



DEPARTMENT OF MATHEMATICS NEWSLETTER

University of California, Davis

Academic Year 2001-02

Message from the Chair

By John Hunter

The past year has been an eventful one in the Department. Three new faculty members have joined us: Craig Benham, Maury Bramson, and Claudia Neuhauser. Craig works in molecular biology, Maury in probability theory, and Claudia in probability and mathematical biology. One faculty member, David Barnette, retired after a long and distinguished research career in graph theory and combinatorial geometry. He came to UC Davis in 1967, and gave a very funny description of the changes from the simpler world of the 1960's to our brave new, and considerably more bureaucratic, world of the 21st century.

The Department faculty members continue to garner new awards: Art Krener is a Guggenheim Fellow for 2001/02, and Anne Schilling has been awarded a Humboldt Fellowship to work in Germany in 2002/03. Albert Fannjiang is a UC Davis Chancellor's Fellow for 2001/02, and an AMS Centennial Fellow for 2002/03. Alex Mogilner was a Chancellor's Fellow in 2000/01, making the Department of Mathematics the only Department in the University that has had a Chancellor's Fellow in the two years since the program's inception. Craig Tracy and Bruno Nachtergaele are invited speakers at the upcoming International Congress of Mathematicians in Beijing, Sept 2002. They are both speaking in the session on Mathematical Physics, which has only 12 invited speakers, two of whom are from UC Davis.

In other good news, the Department has heard from the National Science Foundation that our proposal (led by PI

Bruno Nachtergaele) for a VIGRE program will be funded. This 5 year, \$3,000,000 grant will support graduate students, postdocs and bring undergraduates into research. The VIGRE program will be organized around Research Focus Groups that will bring together undergraduates, graduates, postdocs, and faculty members to work on research areas of common interest.

Several of our current and former Ph.D. students have received awards. Carmeliza Navasca (advised by Art Krener) won first place in the Best Student Poster Prize contest at the 2001 ACM symposium in Houston. Shannon Star (advised by Bruno Nachtergaele) is an NSF Postdoctoral Fellow at Princeton University. Lisa Korf (advised by Roger Wets, and now an Assistant Professor at the University of Washington) won the competition for the best paper by a graduate student or postdoc with a Ph.D. less than 5 years old at the International Conference on Stochastic Programming in Berlin, 2001. The runner-up was Sergio Lucero, another recently graduated student of Roger Wets. Tyler Evans (advised by Dmitry Fuchs) received a UC Faculty Fellowship, and is taking up a position at Humboldt State University.

In a major development, we learned last Fall that the Department will be moving into a brand new building. The building will be located in the South area of campus, on the site between Academic Surge, the Crocker Nuclear Laboratory, and the Engineering III building. We are currently in the first stages of planning for this new Mathematical Sciences Building. With the continued growth of the Department and the University, we are desperately in need of additional space. Even though we will miss Kerr Hall, the new building will be a great improvement. The budget for the project is \$22,000,000 and the building is scheduled for completion in August, 2004.

There have been several changes during the past year in the administration and Department staff. I have taken over as Chair from Motohico Mulase, who did a wonderful job of leading the Department in the previous three years. As I started my new position, the Department's MSO, Tracy Ligtenberg, and business manager, Tracey Brooks, both received well deserved promotions, and left the Department (a possibility Motohico somehow neglected to mention while lining me up as his replacement!). Tracy Ligtenberg is now an Associate Dean in the College of Letters and Sciences, and Tracey Brooks (who spent 11 years in the Department of Mathematics) is now

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the MSO of Biomedical Engineering. Fortunately, we were able to hire excellent replacements: Dan Slauson, our new MSO, joins us from the Department of Pediatrics in the UC Davis Medical School, and Linda Potoski, our new Business Manager, joins us from Graduate Studies.

The coming year promises to be an equally active one for the Department. If you are in the area, please drop by and say hello, or let us know how you are doing.

New Faculty

Craig J. Benham, A Mathematical and Computational Biologist

Suppose we have a loop-like DNA strand. Although most DNA molecules do not form a loop, a loop-like substructure exists on many large DNA molecules, and the same analysis applies to such substructures. As a model, we can imagine a loop made of two tightly intertwined fibers. It is intuitively obvious that when we further twist the strand and then form a loop, the two fibers will be woven tighter. On the contrary, if we untwist the strand before making a loop, then the threads will get loose. Does this intuition have any biological significance?



It required a tremendous insight of Professor Craig J. Benham to discover a mechanism that connects this intuitive mathematical information with biological outputs.

The mathematical quantity in question is the topological winding number. When a double helix forms a loop, the two chains of nucleotides wind one another, and the winding number, which is an integer, determines the topological structure of the loop-like strand.

It has been known that there are enzymes that increase or decrease the topological winding number of a loop-like DNA. These enzymes must be doing something biologically important. To the astonishment of the scientific community, Dr. Benham is able to calculate, for every loop-like substructure of a DNA and a given topological winding number, the minimal separation energy for each base pair on the loop. Based on his calculation, he can predict exactly which base pair would be separated to what extent, and also he discovered that the separation site moves as the winding number changes.

What is the mathematical apparatus that connects the topological winding number and the minimal separation

energy of a nucleoside pair? It is indeed a work of a genius. Dr. Benham identified that the hidden link between topology and biology is statistical mechanics. He uses deceptively simple, elementary statistical mechanical models of a one-dimensional finite system to calculate the minimal separation energy of every base pair in DNA, with the topological winding number as an input. The precise predictions of his beautiful method have been experimentally verified, both in vivo and in vitro.

Since the work of Watson and Crick, the information stored in DNA has been considered to be essentially a linear sequence of nucleotides. Dr. Benham has proven that DNA is a dynamic object that has a mechanical structure that allows creation of topological information, and this very topology governs biologically important functionality of the molecule.

Dr. Benham joined the Department of Mathematics in March 2001. He is also jointly appointed in the Department of Biomedical Engineering, and serves as Interim Director of the UC Davis Genome Center. He received his Ph.D. in Mathematics (for his work in Algebraic Geometry!) in 1972 from Princeton University. Since 1988 he has been Professor of Biomathematical Sciences at the Mount Sinai School of Medicine in New York.

Craig and Marcia Benham live in Davis, with one of their daughters currently attending the Davis High School.

Maury Bramson earned his Ph. D. from Cornell University in 1977, and since has had a post-doctoral position at Courant Institute, followed by faculty appointments at University of Minnesota and University of Wisconsin.

Maury's research interests lie in various areas of probability theory, and his main focus can be loosely described as studying "complicated random systems with many interacting components." Such systems originate from physics, biology, chemistry, or computer science. Maury was one of the founders of probabilistic analysis of interacting particle systems, and, together with his coauthors, introduced and sharpened such techniques as renormalization, random walk asymptotics, and distributional and hydrodynamic limits. One classic tour de force is his work with Joel Lebowitz, in which they study diffusing particles of two types which annihilate upon collision, in the matter—antimatter style. One of the results states that the two types of particles separate in three dimensions, so that only one type can be



seen locally.

