

MESSAGE FROM THE CHAIR

By: John Hunter, Chair of the Math Department

The close of the 2002-03 academic year brought with it a number of transitions in our faculty and university administration. Long-time professors Allan Edelson and Carlos Borges retired as of June 30th, and Peter Rock, Dean of Mathematical & Physical Sciences for eight years, stepped aside and returned to the professorial ranks. I am sorry to write that Professor Emeritus Dallas Banks passed away in June 2003. He joined the department in 1959 and retired in 1991. His research concerned eigenvalue problems and differential equations, and he was instrumental in starting the Applied Mathematics program at UC Davis.

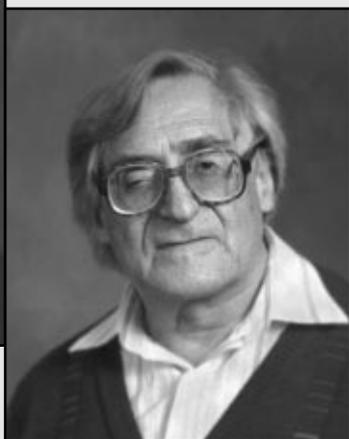
Department members continue to shine in the areas of national and campus awards and in securing extramural funding. The new academic and fiscal

year brought in 14 new grants totaling \$2,501,840. The new grants represent a third of our total number of grants and a quarter of our total grant dollars. To name a few of the new projects: Professor Alex Mogilner was awarded \$1.2M by the National Institutes of Health for research on cell division; Professor Gerry Puckett was awarded \$535K by the Department of Energy for research on computational methods for interface problems; and Professor Joel Hass (and other co-PIs in the department) renewed the department's Graduate Assistance in Areas of National Need grant from the Department of Education, which provides \$614K for fellowship support of graduate students. The department's highly successful and active VIGRE program, funded by a

...continued on page 2

CONTENTS

Awards & Research News	3, 7
New Faculty & VRAPs	4-5
Undergraduate Program News	6-7
Graduate Program News	8
Life After Davis	9, 11
Emeriti Update	10
Staff News	10
Alumni News	11



U.C. Davis Conference on Mathematical Physics

Mathematics and Physics, Helping One Another

May 13 - May 16, 2004

In honor of Professor Albert S. Schwarz, celebrating his 50 years of research contribution to mathematics and theoretical physics.

The conference will begin Thursday afternoon, May 13 and will conclude Sunday afternoon, May 16, 2004.

For more information, visit our website at:
<http://www.math.ucdavis.edu/research/mathphyscon/>

MESSAGE FROM THE CHAIR

...continued from page 1

grant from the National Science Foundation with Professor Bruno Nachtergaele as the PI, began last year and continues this year.

Several department members won awards last year recognizing their efforts in research or in teaching: Professor Abigail Thompson won the 2003 Ruth Lyttle Satter Prize for outstanding research accomplishments by women in mathematics; Visiting Research Assistant Professor and VIGRE Fellow Jared Tanner won the Leslie Fox Prize for outstanding young researchers in numerical analysis; Professor Jesus DeLoera was selected as a 2003-04 UC Davis Chancellor's Fellow; Chris Dugaw was selected to be a Faculty Fellow; and James Peirce received an Outstanding Graduate Student Teaching Award for the UC Davis campus. In other news, Albert Fannjiang was promoted to Professor, and Craig Tracy was advanced to Professor, Above Scale.

Our undergraduate enrollments and graduate student numbers are at record levels. Last year, our cumulative classroom enrollment was 15,921 students, so the department is teaching over 5,000 students per quarter. We have 365 undergraduate mathematics majors

(one for every day of the year), and have introduced two new majors, one in Applied Mathematics and the other in Mathematical and Scientific Computation. Our three graduate programs have a total enrollment of 98 students. The graduate students are very active in the department, sponsoring student-run seminars and department teas. We continue to be highly successful in recruiting our top applicants, partly due to the quality of our faculty and partly due to the involvement of our graduate students.

One outcome of this success is the inevitable sign of growing pains—not enough space. This has, unfortunately, forced us to rotate space among less frequent users, such as visitors and emeriti faculty. We are anxiously awaiting the additional space that will come with the completion of the new Mathematical Sciences Building, scheduled for Summer 2005. To date, plans for the new building have been completed and the \$21M project will be going out to bid in November 2003, with ground being broken in January 2004 (we hope!). In the meantime, the Old Hog Barn, which stands on the site of the Mathematical Sciences Building and counts as a historical building because of its age, will be moved to a new site

near the Silo.

The new academic year welcomes a new Dean, Winston Ko, who is a Professor and former Chair of the Department of Physics. We welcome four new faculty: Roman Vershynin, an Assistant Professor with interests in analysis; Eric Rains, a Professor specializing in combinatorics; Michael Kapovich, a Professor, and Jennifer Schultens, an Associate Professor, both with expertise in geometry and topology. In addition, we welcome two new Visiting Research Assistant Professors: Elizabeth Klodginski, a VIGRE Fellow who works in topology, and Jianfeng Liang, who works in partial differential equations. It is exciting to welcome such excellent new faculty to the department after all the hard work of recruitment last year. With the ongoing growth of the campus, and retirements, we are continuing to recruit faculty, and in 2003-04 we hope to fill at least three tenure track/tenured positions and several Visiting Research Assistant Professor positions.

