single one, and I owe a great deal of this feat to my undergraduate education at Davis.

"Though our intuition is born as early as grade school, we first sincerely test and refine it as undergraduates."

I currently study algebraic geometry, a beautiful interplay of the algebra that Greg Kuperberg and Jesus DeLoera taught me and the geometry which Motohico Mulase was so eager to explain. The subject began its long history with the study of roots of polynomials, which Alexander Soshnikov and I reviewed in the context of Galois theory, and is now firmly rooted in the complicated though useful technical language of schemes, requiring a staggering level of abstraction. For me, and I think for most mathematicians, my mathematical intuition and knowledge of the fundamentals of higher mathematics were established in undergraduate school. Though our intuition is born as early as grade school, we first sincerely test and refine it as undergraduates. Though we've worked on the fundamentals of algebra and calculus throughout high school, most of us develop our ability to deal with abstraction as nineteen and twenty year-olds. For me this was all at Davis under the guidance of several great professors and a coherent program. I certainly hope UC Davis continues to produce mathematicians seeking graduate education with research aspirations.

By Brons M. Larson

...continued from page 4

a viral sensor capable of detecting a couple of copies of dangerous virions, like smallpox, and classifying them in less than one minute. What makes our approaches stand out above many others is our ability to rigorously model the performance of our sensors prior to them being built and deployed.

At my graduation ceremony from UC Davis, Chancellor Vanderhoff talked about a threat facing the United States and the world almost a century ago: starvation. He told of the men and woman who answered the call and began to tackle this problem. Many of them left their chosen disciplines to focus on agricultural research. This eventually led to the establishment of the UC Davis campus. In a similar fashion, I have chosen to try to define the problems that face our nation and world today and learn any discipline needed to solve the problem. Consequently

"...I have chosen to try to define the problems that face our nation and world today..."

Larson currently works at the SAIC facility located in San Diego, pictured above.

I wear many different hats at SAIC (biology, chemistry, optics, radar, communications, sensor design and performance modeling, management, signal and image processing, etc.). Luckily mathematics is always a key ingredient. And I have the UC Davis Mathematics Department to thank for much of my success.

LIFE AFTER DAVIS

By Michael B. Scott **Ph.D. 2002**

Professor Scott hopes to continue helping other teachers build their mathematical knowledge.

I entered the Ph.D. program at Davis in 1997, and about a year later Professor Blake Temple became my advisor. My research area is in the mathematical theory of shock waves, in particular shock wave propagation in the Einstein equations of general relativity. My research partnership with Professor Temple still continues.

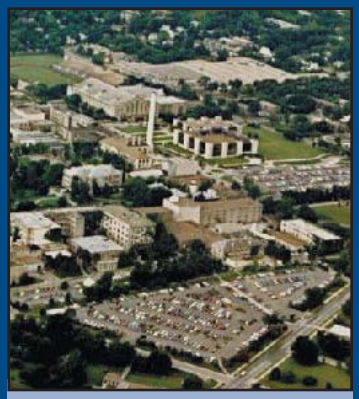
During my last year at Davis my wife elected to attend veterinary school at Kansas State University. Fortunately, I was hired as a post-doctoral instructor in the Mathematics Department at Kansas State. My duties at Kansas State were more than teaching and mathematics research. The majority of the funding for my position originated from a NSF Science, Technology, Engineering, and Mathematics Teacher Preparation (STEMTP) grant. The STEMTP grant, titled "KSU – Mathematics Teacher Preparation Partnership," set out to recruit, prepare, and retain future K–12 mathematics teachers. The partnership consisted of the Kansas State Mathematics Department and College of Education along with various school districts across the state of Kansas. My work on the project involved developing and testing an online gateway homework/exam system for required mathematics courses for pre-service elementary school teachers. I also participated in teaching and planning in-service teacher institutes during the summers and other times throughout the year.

"I am also pleased that I will be closer to Davis, so I can more easily continue my joint research with Professor Temple."

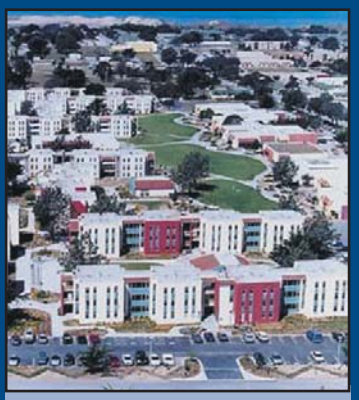
A consequence of my position at Kansas State is that I became more interested in mathematics education. I participated in the Mathematics Education Research Group at Kansas State evaluating what particular data generated by online homework systems correlate to student learning and understanding in mathematics courses. The focus of the evaluation is to develop a framework for how best to use web-based technology to facilitate learning mathematics.

In the spring semester of 2005 I will be starting a tenure-track position in the Department of Mathematics and Statistics at California State University, Monterey Bay (CSUMB). I was able to defer a semester, from the fall of 2004, to stay with my wife in Kansas as long as possible. She graduates from veterinary school in May of 2005. I feel the position at CSUMB is a perfect fit for me. The Department is small, but growing, and has only recently offered a B.S. degree in Mathematics. Jeff Groah, who also received his Ph.D. from Davis and had Professor Temple as his advisor, is an Assistant Professor of Mathematics at CSUMB. I feel fortunate to have a future colleague who works in the same mathematical research area as I do, which is something I missed while at Kansas State. I will also continue developing online homework by implementing a web-based system similar to the one at Kansas State. Furthermore, the CSUMB Mathematics Department has a partnership working with its local school districts analogous to the partnership at Kansas State. I look forward to the opportunities to work with both pre-service and in-service teachers in helping build their mathematical content knowledge. I am thrilled to be moving back to California, where I was raised. I am also pleased that I will be closer to Davis, so I can more easily continue my joint research with Professor Temple.

I want to acknowledge the faculty, staff, and my fellow graduate students in the Department for the wonderful opportunities and resources I've been given. I loved the great topics courses including offerings from Professors Albert Fannjiang, Craig Tracy, and William Thurston. I also enjoyed working with the Department as President of the Galois Group. I want give a special thanks to Professor John Hunter for giving me the opportunity to come to Davis when he was the Department Vice-Chair for Graduate Affairs, and for being a member of my dissertation committee. Lastly, I want to say that working with Professor Temple was and continues to be a rewarding experience. I am indebted not only for the financial and mathematical support he provided to pursue my education and research while at Davis, but also for the continuing mentorship and support after I received my degree.



Scott was hired as a post doctoral instructor in Mathematics at Kansas State after graduation.



Professor Scott recently accepted a position at CSU Monterey Bay in Southern California.

1015 Department of Mathematics
University of California
One Shields Avenue
Davis, CA 95616-8633

Address Service Requested

DONATION FORM

Your gift is welcome! The Department of Mathematics wishes to thank all alumni, parents, students, faculty, staff, and friends who support the Department.

You may return this form to: Dept Manager, Department of Mathematics, University of California, One Shields Avenue, Davis, CA 95616

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signature and date: _____

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Enclosed is my gift of $1000 $500 $250 $100 $50 Other $_____

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ALUMNI NEWS UPDATE FORM

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.

You can fill out the form on our website at:
http://www.math.ucdavis.edu/research/newsletter/

Or send mail to:

Department Manager
Department of Mathematics
University of California
One Shields Avenue
Davis, CA 95616

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

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