More recently, Maury has devoted his attention to queuing systems, with many deep and surprising results which seem paradoxical even to the experts. For example, it may happen that lines in a poorly designed queuing network will grow even when customers are served faster than they arrive, due to the fact that some servers are starved for work while others are overwhelmed.

Claudia Neuhauser joined our department this year as a Professor of Mathematics. She will hold a joint appointment with the Department of Evolution and Ecology. Claudia received Diplom in Mathematics (approximate German equivalent of M.Sc.) at the venerable Heidelberg University, and went on for PhD studies to Cornell. She obtained her Ph.D. from Cornell University in 1990. Richard Durrett, well known mathematician, was her Ph.D.



adviser. She moved a lot after that - true sign of an ambitious scientist - from U. of Southern California, to U. of Wisconsin at Madison, to U. of Minnesota at Minneapolis, stopping by, for few months, at Princeton University. Now, we hope her travels are over - the lure of Davis is irresistible! Claudia's husband, distinguished probabilist Maury Bramson, also joined our department.

Dr. Neuhauser is an applied mathematician. In her early research, Claudia focused on interacting particle systems inspired by biological processes, obtaining many exciting and important results. For example, in her joint work with R. Durrett she developed techniques to prove convergence to reaction-diffusion equations in systems with rapid stirring, while in another work she established integro-differential equations as limits of large-scale models. Lately, Dr. Neuhauser is engaged largely in ecology and genetics, while still doing rigorous mathematics, which makes her unique in the biomath community. (Current trend is to do very simple and heuristic mathematics and very complex biology, see profiles of A. Mogilner and C. Benham.) More specifically, most ecological models of communities do not take into account that individuals interact with each other in a spatial environment. Claudia investigates how space affects community dynamics. In genetics, to interpret population genetic data, genealogical or coalescent methods have proved extremely valuable. This method allows one to estimate population genetic parameter, such as mutation rate. Dr. Neuhauser's research focuses on how selection shapes the genealogical tree of sampled genes.

Besides doing research and teaching, Claudia is involved in a lot of what NSF calls 'synergistic' activities. This year, she is an organizer of the prestigious Gordon Research Conference on Theoretical Biology and Biomathematics. She wrote a novel and unique calculus textbook ("Calculus for Biology and Medicine," Prentice Hall) for biologists and is teaching a new course on campus using this book (MAT17). She is also a PI of an extremely large NSF 'Biocomplexity' grant housed in University of Minnesota. The goal of this grant is to predict the evolutionary and ecological consequences of large range expansions and contractions of plants (like corn and beans) on their associated biological communities. Due to respective obligations, Claudia will spend most of this year in frozen Minneapolis. With luck, we will see more of her next year!

Awards and Prizes

Guggenheim Award to Art Krener

The John Simon Guggenheim Memorial Foundation provides fellowships for advanced professionals in all fields (natural sciences, social sciences, humanities, creative arts) except the performing arts. Professor Arthur Krener was chosen as one of approximately 180 Fellows for the year 2001. He is the fourth member of the Department to be so honored. Roger Wets was a Guggenheim Fellow in 1981, Marc Mangel in 1987 and Blake Temple in 1994.

Krener received his Ph.D. in Mathematics from UC Berkeley in 1971 and immediately joined the department as an Assistant Professor. In 1976 he was promoted to Associate Professor and in 1980 to Professor. He has held visiting positions at Harvard University, the University of Rome, Imperial College of Science and Technology, NASA Ames Research Center, the University of California, Berkeley, the University of Paris IX, the University of Maryland, the University of Newcastle, Australia and the University of Padua.

His research interests are in developing methods for the control and estimation of nonlinear dynamical systems and stochastic processes.

Professor Krener is a member of the American Mathematics Society, the Society for Industrial and Applied Mathematics and is a Fellow of the Institute of Electrical and Electronic Engineers. His 1981 paper with Isidori, Gori-Giorgi and Monaco won a Best Paper Award from the IEEE Transactions on Automatic Control. His 1977 paper with Robert Hermann was recently chosen as one of

25 Seminal Papers in Control published in the last century.

Krener has held a variety of administrative positions including Vice Chair for the Undergraduate Program, Vice Chair for the Graduate Program and Chair of the Department.

With the extra time made available by this Fellowship, Krener hopes to make substantial progress on the study of Normal Forms and Bifurcations of Control Systems

Naoki Saito Receives PECASE Award

Naoki Saito received the Presidential Early Career Award for Scientists and Engineers (PECASE) at the White House on October 24, 2000, for “pioneering work on harmonic analysis and wavelet theory, with application to signal and image processing.” Naoki was among 59 researchers nationwide presented with this award. The PECASE is the highest honor bestowed by the United States government on young professionals at the outset of their independent research career.

Naoki and his wife Mayumi went to the White House to receive this award. Unfortunately, Naoki and others could not meet President Clinton due to his busy schedule, in particular, his meeting with King Abdullah of Jordan on that day.

The ceremony was conducted by Dr. Neal Lane, then Assistant to the President for Science and Technology (currently University Professor at Rice University). Dr. Lane not only congratulated the awardees but also highly praised their spouses and families for their support. Naoki had a good time chatting with Dr. Lane at the reception after the ceremony. It turned out that Dr. Lane is a saxophone player and shared some musical interests with Naoki, who is a guitar player.

With this award, Naoki will conduct research on computational harmonic analysis, in particular, its application to characterization and model building of high-dimensional stochastic processes (e.g., faces, hyperspectral images, seismic data), extraction of features insensitive to geometric transformations (e.g., translations, rotations, dilations), and segmentation of images into homogeneous textured regions. He will also investigate the use of the uncertainty principle developed in harmonic analysis for the above-mentioned applications as well as for computational neuroscience.

Official White House release page of the Office of Science and Technology Policy for PECASE: (see Department of Defense) http://www.ostp.gov/html/001030_2.html. Dr. Neal Lane’s speech at the award ceremony: http://www.ostp.gov/html/001030_3.html

PECASE award photo web page: <http://math.ucdavis.edu/~saito/pecase.html> Naoki Saito’s home page: <http://plane.math.ucdavis.edu/~saito/>.

Alex Mogilner and Albert Fannjiang named Chancellor’s Fellows

Alex Mogilner has been selected to be a Chancellor’s Fellow for 2000-2001 and Albert Fannjiang was selected for 2001-2002. The Chancellor’s Fellow Program was established to honor the achievements of outstanding faculty members early in their careers. Both Alex and Albert were chosen for their demonstrated excellence in academic pursuits, as evidenced by the quality and significance of their research and teaching.

Tyler Evans named Faculty Fellowship Researcher

Tyler Evans was appointed to the position of Faculty Fellow Researcher just after he completed his Ph.D. dissertation under the direction of Professor Dimitry B. Fuchs. It is a two year appointment. Quoting from the memo distributed by the office of the Vice Provost Patricia Turner, “The Faculty Fellows Program for UC Ph.D.s provides mentored training and experience in the design and conduct of instructional courses and research.”