This year marks my third and final year as department chair. I expect this academic year to be as interesting as the previous ones, with our mathematics faculty and students creating news that makes the department proud.

SPREADING THE GOOD NEWS

The American Society for Information Science & Technology included Professors William Thurston and Roger Wets in their list of Highly Cited Researchers based on the important scientific developments of the last two decades; the list identifies about 200 researchers worldwide from the Mathematical Sciences community.

Professor Motohico Mulase gave plenary or major invited addresses at the International Workshop on Integrable Systems (Guanajuato, Mexico), at MSRI (Berkeley) and the Yukawa Institute of Theoretical Physics (Kyoto) conferences on Random Matrix Theory and Its Applications, and at the Mathematical Society of Japan National Meeting. He also occupied Visiting Professor positions at Humboldt University (Berlin) and

Nagoya University.

Professor Jesus De Loera gave plenary addresses to the International School in Computational Commutative Algebra (Cadiz, Spain) and at this year's Joint AMS-SIAM Summer Conference (Snow Bird, Utah). This is also where Professor Steve Shkoller gave a plenary lecture at the SIAM meeting on Applications of Dynamical Systems.

Professor Jared Tanner, in addition to collecting his Fox Prize at Cambridge (U.K.), visited the Numerical Harmonic Analysis Group in Vienna (Austria).

Professor Anne Schilling was a Humboldt Fellow at the Max-Planck-Institut for Mathematics in Bonn and the University of Wuppertal, she organized the Bay Area Discrete Mathematics Day (2003) and gave invited lectures at

meetings in Gainesville (Florida) and Linköping (Sweden).

Professor Arthur Krener spent the spring quarter on sabbatical leave at the Mittag-Leffler Institute (Stockholm, Sweden) during its Program on Mathematical Control and Systems Theory. He will continue his sabbatical in the Fall Quarter at the Department of Mathematics of the Naval Postgraduate School (Monterey, CA) and will then move to the Statistical and Applied Mathematical Sciences Institute (Research Triangle Park, N.C.) as a University Fellow for the Winter and Spring quarters.

Professor Thomas Strohmmer was invited to give a series of lectures at University of Aalborg (Denmark). Also, his book on "Gabor Analysis," co-edited with H.G. Feichtinger, was published this year.



CHRIS DUGAW SELECTED AS FACULTY FELLOW

Chris Dugaw has been selected to be a UC Davis Faculty Fellow for 2003-05. A Faculty Fellow has a dual appointment with both research and teaching obligations. Appointees are mentored and given time to hone their research and teaching skills for an eventual tenure-track position. With Chris Dugaw's strong background in research and fine performance as a teacher, he was an excellent choice for this appointment.

Chris' research is in mathematical ecology. He completed his Ph.D. in Applied Mathematics in June 2003; his thesis was on the modeling of parasitic nematodes and their insect hosts. This work is mathematically sophisticated and is carried out in close collaboration with experimental ecologists. Chris plans to continue and further develop this work as a UC Faculty Fellow.

Given Chris' background in biology and his skills as an instructor, we look forward to his contributions to the Department's teaching mission. With our very heavy undergraduate teaching workload, including a large number of students planning to go into the life sciences, he will add particular value to the classroom.

Congratulations Chris, we are delighted to have you on board as a UC Davis Faculty Fellow!

Kudos!

LESLIE FOX PRIZE AWARDED TO JARED TANNER

The Eleventh Leslie Fox Prize meeting was held on June 20, 2003, at the Isaac Newton Institute of Mathematical Sciences at Cambridge. Jared Tanner, a VIGRE Visiting Research Assistant Professor in the Department of Mathematics, was the selected recipient for the first prize. The entries were considered by an Adjudicating Committee (selected by the Editorial Board of the *IMA Journal of Numerical Analysis*); particular attention was given to the originality and quality of each paper, and to the suitability of the material for a 40 minute talk to a general audience of numerical analysts. Jared's paper, "Adaptive mollifiers for high resolution recovery of piecewise smooth data from its spectral information" was chosen from the six finalists.

Leslie Fox was the first Professor of Numerical Analysis at Oxford University. The Prize was established in his name as a lasting memorial to his influence on the subject of numerical analysis. Its aim is to give encouragement and recognition to young research workers.



JAMES PEIRCE RECIPIENT OF 2003 OUTSTANDING GRADUATE STUDENT TEACHING AWARD

Chancellor Larry Vanderhoef presented James Peirce with the 2003 Outstanding Graduate Student Teaching Award in an awards ceremony on June 3, 2003. This award, which is sponsored by the Academic Senate and the Teaching Resources Center, recognizes excellence in teaching by graduate students on the UC Davis campus.

James was a natural selection for this recognition since his evaluations routinely reflect his skills, both as a Teaching Assistant and as an Associate Instructor. A versatile instructor, he ably handles a broad range of challenges. Receiving this award is only the latest of honors bestowed upon this gifted teacher and leader—and we have no doubt the future will bring even more! Well done, James!

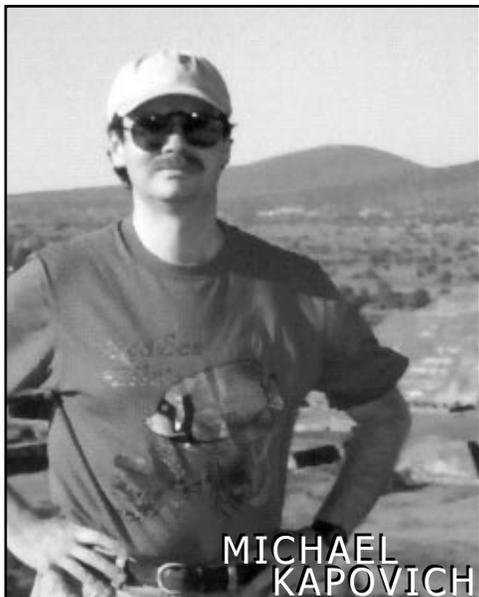
RUTH LYTTLE SATTER PRIZE IN MATHEMATICS AWARDED TO PROFESSOR ABIGAIL THOMPSON

The American Mathematical Society recognized Abigail Thompson on January 16, 2003, at their annual meetings held in Providence, Rhode Island. She was awarded the Satter Prize for her outstanding work in 3-dimensional topology, particularly for her papers "Thin position and the recognition problem for S^3 " (*Mathematical Research Letters* 1 (1994)), and "Thin position and bridge number for knots in the 3-sphere" (*Topology* 36 (1997)). As a consequence of Abby's work, the concept of thin position, first introduced by Gabai for the study of knots in the 3-sphere,

has emerged as a major tool for attacking some of the fundamental problems in the study of 3-manifolds.

The Satter Prize was established in 1990 using funds donated by Joan S. Birman in memory of her sister, Ruth Lyttle Satter. Professor Birman requested that the prize be established to honor her sister's commitment to research and to encourage women in science. The \$5,000 prize is awarded every two years to recognize an outstanding contribution to mathematics research by a woman in the previous five years.

New FACULTY



Michael (Misha) Kapovich came to our Department from the University of Utah, where he has been since 1992. He received his undergraduate degree at the Novosibirsk State University in 1985 and his Ph.D. in 1988 at the Institute of Mathematics in Novosibirsk (Russia).

Since then he has been at the Institute for Applied Mathematics in Khabarovsk, University of Maryland, MSRI in Berkeley, IHES in France, Max Plank Institute and Bonn University in Germany, and Bar Ilan University in Israel, among others. Misha was born in Khabarovsk, USSR. Khabarovsk is about 10 miles from the Chinese border and about a 1 hour flight from Japan.

Misha works in the areas of low dimensional geometry and topology, and geometric group theory. His book "Hyperbolic Manifolds and Discrete Groups" was recently published by Birkhauser. His other research interests include spaces of nonpositive curvature, representation varieties and configuration spaces of elementary geometric objects (e.g. mechanical linkages).

His recent work on algebraic groups and their representations involves a generalization of the following 19th century problem: Given the sets of eigenvalues of symmetric matrices A and B , what can be said about the eigenvalues of $A+B$?

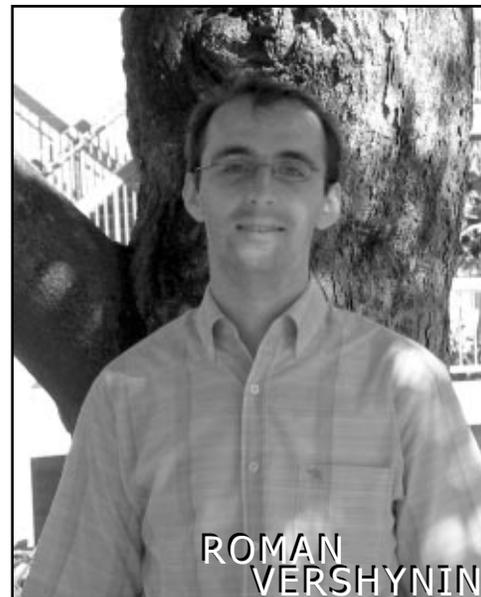


Eric Rains comes to Davis from New Jersey where he was employed as a research mathematician. While in industry, his research was focused in three main areas: quantum information theory; self-dual codes and lattices; and random matrices. Eric received his Ph.D. from Harvard in 1995, working since then for the Center for Communications Research in Princeton, as well as AT&T's Shannon Laboratory. Most recently, he was a visiting lecturer during fall 2002 at the California Institute of Technology. These experiences, as well as his interest in the work of our faculty at U.C. Davis, has led him to return to a career in academia.

Eric's current research grew out of his work on combinatorics of random matrices, having since mutated into a study of multivariate hypergeometric functions, orthogonal polynomials, and Hecke algebras. This year, he will be teaching courses in combinatorics and discrete mathematics.

Eric is a former member of the MIT Assassins' Guild, and for several years has flown to Chicago (in February) to help run the art show at Capricon. From this, we deduce that his personal interests include role-playing games and science fiction (books and television); the art thing is clearly a red herring.

We're very pleased to have Professor Eric Rains join the Department.



Roman Vershynin was born in Ukraine in 1974 and graduated with a M.S. degree in 1996 from Kharkov National University. He got a Ph.D. from University of Missouri, Columbia in 2000, then spent a year as a postdoctoral fellow at the Weizmann Institute of Science in Israel, and afterwards two years as a Pacific Institute of Mathematics postdoctoral fellow at the University of Alberta, Canada.