The Teaching Resource Center hosted a dinner, attended by all 6 Faculty Fellows, corresponding mentors and department chairs and the college Deans. The purpose was to discuss the ways in which the fellows were being utilized in strengthening undergraduate education at UC Davis.

Dr. Evans was offered, and accepted, a tenure track position at Humboldt State University.

Humbolt Fellowship to Anne Schilling

Anne Schilling won an Alexander von Humboldt Fellowship for 2002/03. She plans to spend from June to December of this year at the Bergische Gesamthochschule Wuppertal working with Prof. Peter Littelmann and at the Max-Planck-Institut für Mathematik in Bonn, Germany. In terms of her research Anne says, “I have been working on affine crystals which are the combinatorial structures underlying quantum algebras associated with affine Kac-Moody algebras. Affine crystals provide a grading of tensor product spaces, also known as charge. Peter Littelmann in Bonn/Wuppertal

introduced the now famous path model. The fundamental combinatorial objects in this theory are piecewise linear maps in the vector space spanned by the weights of an symmetrizable Kac-Moody algebra. However, it is not yet known how to define the charge in the path model setting. It is the hope that during my stay in Bonn/Wuppertal we can merge our ideas and make progress on this problem.”

Five Visiting Research Assistant Professors Join Us this Year

Raymond Hemmecke joined the department as a Visiting Research Assistant Professor in July of this year. In 1997, he received his diploma degree in mathematics from the University of Leipzig, Germany, and in 2001, his doctoral degree in mathematics from the University of Duisburg, Germany. At UC Davis, he collaborates with the group of Jesus De Loera.



Raymond’s research interests are computational algebra, combinatorics, and primal methods in integer programming. His favorite notions are test sets, Groebner bases, and Hilbert bases.

In his spare-time he likes to travel, to play games like Tantrix, to drink café latte in a cozy place, to chat with friends in nice pubs, and to think about the meaning of life.

Aaron A. King recently joined the department as a half-time VRAP. His other half is an NSF Mathematical Sciences Postdoctoral Research Fellow. He studied at Rice, Hawai’i, and Arizona, taking his Ph.D. there in Applied Mathematics in 1999. After a postdoctoral stint at Arizona, he came to Davis in the summer of 2000. His work has both theoretical and experimental components. On the theoretical side, he uses the mathematics of dynamical systems, bifurcation theory, and stochastic processes to understand spatial and temporal patterns in animal population fluctuations and their role in community organization. On the experimental side, he works with populations of flour beetles, whose cannibalistic lifestyle leads to mathematical nonlinearities and thence to exotic fluctuations.



When not engaged in research or teaching, he enjoys life in Davis with his artist wife, Carrie, and 10 year old son Sequoyah.

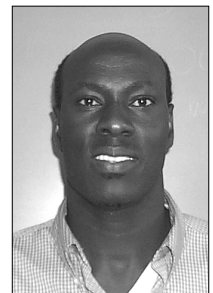
Xiaoping A. Shen is half time VRAP and half time ONR Fellow working with Naoki Saito. She received her MS degree in mathematics from Chinese Academy of Sciences, Beijing, China in 1987, MA degree in mathematics from University of Toledo in 1993, and Ph.D in applied mathematics from University of Wisconsin—Milwaukee, in 1997. She held faculty or visiting faculty positions at Tianjin University (China), Tsinghua University (China), University of St. Thomas (USA), Naresuan University (Thailand) and Eastern Connecticut State University (USA). She also has extensive industrial experience as a consultant.



Her research interests include numerical methods for integral equations, wavelet analysis and their applications. She will work on computational harmonic analysis, in particular, applications of the prolate spheroidal wave functions with Naoki Saito.

Her non-research interests include reading and sewing. She has already found the atmosphere of Davis suitable for her because she likes small towns, cozy settings and loves animals.

Issa A. Tall joined the department as a Visiting Research Assistant Professor. He received his PhD in December 2000 at the Institut National des Sciences Appliquées de Rouen in France. He worked in control theory under the supervision of Professor Witold Respondek who was a postdoctoral scholar at UCD in 1985.



Tall’s research interests are concerned with normal and canonical forms of control systems, their symmetries and the important subclass of feedforward systems. Before receiving his PhD in France, he did graduate work in his native country at the University of Senegal where he received the certificate (DEA) in Differential Geometry. While at Davis, he will be collaborating with Professor Arthur Krener.

Daniel Ueltschi graduated from the Ecole Polytechnique Fédérale de Lausanne, Switzerland, in 1998. He comes



here from Princeton University where he spent two years as an Instructor. His work in mathematical physics focuses on the mathematical description of equilibrium states of quantum lattice systems. Dr. Ueltschi's faculty mentor will be Bruno Nachtergaele. Daniel already feels quite at home in Davis. The bike friendliness of Davis and the good medicine of the Napa Valley

are helping a lot!

News from the Undergraduate Program in Mathematics

By James Diederich

Vice Chair for Undergraduate Matters

The Undergraduate Program Committee was very active this year. Among its many activities, two are particularly noteworthy.

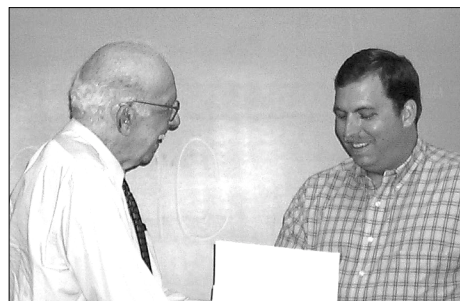
A new course, "Calculus for Biology and Medicine," Math 17ABC was developed and proposed in cooperation with Prof. Claudia Neuhauser, who will be joining our faculty this Fall and is an expert in mathematical biology, mathematical ecology, and biocomplexity. The course will be based on Prof. Neuhauser's new text, which has abundant applications of calculus in the biological sciences. Math 17A will be offered the first time beginning in the Fall Quarter, 2001. Math 17B and 17C will be offered in Winter and Spring, 2002, respectively.

Within the last decade, the research interests of the Department's faculty have expanded significantly into applied mathematics and into mathematical computation. Over 31 of our regular faculty work in applied and/or computational mathematics, 5 of whom work in mathematical and computational biology. The demand for understanding mathematical computation and applied mathematics comes increasingly from non-traditional sectors these days such as biology, economics & finance, design, and the like. Opportunities for students in applied and computational mathematics continue to expand as well. Consequently, two new majors in mathematics have been proposed, a Bachelor of Science in Applied Mathematics and a Bachelor of Science in Mathematical and Computational Mathematics. These new majors will provide considerable flexibility to students who desire

strong mathematical training but also wish to focus on particular areas of application of mathematics. We anticipate that these majors will be approved by Fall, 2002.