Dr. Vershynin works on a range of problems in asymptotics convex geometry (in R^n with very large n), probability, statistical learning theory, extremal combinatorics, operator theory, also touching on some harmonic analysis and applications. He already has fifteen research papers that are published or accepted for publication in prestigious mathematical journals including *Inventiones Mathematicae*, *Geometric and Functional Analysis*, *Israel Journal of Mathematics*. Perhaps his most fascinating paper to date is "Entropy and the Combinatorial Dimension" published in *Inventiones* this year. In this paper Dr. Vershynin (together with S. Mendelson) solved a famous Talagrand's entropy problem.

Dr. Vershynin's interests also include photography, choir singing and spending time with his family. He lives in Davis with his wife, Lilia who is a Ph.D. student at the University of Alberta, Canada, and their three month baby son Ivan.

New VISITING RESEARCH ASSISTANT PROFESSORS



JENNIFER
SCHULTENS

Jennifer Schultens is a topologist who joins the Department as an Associate Professor, coming from Emory University. She got her Ph.D. at U.C. Santa Barbara in 1993. Subsequent to that she was at Emory University, except for a two year stay at UC Berkeley where she held an NSF Postdoctoral Fellowship from 1995-97.

Jennifer works in the area of 3-dimensional topology, especially the structures on 3-manifolds known as Heegaard splittings. Jennifer has already had two Ph.D. students, and brings one more student with her from Emory. We look forward to having her join the group in geometric topology.

Her personal activities include hiking, yoga, learning and forgetting foreign languages.



ELIZABETH
KLODGINSKI

Dr. **Elizabeth A. Klodginski** received her Ph.D. in Mathematics from the University of Michigan in August 2003. While at Michigan she was a Regents Fellow and VIGRE Graduate Fellow.

Here at U.C. Davis, Elizabeth will be joining our other VIGRE Visiting Research Assistant Professors while pursuing her research interests in geometric structures on 3-manifolds and their connections to immersed surfaces and geometric group theory. Professor Joel Hass will be serving as her mentor.

In her leisure time, she enjoys golfing, yoga, and reading modern fiction.



JIANFENG
LIANG

Dr. **Jianfeng Liang** received his Ph.D. in Mathematics in 2002 from the University of Michigan under the supervision of Jeffrey Rauch. After graduation, he spent a year as a visiting assistant professor at Northwestern University. His research interests are nonlinear PDEs and wave propagation.

With his faculty mentor Professor Fannjiang, Jianfeng is now working on linear/nonlinear Schrodinger equation with random potentials.

The most interesting personal information at this point is that his wife, Guangyu, had just given birth to their first daughter, Cindy, one month after they moved to Davis. They enjoy their new life in Davis very much.

FALL 2003 VISITORS

Yurii Lyubarskii received his Ph.D. degree in Mathematics from Institute for Low Temperatures, Acad. of Sci. Ukraine in 1974 and his Doctor degree (the second degree in the former SU) from St. Petersburg branch of the Steklov Mathematical Institute in 1991. He had long-term visiting positions in several places, including University of Amsterdam,

Weizmann Institute, University of Connecticut, and others. Since 1996 Yurii is a Professor at the Mathematical Department of Norwegian University of Science and Technology, Norway.

Yurii's research interests are related to complex and harmonic analysis, singular operators as well as to applications to signal analysis. While in Davis, Yurii is collaborating with Thomas Strohmmer.

Yurii came to Davis with his wife, Eugenia Malinnikova. Eugenia received

her Ph.D. in Mathematics from St. Petersburg State University, Russia, in 1999. Since then, she has been a post-doc at Norwegian University of Science and Technology, Trondheim, Norway. In 2000 she spent a semester at University of Missouri, Columbia. Eugenia's research areas are potential theory and harmonic analysis. Her favorite object is harmonic differential form.

Yurii and Eugenia spend most of their spare-time with their two small daughters Anna and Aleksandra.

News from the UNDERGRADUATE PROGRAM

By:

Janko Gravner, Vice Chair for Undergraduate Matters

To satisfy a growing demand from students and employers for training in the applied areas of mathematics, and to reflect our faculty's increasing orientation towards research motivated by problems in applied sciences, our department has proposed two new majors. This proposal, for majors in Applied Mathematics and in Mathematical and Scientific Computation, has been submitted more than two years ago by Professor Jim Diederich, then the Undergraduate Vice Chair. The long and arduous process of approval, which enlisted participation from many of our own faculty, as well as those from other departments, finally came to fruition in March 2003. The two new majors were approved, and students are able to begin transferring to them starting in the fall quarter of the 2003/04 academic year. We view this as a very important development for

us, as applied math training is a good preparation for a career in almost any area of modern technology, while increased use of the computer to study different problems (e.g., in genetics or high-energy physics) creates more and more demand for training in mathematics and computation.

Among other issues, the Undergraduate Program Committee (UPC) continued its comprehensive review of the department's undergraduate program, with a review of all syllabi and assigned textbooks.

The Department's Annual Awards Ceremony was held on June 5, 2003. This is the occasion for the Department to honor its best undergraduate students and its best teachers among the faculty and graduate students. Below is the list of this year's recipients.

2003 ANNUAL AWARDS CEREMONY

THE 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 Peter Rock, was Erin Cuarenta.

Erin began her teaching career as an undergraduate, by working with underprivileged students as a mentor and tutor. She entered our MAT program in 2001, and has since worked as a TA, taught mathematics at elementary and high school levels, provided tutor support and helped with high school curricula. Erin receives high praise from her supervisors, who praise her commitment to excellence in teaching and her leadership.



ERIN CUARENTA LECH WOLOWSKI

THE ALICE LEUNG PRIZE

Alice Siu-Fun Leung received a Master's degree in Mathematics in 1975 from UC Davis and worked as an accountant in Hong Kong. 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 the award was presented by Dean Peter Rock and made to Lech Wolowski.

Judging from the letters from the faculty, Lech has the right stuff to become an excellent research mathematician. He has garnered a reputation of deep and wide knowledge of mathematics and is clearly one of the top few students in this department. One of the letters states that Lech's research work and maturity is on the level of "the best students in the top math graduate programs in the world."



SCOTT RITCHIE JANKO GRAVNER

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 Janko Gravner.

Janko's teaching evaluations all point out to his entertaining and active lectures, and to his students' realization that they had worked hard and learned a lot. The consensus is that he is an excellent teacher.



KONSTANTIN CHUDNOVSKY,
PETER HUGGINS AND
LISA WHEELWRIGHT

AWARD OF PRIZES IN THE SPRING MATHEMATICS CONTEST

Each year some very talented students participate in the Spring Mathematics contest, which is open to all undergraduates. Peter Huggins and Lisa Wheelwright shared this year's first prize and received \$400 each, while the second prize, in the amount of \$200, went to Konstantin Chudnovsky.

REACHING FOR THE STARS...

...and beyond

Professor Blake Temple and collaborator Professor Joe Smoller of the University of Michigan are “shocking” the cosmological and mathematical communities. Their theory, derived from Einstein’s equations for relativity, suggests that beyond our universe “is a universe we are expanding into, a much bigger place.”

In the standard Big Bang theory, the universe is assumed to go on expanding infinitely in every direction and eventually to reach infinite mass. But they point out that a basic principle of physics is that nothing is infinite, and every explosion must come with a shock wave.

The model they propose that accounts for the shock wave which is published in the Proceedings of the National Academy of Sciences, leads them to conclude the universe itself may exist inside a “reversed” black hole. Instead of sucking everything into oblivion, the “white hole” is ejecting everything outward.

Blake said future papers will help reveal when our expanding universe will contact the wave and emerge from the edges of the white hole. He adds, however, “what set the explosion in motion is still a complete mystery.”

...and the nitty gritty

Professor Alex Mogilner together with Jon Scholey, Professor of Cell Biology, organized the Laboratory of Cell and Computational Biology at the Center for Genetics and Development. They were awarded more than a million dollars last year by the National Institutes of Health (NIH) to support combined experimental and theoretical studies on cell division. The lab studies mitosis, the process by which chromosomes are segregated to daughter cells before the mother cell divides.

A current challenge is to understand how the activities of the individual components are coordinated to produce a precision machine capable of segregating chromosomes with the fidelity observed in cells. The lab addresses this challenge by using mathematical modeling and theoretical biophysics. Mathematical modeling alone cannot solve the problem, of course, so the lab does a lot of genetics, biochemistry and microscopy also.

Besides exciting research, some of it already published in leading journals including Nature, the significance of the lab is that it educates a new generation of interdisciplinary researchers who will give biology a new, mathematical dimension in the coming decades. More about cell division and related activity of the lab can be found on Alex’s homepage: <http://www.math.ucdavis.edu/~mogilner>.

HENRY L. ALDER PRIZE FOR EXCELLENCE IN TEACHING

Prof. Henry Alder was a member of our Department from 1948 to 1994, which includes his service as a Chair from 1992 to 1994. Even after his retirement, Prof. Alder continued to teach and to be a strong advocate for quality teaching. Sadly, Prof. Alder died on November 6, 2002. The prize given in his name is but a very small part of his legacy.

In 1999, Prof. Alder established an endowment known as The Henry L. Alder Graduate Fellowship in Mathematics. This Fund provides support to mathematics graduate students at UC Davis through the Henry L. Alder Prize for Excellence in Teaching, given each year to the graduate student 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, Prof. Alder’s widow.

This year’s recipient was Shawna Bynum.

Shawna has achieved a remarkable teaching record since she started teaching at UC Davis. She distinguishes herself by very high student evaluations, which last year ranged from 3.9 to 4.8 (out of 5), while her students’ comments give her high praise for excellence of her lectures, and her accessibility to students and devotion to teaching. Her students’ enthusiastic comments demonstrate that Shawna is a brilliant teacher.



SHAWNA BYNUM
WITH BENNE ALDER
AND PAT TURNER



JAMES PARMENTER AND
JOSEPHINE YU

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.

James Parmenter had an upper division math GPA of 3.97, but his involvement with our program goes far beyond his course work. For example, he has been an undergraduate assistant in our Emerging Scholars Program (ESP) lab for three years. We are very happy that James is joining our department as a graduate student this year.

Josephine Yu had an upper division math GPA 4.0, and many instructors consider her the very best student they have ever had. For the past three years, she collaborated with Prof. Mulase, doing research on matrix integrals and group representations. In a truly outstanding achievement, she coauthored two very substantial and elegant papers with Prof. Mulase. In recognition of her excellent work, she received the runner-up award for the 2003 Alice T. Schafer Prize from the Association of Women in Mathematics. Finally, Josephine has been very active in this Department’s life. She was the President of the Math Club, our Peer Advisor, and a Tutor at the Learning Skills Center. This year, Josephine is attending U.C. Berkeley as a graduate student in Mathematics.