Henry L. Alder Prize for Excellence in Teaching Awarded to James P. Peirce

At the Department's Annual Awards Ceremony on June 7, 2001, the second award of the Henry L. Alder Prize for Excellence in Teaching was presented. The award was established in 1999 by Professor Henry L. Alder as an endowment for the Department to be used primarily for an annual prize of \$2,000 for the graduate student who is deemed to be the top teacher among all graduate students in mathematics.



This year's award was presented to James P. Peirce. He has done a remarkably effective job in his teaching ever since he taught his first class in the mathematics department in the first summer session of 1998. A faculty member visiting his Math 22B class in the fall of 1999 wrote that he "was impressed by the excellent organization of his work on the board and the clarity of his verbal explanations to the class."

The student evaluations for the classes he has taught confirm the impressions of this faculty member. In each of the classes he has taught recently, the average score of students' responses to the question asking for an overall evaluation of the instructor's teaching (on a scale from 1.0 to 5.0) ranges from 4.2 to 4.5, the latter being achieved in the most recent course he taught in the summer of 2000. Most noteworthy is that this latter score was achieved in a calculus course for non-majors which for almost all the students in the class is a required course and, therefore, typically not a favored one.

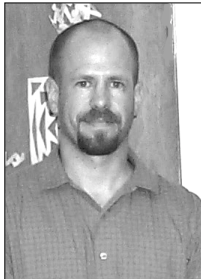
Many students added individual comments to their evaluations of the classes he has taught of which words like "a great teacher," "always willing to help," "overall a fantastic teacher," "one of the best ... I've ever had" are

typical. Many comments praise his clarity of presentation, his availability to students, and his care for student learning.

The department has previously recognized his special talents as a teacher by awarding him the William Karl Schwarze Scholarship in Mathematics for the academic year 2000-01.

In presenting the award, Henry Alder noted that the selection committee was impressed with the many graduate students who had an outstanding teaching record and that it would have been easy to give several prizes if this had been possible. He mentioned this for two reasons: 1. To show why the many graduate students with such superb teaching records should feel proud of their achievement by means of which they make a substantial contribution to the teaching mission of the department, and 2. to indicate why James Peirce should feel particularly good about having emerged as the recipient of this year's award among so many highly qualified graduate students.

*Michael Scott is the Wm. Karl Schwarze
Scholarship Recipient for 2001*



Michael Scott has been a graduate student in our Math Department for four years, since he received his master's degree in Mathematics from the CSU Northridge. His teaching career began even before that, as a tutor in community college. At Northridge, he was the only undergraduate allowed to be a physics teaching assistant. While pursuing his master's degree he was able to teach developmental math on his own for the first time.

Since coming to Davis, Michael has been an Associate-In for seven quarters, teaching classes which range from Math 16A to Math 22B. Currently he is working on his thesis under Blake Temple who enthusiastically recommends him. In addition to all of these efforts, for the past year he has served as a strong and effective President of the Galois Group.

Mr. Scott's letters of support stress both his mathematical competence as well as his teaching ability. Dr. Carole Hom, who was his first mentor when he began as an Associate-In commented "his presentation was superb, especially for a new instructor" and "He is head-and-shoulders above the average first-time Associate-In."

Students are equally enthusiastic. Here are some typical comments:

"Best instructor I have had in the Math 21 series." (21D student)

"This is the best math teacher I have ever had." (22B student)

"This was the most interesting math course I have taken at UC Davis, and most of the credit goes to Mr. Scott's manner of teaching." (22A student)

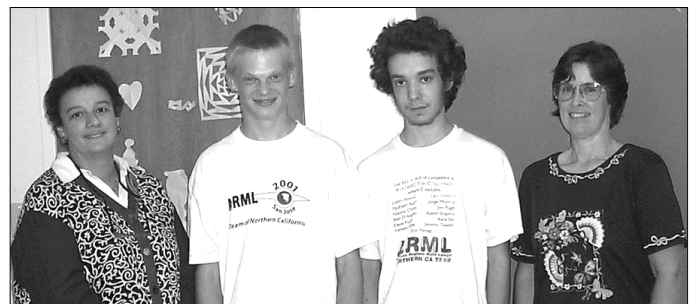
"Our instructor was always open to talk to and patient with dealing with lots of questions. The best math teacher I've had thus far." (22A student)

With all of these positive comments about his teaching ability and with his commitment to students, it is with great pleasure that we present the 2001 William Karl Schwarze Scholarship to Michael Scott.

The 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 from 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.

*Two Winners of the Eighth
Robert Lewis Wasser Prize*

The Robert Lewis Wasser Prize was presented to two students this year, **Austin Shapiro** and **Jeremy Tauzer** by Vice Provost for Undergraduate Studies Patricia Turner and by Cheryl Booth, Robert Wasser's mother, at the Mathematics Department Awards Ceremony held on June



7, 2000. The Wasser Prize of \$500 is awarded to the freshman or sophomore with the highest score in the Department of Mathematics Spring Math Contest.

Austin and Jeremy were Davis High School students who were enrolled in math classes at UC Davis. Jeremy was last year's winner of the Spring Math Contest. Both had perfect scores on the exam.

Mike Booth, Robert Wasser's step-father, also attended the ceremony. Vera May Wasser, Robert's grandmother was unable to attend due to an illness. She has faithfully attended all previous ceremonies since the inception of the Wasser Prize.

The Robert Lewis Wasser Memorial Fund, in excess of \$10,000, is named in honor of Robert Lewis Wasser and was initiated by Vera May Wasser. Prior to his tragic death in an automobile accident in September of 1993 just before the beginning of his junior year as a math major, Robert showed high promise as a developing mathematician, having taken some of the most challenging of our Junior-Senior courses as a sophomore and having impressed his instructors.

2001 Spring Mathematics Contest

What are the last four digits of 2001^{2001} ? Twenty-five participants in the Spring Mathematics Contest, held on May 19, spent two hours pondering over this and other questions. The contest is open to all undergraduates and high school students taking mathematics courses at UC Davis.



Seth Dutter, Austin Shapiro, and Jeremiah Tauzer presented complete solutions of all problems. Austin Shapiro and Jeremiah Tauzer shared the Wasser prize, which carries a cash award of \$500 for each winner. Austin Shapiro and Jeremiah Tauzer are Davis High School seniors with strong interest in mathematics. This year they are freshman at UC Berkeley.

Seth Dutter, a fourth-year student at UCD, won the first prize and a cash award of \$250. His other honors include

a departmental citation and a place on the Top 100 list in the Putman examination. Seth plans to enter the Berkeley graduate program in mathematics.

Ting Xi Liao and Kenneth Waters shared the second prize and received cash awards of \$150. Luke Donev, Samuel Merritt, and Josephine Yu won the third prize and cash awards of \$50 each. The hardest problem of the contest was probably the following:

A knight's journey is a sequence of squares connected by knight's moves that visits each square exactly once. Is there a knight's journey on a 4 by 4 chessboard?

Bori Mazzag wins the 2001 Alice Leung Prize

The Alice Leung Prize is an endowed prize in the Department given to one or more graduate students who have shown exceptional promise in all aspects of scholarship in mathematics, in particular, strong research potential. The winner receives a certificate and a cash prize of \$1,000.

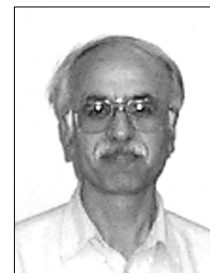
Bori Mazzag is currently working in Mathematical Biology jointly with Profs. Alex Mogilner, Abdul Barakat, and Geoff Goodhill. She is involved in a very complex interdisciplinary research in microbiology, where realistic mathematical models help experimentalists to unravel the mysteries of nature. Specifically, Bori models the process of chemotaxis (how bacteria find the optimal level of oxygen, and how growing neurons find their proper place in the nervous system). Bori is an excellent representative of a new generation of interdisciplinary minded, truly applied, mathematicians. She was nominated by Alex Mogilner.



Lower Division Teaching Award

Ali Dad-del, a lecturer in the Department, was the recipient the 2001 Prize for Outstanding Teacher of Lower Division Mathematics. During the period under review he taught a large number of the lower division courses offered.

After very lengthy deliberations the Committee unanimously chose Ali Dad-del as the recipient of this year's Lower Division Teaching Award. They were particularly impressed by



the fact that he teaches very large classes with remarkable success and that he has made very significant contributions to the teaching of Math 22A.

Dr. Dad-del received a 4 out of 5 rating in Math 16C with 333 students, a 4.7 out of 5 in Math 16A with 215 students and a 4.3 out of 5 in Math 22A with 63 students.

The students' comments are uniformly positive, and the following are representative: "Dr. Dad-del is a very tough professor," "I enjoyed the class, teacher very helpful in office hours," "I wish all teachers would hold review sessions like Dr. Dad-del does - they're very helpful."

He is doing a great job for the Department and he clearly deserves this distinction.

Picnic Day 2001

This year Picnic Day occurred on a pleasant spring day, no rain, wind or heat, just perfect weather. Crowds of people of all ages visited our display. Children accompanied by their parents, groups of youngsters, and alumni of the mathematics department all attempted math problems, tried puzzles, and enjoyed the challenges. Teachers and parents collected problems and information about our mathematics department, about studying math, and about careers related to mathematics. Many stopped to read about the research activities of faculty in our department. It was really very enjoyable to see so many different people show so much interest and challenge themselves with math problems.

The display opened at 10 AM and closed at 3 PM, when groups of people were still busy with the puzzles and doing problems. The whole display was a collective effort of undergraduates, graduate students and faculty. Many undergraduates devoted their time and effort for a big part of the day to set up, to stand behind tables and interact with visitors, and to clean up. Several graduate students helped to set up the display, including James Peirce and Genevieve Walsh. Inspired by an article of New York Times: "Why Mathematicians Now Care About Their Hat Color" published on Tuesday April 10, 2001, Wolfgang Spitzer, a visiting faculty member, and Genevieve Walsh made their own table for playing "What color is your hat?" Two undergraduates unexpectedly showed up in costumes as "Super MATH Man and Woman." Mikhail Khovanov set up his own table to play some pebble problems. He was a tremendous help in setting up the display.

Ali Daddel was the principal organizer of the display this year. Abby Thompson who was on sabbatical at Princeton

sent us a collection of interesting problems for children. These problems were printed on table napkins to entertain children in one of the local pancake houses in Princeton. In the past three years Ali Dad-del and Abby Thompson organized the display together.

The Math Department display has established its own place in many people's minds as a great place to visit on Picnic Day and is a terrific opportunity for the department to reach out and demonstrate the fun applications of math with many different people. Our special thanks go to the following students: Josephine Yu, Elaine Mi, Sandy Tu, Leopoldo Ocampo, Daisy Raymondson, Hiroshi Miyazaki, Jeffery Garberson, Joshua Damoth, Verity Sharp, Jennifer Cordial.

Graduation and Departmental Citations

This year a record 7 seniors received Departmental Citations, which were presented at the Annual Mathematics Department Awards Ceremony on June 7. These citations recognize students of exceptional ability who have achieved superb records in mathematics and have taken very strong programs in mathematics. Their grade point averages in mathematics were at or above 3.6 out of a possible 4.0 and their overall grade point averages were similar. They all received very strong support from the



faculty. They are Seth Dutter, who also won the Spring Math Contest; Heidi Arnold, who had one of the best records in two of our full year core sequences, Math 127ABC and Math 150AB; Lee Martin, who received the highest award for a graduating senior in the College of Letters and Science and is a double major in Mathematics and Linguistics; Lawrence Pack, who is a double major in Mathematics and Physics and has published a joint paper with Prof. Nactergaele; Ricky Burnett, who is a double major in Mathematics and Computer Science; Zachary Hannan, who is a double major in Mathematics and Physics; and Jennifer Cordial, who is a double major in

Mathematics and Economics and who wrote a thesis in Economics.

Undergraduate Degrees Conferred in 2001

AB

Katherine S. Allard
Michelle Z. Dulude
Jennifer C. Hung
Eva Elizabeth Rieder

Sara E. Day
Lisa Brooke Gassner
Everett L. Louis
Sarah B. Treadwell

BAS

Jennifer L. Cordial
Robert A. Lynds
Hoang M. Pham

Allen Liu
Lee M. Martin

BS

Matthew Steven Anderson
Heidi Jeanette Arnold
Ricky G. Burnett
Jeremy Thane Clark
Richard Robert Collins
Erin E. DeWeese
Janice D. Dudensing
Jeremy G. Dybdahl
Nicole M. Fleming
Steven T. Hess
Jesse R. Holman
Hoa T. Khuu
Jessica J. Kuang
Frances E. Lee
Karim Magdi Mahrous
Christopher R. Marsh
Tyrrell B. McAllister
Mark H. Nassi
Randall Everett Orr
Ram Puri
Daisy A. Raymondson
Bridget L. Riggs
Verity S. Simmons
Georgia L. Toland
Mariana Uribe
Zeke K. Vogler
Paul M. Wilson
Agnes M. Yik
Stacey Ann Zuccaro

Ikenna Patrick Anyaso
Parsa Bakhtary
Nhi T. Cao
Brian J. Coburn
Veronica S. Davis
Martin J. Donegan
Seth C. Dutter
Minda Marie Flanary
Zachary W. Hannan
Edward C. Ho
Christine Ironfield
Mark Kenneth Knapp
An Hoang Le
Scotland C. Leman
Harjit K. Mangar
Danielle B. Martinez
Brandon I. Muranaka
Loi M. Nguyen
Lawrence William Pack
Ivan C. Rankenburg
Matthew S. Renquist
Adrian J. Scherger
Ranjani Singh
Thao Trinh
John E. Van Veen
David M. Whitbeck
Olivia M. Wright
Rani K. Zahr

Graduate Program News

By Joel Hass

I am glad to report that the graduate programs at Davis are in a very healthy condition, with increasing numbers of applications, rising international recognition, and strong accomplishments by our students. In a major development, in Fall 2001 we learned of the award of a VIGRE (Vertically Integrated Graduate Research) grant to Davis from the National Science Foundation, through an effort spearheaded by Prof. Bruno Nachtergaele. This will result in major new resources for our graduate programs, in particular quite a few fellowships. It supplements our continuing Department of Education GAANN grant, which provides a half-dozen or so fellowships each year.