News from the GRADUATE PROGRAMS

By:

Joel Hass, Vice Chair for Graduate Affairs
Bruno Nachtergaele, Chair, Graduate Group in Applied Mathematics
Evelyn Silvia, Director, Master of Arts in Teaching (MAT) Mathematics Program

It was another successful year for the Ph.D., MA, M.S. and M.A.T. graduate programs in Mathematics and Applied Mathematics. The level of activity around the graduate programs 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 were a big success in their first year and are now being repeated. Students arrive on campus three weeks early to participate in review and problem sessions to help prepare for Fall courses and exams. As the year begins, the MAT anticipates year three of its revitalized program, which again will have a large group Socratic teaching component based at Markham Elementary School in Vacaville.

The new year welcomes 17 new students into the Mathematics program, along with 8 to the MAT and 7 coming

to the GGAM program. Altogether we now have about 100 graduate students, and the number of applicants we attract continues to grow. This year Mathematics had 110 applicants and the GGAM had 68. This can be compared to 1996, when each program had 29 applicants. Given the increase in applications and the increase in resources such as Fellowships and TAs, we are able to grow the size of the programs even as we are becoming more selective. One major constraint is pressure on space; hence we are looking forward to having more room in the new Mathematical Sciences Building.

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 graduate coordinator Celia Davis with your news:

davis@math.ucdavis.edu.

JOIN US IN CONGRATULATING THE DEGREE RECIPIENTS FOR 2002-2003

Justin Abbott, Ph.D., Mathematics

Adviser: Prof. Bruno Nachtergaele
Dissertation: Low Temperature Results for the Heisenberg XXZ and XY Models
Current Position: Actuary, CIGNA

Katherine Allard, M.A.T., Mathematics

Adviser: Prof. Evelyn Silvia
Current Position: Mathematics Teacher, Mira Costa High School

Alexander Barchecheat, Ph.D., Mathematics

Adviser: Prof. Joel Hass
Dissertation: Minimal Triangulations of 3-Manifolds
Current Position: NSF VIGRE Postdoctoral Fellowship, Tulane University

Shawna Bynum, M.A.T., Mathematics

Adviser: Prof. Evelyn Silvia
Current Position: Assistant Professor, Napa Valley College

Chris Dugaw, Ph.D., Applied Mathematics

Adviser: Prof. Alan Hastings, Dept. of Environmental Science & Policy
Dissertation: Dynamics of a Soil-Dwelling Parasite and its Insect Host
Current Position: Faculty Fellow Researcher, UC Davis Math Dept

Jeremy Dybdahl, M.A.T., Mathematics

Adviser: Prof. Evelyn Silvia
Current Position: Mathematics Teacher, Scotts Valley High School

Benjamin Etgen, M.A.T., Mathematics

Adviser: Prof. Evelyn Silvia
Current Position: Lecturer, American River College

Tigran Ishkhanov, Ph.D., Mathematics

Adviser: Prof. Dmitry Fuchs
Dissertation: Legendrian knots: equivalence of normal rulings and augmentations of Chekanov-Eliashberg algebra
Current Position: Teacher, Master Chess Academy

Wenlong Jin, Ph.D., Applied Mathematics

Adviser: Prof. Michael Zhang, Dept. of Civil & Environmental Engineering
Dissertation: Kinematic wave models of network vehicular traffic
Current Position: Postdoctoral, UC Irvine

Dongseok Kim, Ph.D., Mathematics

Adviser: Prof. Greg Kuperberg
Dissertation: Graphical calculus on representations of quantum Lie algebras

Li Lei, M.S., Applied Mathematics

Adviser: Prof. Bruno Nachtergaele
Dissertation: The low energy spectrum of the 1/2 spin Heisenberg XXZ chain in a pinning field

Tu Nguyen, M.A.T., Mathematics

Adviser: Prof. Evelyn Silvia
Current Position: Graduate Student, MBA program, San Jose State University

Mariana Uribe, M.A.T., Mathematics

Adviser: Prof. Evelyn Silvia
Current Position: Mathematics Teachers, Winters Middle School

Genevieve Walsh, Ph.D., Mathematics

Adviser: Prof. William Thurston
Dissertation: Great Circle Links in the Three-Sphere
Current Position: NSF VIGRE Postdoctoral Fellowship, University of Texas-Austin

LIFE AFTER DAVIS

By Jennifer Cordial **BAS 2001**

Going from high school to college is like dipping a toe into the real world. The transition from college to after college is more like an icy plunge. I graduated from UC Davis in 2001 with degrees in math and economics. I could recite and prove any number of theorems or tell you all about supply and demand curves, but no one ever explained so many other things to me.

While I was excited and motivated, albeit naïve, college did not entirely prepare me for many of the challenges faced as I made that transition from college to career. Just a few challenges the new college graduate is faced with are the much greater emphasis placed on teamwork skills, the importance of dealing with all types of people and personalities, the need to manage personal finance issues and budget for the future, the necessary balancing of work demands with family/friends/personal life, and the importance of developing job-hunting skills, especially networking, interviewing, and salary negotiation.