The 2000-2001 academic year saw six students completing Ph.D. degrees in Mathematics. Our students are the center of our graduate program, and I will now describe their achievements.

Jennifer Henry, working with Prof. David Barnette, completed a thesis titled "On Generating a Diminimal Set of Polyhedral Maps on the Torus." **Regina Parsons**, working with Prof. Tom Sallee, wrote on "The Effects of Increased Attention to the Calculus Foundations When Teaching Definite Integrals." She is currently working as a lecturer at UCD. **Shannon Starr**, whose adviser was Prof. Bruno Nachtergaele, wrote a well received thesis on "Some properties for the low lying spectrum of the ferromagnetic quantum XXZ spin system." He received a prestigious postdoc appointment at Princeton, as well as a highly competitive NSF postdoctoral fellowship. **John Thoo's** thesis was titled "Nonlinear Waves in Random Media," directed by Prof. John Hunter. John is on the Math Faculty at Yuba College, CA. **Eiko Tyler's** thesis, "Topology of Algebraic Varieties," was supervised by Prof. Motohico Mulase. She too is a lecturer at UCD this year. Finally, **Tyler Evans** (who really finished in 2000, but filed in 2001) wrote a thesis on "Deformations of infinite dimensional Lie Algebras" under the guidance of Prof. Dmitry Fuchs. Tyler taught this year, as a lecturer at UCD, and is now moving to a tenure track job at CSU Humbolt. Finishing with Master's degrees this year were Laimi Cong-Huyen, Tom Craven, Debbie Hill, Nichole Hoover and Michelle Lin. Debbie is an instructor at Sierra College. Michelle Lin is doing a Technical Director Internship at Pixar. Susan Kingston and Gratia Oakley completed MAT degrees. Susan is teaching at Dixon High, not far from Davis. Congratulations to all our graduates.

We welcomed ten new students this fall to the Mathematics program and seven to the MAT program. There has been steady growth, and with the addition of the VIGRE

program we can expect this to continue.

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.

GGAM Program News

By Bruno Nachtergaele

With four new faculty members joining the Graduate Group in Applied Mathematics, the group continues to expand its variety of expertise in mathematics and its applications. Craig Benham, Maury Bramson, and Claudia Neuhauser are members of the Department of Mathematics and Susan Tucker is in the Department of Chemistry. She works in theoretical chemical kinetics, energy transfer processes in and between molecules, and computer simulations of these phenomena.

Our program continues to grow with eleven new students arriving in the Fall of 2001.

Two student received their PhD degrees in 2000-2001. **Michael Casey** wrote his dissertation on "Stochastic Limit Laws for Stochastic Programming." His advisor was Professor Wets. Michael is now a Visiting Assistant Professor at the University of Arizona. **Matthew Williams'** advisor was Professor Puckett. The title of his dissertation is "Numerical Methods for Tracking Interfaces with Surface Tension in 3-D Mold-Filling Processes." Matt accepted a postdoctoral position at Los Alamos National Laboratory.

The following students received Masters degrees: **Wenlong Jin**, **Nicole London**, and **Barbara Mazzag**. They are now pursuing their PhD degrees.

Carmeliza Navasca, won first place (shared with Diane Jamrog, Rice University), in the Best Student Poster Prize contest at the ACM's First Richard A. Tapia Symposium, 2001, Houston, Texas, Oct 18-20, 2001. She presented a poster entitled "Local Solution of the Dynamic Programming Equations in Discrete-Time," co-authored with Arthur J. Krener, her dissertation advisor.

MAT Program News

By Evelyn Silvia

The third phase of the MAT Program in Mathematics is now well underway. We are pleased to report that the

professional development courses, Curriculum Development in Mathematics (MAT302), Pedagogical Issues (MAT303) and Mathematics Practicum (MAT301) have been reinstated so that all of the requirements for our MAT Program again can be completed within the department. This makes it easier for people who already hold teaching credentials to complete our program while providing more flexibility for graduate students who would like to double major (MAT/MA, MAT/Credential, etc.).

The MAT302 and MAT303 courses will be meeting every other week, on Monday evenings, for two hours and may be taken through concurrent enrollment. Anyone in the area who would like to join us for reflective and hopefully lively discussions is welcome. This can be a nice way to renew and/or enhance personal levels of enthusiasm for striving to meet the challenge of successful teaching.

A really exciting outgrowth from the program reorganization has been a return to an original cornerstone of our program, namely, an intensive extended experience with large group Socratic instruction at the elementary level. The elementary teaching component of the program is in progress at Markham Elementary School in Vacaville. We have been enjoying an enthusiastic reception from both the teachers and students. The ongoing interaction has also enabled us to offer assistance to teachers who have been struggling to implement new text adoptions. For the remainder of this academic year, we will be conducting 5-7 classes at different grade levels. Anyone wanting to observe some of our classes is welcome; times for observations can be set-up by contacting Evelyn Silvia (emsilvia@math.ucdavis.edu).

In addition, our program requirements still offer flexibility for students to pursue a special emphasis on a mathematics-education topic or issue of interest. Consequently, students are still afforded the opportunity to focus on such things as technology in mathematics instruction, the use of history of mathematics to motivate and/or inform instruction, assessment, curriculum development projects, etc.

Finally, while we are on the critical topic of mathematics-education, we are wondering if you would like to contribute a phrase for us to consider including in a MAT Program Bill of Mathematics Learning Rights (the title needs a bit of work.). What kind of view of mathematics do we believe each child is entitled to see? Are there certain ways of thinking mathematically that we should seek to engender in every child or student. If you have a short relevant phrase that you think should complete the opener "Every student has the right to ___", send it to Evelyn at the email address given above.

Keep in mind that “Math is not a spectator sport.” Renew and rejuvenate your mathematical ways of thinking on a regular basis. You may come to need them when you least expect it.

Life After Davis

*Submitted by John Wagner
(BS 1990, MS 1994, Ph.D. 1998)*

I transferred to Davis from Santa Rosa Junior College in 1986, enrolling as a mathematics major. I had started off at SRJC in physiology, but my interests were too broad, so I changed to mathematics after two years. When I got to Davis, my interests broadened again when I discovered computers, thanks in large part to Ron Olsson. Soon thereafter, Gary Kurowski and Dallas Banks showed me The Way—the applied side of mathematics. Then something amazing happened—I lucked out. I met Joel Keizer, the director of the Institute of Theoretical Dynamics, and he hired me as a computer assistant. Within months, I was working with Joel and Ron Fox (GA Tech), computing trajectories of systems of ordinary differential equations in the presence of (thermal) noise. Soon, I found myself working with Angela Cheer and a number of others at the ITD. They had gotten me hooked on an area of research that allowed me to combine my interests and talents—computational science.

After finishing my BS in 1990, I continued working at the ITD. In 1992, I started graduate work in the GGAM, with Joel as my advisor. Again, I lucked out, because around that time, he moved from physical chemistry to mathematical/computational biology. For my MS research, I developed a theory of how calcium is buffered in cells. I then continued on with Joel, developing a model of the fertilization calcium wave in frog eggs, in collaboration with Richard Nuccitelli. Almost all of my coursework was vital to my research, in particular, Angela Cheer’s and Gerry Puckett’s courses in numerical analysis, Alan Edelson’s course in partial differential equations, and Gerry Puckett’s courses in mathematical fluids.

Upon completion of my Ph.D. in September, 1998, I began working with Joel building a prototype beowulf computer cluster at the ITD. Soon thereafter, he became ill, and passed away several months later. I then joined a group Joel and I had collaborated with at the University of Connecticut Health Center. They were developing a computational framework, The Virtual Cell, for modeling cellular phenomena, and their director, Leslie Loew, took me on as a postdoctoral fellow. I now work on The Virtual Cell as a developer, as well as do my own research. I have

a NIH NRSA fellowship, with which I am studying the mammalian fertilization wave—not only modeling, but also in the lab. And, while I don’t currently teach mathematics, I do teach a bit of neurophysiology in the medical school, including a lab. I also collaborate with a number of other experimental biologists, and work half time for a small marketing company in New Mexico.

Life in Connecticut is quite different. I got used to the weather quickly, but I am not certain I will ever adjust to the differences in attitudes and lifestyles. On the other hand, I get to spend a good amount of time on Cape Cod, especially during the summer, and I have taken up fishing again. I’m also finding it quite a challenge being a single dad (more or less—it’s a long story) and working in research. Michael is in preschool, and Robin is in a private kindergarten—though I can’t really afford either. I still follow Aggie football as religiously as before, listening to every game via the web, and taking the kids to games whenever we play on the east coast.

I loved my time at Davis, and my time there was very well spent. While there wasn’t actually any kind of a program in mathematical/computational biology, the GGAM gave me the coursework I needed in mathematics while allowing me to take the coursework I needed outside the department; the flexibility really made a difference. I was also fortunate enough to meet people who were willing to take me under their wings and mentor me, not only coursework but research as well. Much of that I owe to the ITD, and the people there—faculty like Joel, Angela Cheer, Carole Hom, Michael Saxton, and Alan Hastings, as well as graduate students and postdocs, like Kevin Higgins, Greg Smith, Saleet Jafri, Eric Marland, and Chris Fall. But the ITD is almost inseparable from the GGAM, and without that deep relationship, I would have had a difficult time

Staff News

by Dan Slauson, Manager

As many of you may be aware, this has been a year of much transition for the staff within the Department of Mathematics. The most obvious changes were the loss of both managers this past summer. Tracy Ligtenberg was promoted to Assistant Dean in the College of Letters and Sciences and Tracey Brooks received a promotion to Manager of the Department of Biomedical Engineering. On behalf of the Department, we congratulate “the two Tracy’s” on their promotions.

Linda Potoski was hired in September as Business Manager to replace Tracey Brooks. Linda brings with her 14 years of experience working with the University, most of which was within the College of Letters and Sciences in

the areas of undergraduate, graduate and financial support. This experience and knowledge will no-doubt benefit the Mathematics Department and Linda was warmly welcomed by the department upon arriving.

Finally, I would like to thank the staff and faculty for such a warm welcome since I came on board as the Manager for the department on November 13. I feel my prior five-year tenure as Administrative Manager for the Department of Pediatrics at the Medical Center has provided me the experience and the basic tools to make this transition successful. I am very excited to be a part of this department. If we haven't yet met, please feel free to stop by Room 568 and introduce yourself.

I, along with all the staff of the Department of Mathematics, look forward to an exciting year.

Emeriti Update

By Sherman Stein, Professor Emeritus

Henry Alder, who ended his teaching career with the 2000-2001 academic year, is pleased that the number theory course he offered for many years was taught by his excellent student Matthew Nelsen (now Nelsenador). He continued to serve on committees, including chairing the department committee selecting the recipient of the Henry L. Alder Prize for Excellence in Teaching. He also served on the committee preparing the statewide tests that measure students' mathematical achievement. He continued to serve on several MAA committees, including the one selecting the recipients of the MAA Distinguished Service Award and was a member of the Committee on Polya Lecturers. He also continued to serve on the Board of Governors of the Pacific Journal of Mathematics and chair of its investment committee.

Donald Benson is writing a second book under contract with Oxford University Press. It is on the topic of math appreciation and is intended as both a trade book and a college-level text. He expects to finish the manuscript by the end of this year.

Don Chakerian has continued working with Kurt Kreith in the California Professional Development Institutes. They are also collaborating on a technology-oriented high school textbook, *Teaching Mathematics Using Technology*, consisting of activity-based algebra modules, to be published by McDougal Littell in October, 2001. His article, "Central Force Laws, Hodographs, and Polar Reciprocals," appeared in the February, 2001 issue of *Mathematics Magazine*.

Kurt Kreith interrupted his retirement to accept a

position as co-director of the California Mathematics Project. In this capacity he also serves as co-director of the California Mathematics Education Technology Site (CMETS), providing assistance to secondary school teachers who wish to integrate technology into the mathematics curriculum. He also helped establish a Davis site for Cosmos, a program in mathematics and science for high-school students, previously only at Irvine and Santa Cruz. Eighty students from all over California participated for four weeks during the summer, 2001.

Washkek Pfeffer's new book, *Derivation and Integration*, was published by Cambridge University Press. He gave two lectures at the University of Ulster in Northern Ireland, was a principal speaker at the Conference on Real Analysis in Ogden, Utah, and an invited lecturer at the Workshop on Measure Theory and Real Analysis in Italy. He also spent two weeks as an invited Research Professor at the Center for Theoretical Study of Charles University in Prague and completed an invited paper, *Derivatives and Primitives*, for *Mathematicae Scientifcae Japonicae* (formerly *Mathematica Japonica*).

Sherman Stein's third book since he retired, *How the Other Half Thinks*, was published by McGraw-Hill in July. It is a trade book which uses nothing more than arithmetic and common sense to introduce the reader to several topics in advanced mathematics and the mathematical style of thinking. In addition, he gave several talks on Archimedes, a week's lectures to high school teachers, and a similar contribution to Cosmos. He also made progress in his study of latin transversals of rectangular arrays.