I am currently a senior consultant with Protiviti, a young company that I have been with since its inception. Protiviti is a firm dedicated exclusively to risk consulting and internal audit. I work primarily in the consumer products group. Day in and day out, I no longer use the specific mathematic knowledge gained at UCD. I do, however, constantly apply the analytical way of thinking that we were

taught. Just as there are many approaches to solve a given math problem, there are endless approaches to solve a business problem and to help companies mitigate business risks.

“Just as there are many approaches to solve a given math problem, there are endless approaches to solve a business problem...”

I spend a majority of my time working on supply chain and marketing projects with a focus on process controls, efficiency and cost recovery. The projects often include extensive sampling and data analysis. I am constantly looking at millions of transactions in order to understand how product is moved, invoiced and accounted for, and to identify errors, overcharges and opportunities to add to the client's bottom line. I never knew how complicated it was to get that tube of toothpaste on the shelf at your local drug or grocery store!

Although everyday presents new situations and problems that I never expected to be faced with when I left Davis, I still approach each problem the same way I used to approach a math problem: examine the information given, identify the ultimate goal, consider all possible methods to get there, choose what I believe to be the best method and proceed. Just as with a math problem, the first try seldom works. Instead about halfway through, I find the faults in the method, realize what approach I should have taken and start over. The process of solving a business problems is challenging, but when it gets tough, I remember my days in the math department and try not to think of these problems as “too hard” or “too complicated,” but, instead, “more interesting”.

By Igor Aleinov **Ph.D.**

I came to Davis from Russia after being accepted into a Ph.D. program in 1991. During my stay in Davis my scientific adviser was Professor Albert Schwarz and my main research was in Mathematical Physics, including Matrix models, integrable systems and similar topics. While working with Professor Schwarz in the field of pure mathematics, I didn't give up completely my interests in applied mathematics and scientific computing.

Soon after my arrival in Davis I got involved in several applied projects. The first one was in Magnetic Resonance Imaging (MRI) in which I collaborated with Dr. Mike Buonocore from the Department of Radiology. It involved post-processing and visualization of 3D MRI scans of the human heart and some major blood vessels. This was my first big project on UNIX and thanks to the hospitality of ITD I had access to the best computer equipment available at that time. Later in the summer of 1992, I started collaboration with Professor Gerry Puckett and Professor Ken Verosub (from the department of Geology) on the dynamics of the magnetic field of the Earth. Though the work on this project eventually stopped due to the lack of funding, our collaboration with Gerry Puckett continued, now on his own project of modeling micro-scale fluid flow. I was finishing my PhD work with Albert Schwarz, when Gerry Puckett suggested that I continue to work with him on the micro-scale fluid flow as a postdoctoral fellow. I gladly accepted his offer.

My postdoctoral research was supported jointly by NSF and by Xerox, as a part of an NSF program to encourage collaboration between industry and universities. One of the requirements was that I spend some time at the Xerox Research center in Webster, NY. My time spent at Xerox was extremely useful and stimulating. While working on development of a computer model for micro-scale jetting devices, I had a unique opportunity at the same time to see such devices at work and observe the flow I was modeling in real time. This was an opportunity many fundamental researchers can only dream about.

Upon completing my postdoctoral research I accepted an offer from a joint laboratory of Columbia University and NASA at Goddard Institute for Space Studies (NASA GISS). The main topic of research in this lab is long-term climate prediction and the study of the effects of human activities on global climate change. The tool which is being developed and used for this purpose is a General Circulation Model (GCM). GCM is a computer model which simulates all the important (from a climatological point of view) processes in the atmosphere, on the land surface and in the ocean for the entire globe. My current research is mostly concentrated on the improvement of the Land Surface model. I am also partially responsible for the general organization of the model, including its porting to the parallel computer architecture. The project itself is quite challenging and promises a lot of interesting research, though the

...continued on page 11

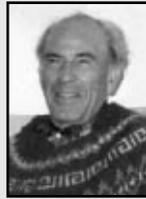
EMERITI UPDATE

Kurt Kreith continued to serve as acting co-director of the California Mathematics Project. He taught in Cosmos 2003 and offered one week workshops for teachers at both Columbia and Masaryk Universities. At U.C. Davis he taught both freshman seminars and a graduate course for MAT students. An invited paper on *Mathematics in the Time of Computers* was the basis for a colloquium talk at the School of Education at the University Complutense in Madrid.



Don Benson's new book, *A Smoother Pebble*, will be published by Oxford University Press this fall. Like his first book, *The Moment of Proof*, it can be read independently by a general reader with an interest in mathematics. It addresses topics from elementary mathematics, including Egyptian fractions, the Greek theory of proportion, the mathematics of musical harmony, Cardano's method, Galileo and the inclined plane, and various concepts from calculus.

Other than reviewing and refereeing, **Sherman Stein** was occupied in writing a book-length manuscript called *The Edge of Reason*. The subtitle is *How to Survive in an Irrational World*. A few of the chapters use a mathematical style of thinking to show that we can only be so wise. It is being submitted to several publishers.



Don Chakerian has completed two joint papers with M. S. Klamkin entitled *Maximum of the Product of Distances to a Finite Point Set* and *Centroids of Skeletal of Simplices*. Last fall he gave a mathematics colloquium at the Sacramento State University, and he was a featured speaker at the spring conference of Community College Mathematics Teachers at Lake Tahoe.

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. He wrote a non-mathematical essay regarding the cycle for the Covell Gardens Monthly Newsletter which led to the present mathematical version.



RECENT RETIREES

After 38 years in the Department, Professor **Carlos Borges** retired on June 30, 2003. During his time at UCD he served the department by being Department Chair for four years and was known to be a versatile and respected teacher of the courses he taught.

Professor **Allan Edelson** retired on June 30, 2003 after serving 34 years with the Department. Besides being acknowledged as a very talented teacher and able to teach many of our courses, Professor Edelson was very active in his service efforts. During his career, he was on numerous departmental committees and he served in lead administrative roles for campus personnel committees.

STAFF NEWS

Academic Personnel

Pam Tise

Business Services

Richard Edmiston, Jessica Potts, Brandy Skipton

Department Manager

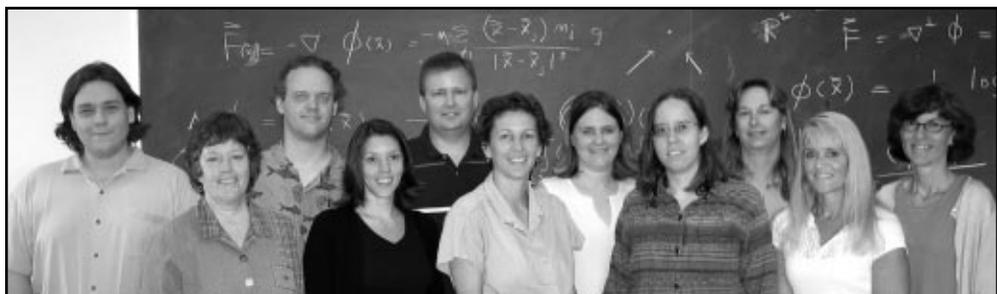
Tracy Ligtenberg

Student Services

Celia Davis, Nancy Davis, Cris Horgan

Technical Services

Bill Broadley, Zach Johnson, Marianne Waage



The Department welcomed new staff members in 2002-03 as former staff moved on to new positions and new challenges. Newcomers included: Cris Horgan as Student Services Assistant for both the undergraduate and graduate offices; Brandy Skipton as Business Office Assistant (filling an open position that had been unfilled); Pam Tise (replacing Kristen Carner) as Academic Personnel Coordinator.

Department Staff were reorganized to represent the main functional areas of support that is provided to our faculty

and students. The groupings are listed at the left.

Staff continue to automate administrative procedures and respond to technological changes in the workplace. Computer security has become a much more important issue as well as the ability to retrieve and/or compile critical information in a short period of time. Our over-riding goal is to anticipate the needs of department members and to provide a level of service necessary to support the research and teaching mission of the Department.

LIFE AFTER DAVIS

...continued from page 8

environment is a little too conservative and I miss the dynamics inherent in university research.

The life in New York City is as one would expect it to be in the "Capital of the World." Museums, theaters, restaurants - we have it all if one has enough time and money. Sometimes, though, I miss Davis, which I still consider my home in the

"...I still miss Davis, which I still consider my home in the U.S."

US. In the end I would like to thank the faculty, the staff and the graduate students of the Department for all they gave me, especially my adviser Professor Albert Schwarz to whose incredible scientific erudition and energy I remain indebted, Professor Gerry Puckett for the opportunity to do post-doctoral research with him and Professor Dmitry Fuchs for his excellent lectures and personal friendship. I would also like to thank the former graduate coordinator Kathy La Giusa for her help during my first days at U.C. Davis.

ALUMNI NEWS

Edward Jenvey, who received his B.S. in Math at U.C. Davis in 1985, continued his studies at Stanford and received a Ph.D. in Math for his work in ergodic theory. Since then he has been working in financial mathematics and recently joined a very small consulting firm.

Tamara (Beirmann) Thornell, who received a B.S. in Mathematics and a minor in Spanish in 1993, is an elementary school teacher in Oxnard, California. We are pleased to learn that she recently was awarded the 2003 Cal Aggie Alumni Association Award from U.C. Davis. Recipients are chosen based on their outstanding contributions or achievements and their professional and volunteer activities.

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 UCD.

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

Or you can fill out the form on our website at:

http://www.math.ucdavis.edu/research/newsletter/alumni_quest

Please print your name: _____

email and phone: _____

and your address: _____

Degree and year received: _____

Positions held since leaving UCD: _____

Current Position: _____

Institution or Company: _____

Location: _____

Other news about yourself and others: _____

Check here if we can use the "other news about yourself and others" in the next issue

If you wish to write a longer article about your "Life After Davis," please feel free to send that along. We will do our best to include it in the next newsletter.

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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Enclosed is my gift of \$1000 \$500 \$250 \$100 \$50 Other \$_____ Please make your tax deductible gift for the Department of Mathematics payable to UC Regents.

Please print your name as you wish it to appear for donor listings: _____

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Your gift will be used to support the Mathematics Department's greatest needs. These may include undergraduate and graduate support, research support, and departmental initiatives.

The information you provide will be used for University business and will not be released unless required by law. A portion of all gifts is used to defray the costs of administering the funds. All gifts are tax-deductible, as prescribed by law.

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