Takayuki Tamura continued his research in semigroups, contributing papers to the Fourth Symposium on Algebra, Languages, and Computation at Osaka Prefectural University and to Colloquia at the Mathematical Research Institute at Kyoto University. In addition, he continued to serve as a reviewer for *Mathematical Reviews* and *Zentralblatt fur Mathematik* as well as a monitor of Radio Japan's World Network. He continues to publish poetry in the traditional Tanka style in the *Meiji Shreine Tanka Monthly* in Japan and in the *Monthly Tanka Group* in the United States, as well as free verse in English in the *Covell Gardens Monthly*.

Life After Davis

Submitted by (Meng Kai) John Hong (Ph.D. '00)

First I would like to thank to Professor Cheer for giving me the opportunity to talk about my life at UC Davis and express my appreciation to people who have helped and inspired me in many ways.

I was a graduate student in the applied math program at UC Davis from 1995 to 2000. Currently I am a post-doctoral researcher in the Mathematics Department at UCLA. It's been more than a year since I moved down to Los Angeles, but I feel like I am still living and working with my colleagues at Davis. I have lots of sweet memories that I would like to share with my friends at Davis.

The first thing I want to talk about is my research life with Professor Blake Temple in Davis. I will say that he is the professor who had the most influence in my learning of mathematics. To me, he is not only my thesis advisor but also a good friend who encouraged me when I was stuck in my research. I finished my master's degree in mathematics at UC Santa Cruz before I came to Davis. I was sort of aware of which research field I wanted to focus on in mathematics. I like Partial Differential Equations and Differential Geometry. After I talked to some professors in Mathematics Department, they suggested to me that I talk to Professor Temple. After a short talk with him, his research field and brilliant way of thinking impressed me, so I decided to learn shock waves theory from him. After all these years of working with him, I believe I was very lucky to have him as my advisor and friend. Here I want to thank him with all my heart.

Another thing that I really enjoyed in Davis was the courses that I took in the Mathematics Department. In most of these courses the instructors really cared about what students needed and were willing to help students out. They also taught students to understand general concepts as well as computing skills. This dedication provides me with a nice example to follow when I teach at the university level. I am thankful to those professors who contribute their time and effort in their teaching in the Mathematics Department of UC Davis.

In the end I would like to thank my friends at Davis who shared their experience of life with me in my last five years at Davis, especially to Youn-Sha Chan, Eric Lau, Long Li and Wenlong Jin. I still remember many nights of hard-work in offices with those fellows. Without them, life in Davis would have been boring for me. I will cherish those wonderful memories that they gave me in Davis.

Alumni News

- **Kirk Athanasiou** (BA, 1998), is in his third year of law school at Boalt Hall (at the UC campus down the road). Upon completing his J.D., he anticipates moving to Seattle with his fiancée.

- **Leeann Bent** (BS, 1998) completed a Master's in Computer Science at our sister campus, UC San Diego (Spring 2000). She currently is a doctoral student and works on high performance computing software. Leeann still maintains ties to Davis via co-authorship of a manuscript with her undergrad thesis advisor, Professor Alex Mogilner. Now that she lives in Southern California, she has taken up snowboarding.
- **Jason Gonzales** (BS, 1997) and **Aileen Co Gonzales** (BS, 1997) are the proud parents of Matthew Co Gonzales, born Wednesday, 12 September. When not changing diapers, Jason is a doctoral student in chemistry at the University of Georgia and Aileen did database work and programming for researchers in the health sciences.
- **Anne Goodchild** (B.S., 1995) left a position with the London office of PriceWaterhouse Coopers and began a doctoral program in Operations Research at UC Berkeley this fall. While in London, she successfully trained for and completed her first marathon. She and husband Bill Cahill (Engineering, 1998) returned to the US by way of several mountains and fjords in Scandinavia.
- In April 2001, **Nikki Levine** (a.k.a. Leslie N. Levine, B.S., 1996) and husband Ben Willis became proud parents of a little girl, Emily Rose. Nikki currently enjoys the tasks associated with both being a mom and writing a master's thesis. She should receive her degree from the University of North Carolina this year. Nikki, Ben, and Emily Rose have returned from the east coast and now live in Carson City, Nevada, just a few hours from Davis.
- Since graduation, **Becky Noonan** (B.A., 1999) has spent much of each year working at Plimouth Plantation, a historical re-enactment park in Massachusetts. Most recently, she portrayed the pilgrim woman "Lucretia Brewster." In August 2001, Becky moved to Budapest to teach high school mathematics and English. In case you're wondering, Becky speaks modern English, 17th century English, Spanish, German, and Hungarian well enough to get by in a variety of cultures.
- **Seth Stevelman** (B.S., 1998) exchanged writing and

grading mathematics homework at Davis for research- ing and writing legal papers in law school. As a result of his labors, including a 100 page treatise on Casey Martin v. PGA Tour, Inc., Seth graduated from Harvard Law School in June 2001. He spent the summer preparing for the New York Bar exam and began a clerkship with a federal judge in Riverside, CA, after Labor Day. His efforts paid off -- he recently learned that he passed the New York bar. Seth currently anticipates spending the winter studying for the California Bar Exam. He really knows how to have a good time.

- **Peter Storm** (BS, 1997) has been busy since graduation. He married former UC Davis math major Cheryl Bickford and began work at MIT's Lincoln Laboratory in Sept of 1997 doing research on radar systems for Ballistic Missile Defense. Cheryl and Pete have two sons, Jeremy and Will. Current students and recent grads may know Pete because he visits UC Davis at least once a year to recruit for Lincoln Labs.

The Department of Mathematics Newsletter

EDITORIAL BOARD

Angela Cheer
John Hunter
John Gehrmann
Dan Slauson

As always, we would like to hear from former Davis mathematics students about what they are presently doing and how they are applying their mathematical skills.

Please return the complete Alumni News Update Form to:

Dan Slauson, Newsletter Editor
Department of Mathematics
University of California
One Shields Avenue
Davis, CA 95616-8633

or access the form on the Department's Home Page at:

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

Alumni News Update Form

Please send us information about yourself

Name: _____

Address: _____

E-mail: _____

Phone: _____

Degree and year received: _____

Positions held since leaving UCD:

Current position:

Institution or company:

Location: _____

Other news about yourself and others:

Type of information (not included in this Newsletter) which you would like to see included in the next issue:

[] Check here if we can use the "news about yourself and others" in the next issue of the Newsletter.

Any comments and suggestions:

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DEPARTMENT OF MATHEMATICS NEWSLETTER

University of California, Davis

Academic Year 2001-02

Message from the Chair

By John Hunter

The past year has been an eventful one in the Department. Three new faculty members have joined us: Craig Benham, Maury Bramson, and Claudia Neuhauser. Craig works in molecular biology, Maury in probability theory, and Claudia in probability and mathematical biology. One faculty member, David Barnette, retired after a long and distinguished research career in graph theory and combinatorial geometry. He came to UC Davis in 1967, and gave a very funny description of the changes from the simpler world of the 1960's to our brave new, and considerably more bureaucratic, world of the 21st century.

The Department faculty members continue to garner new awards: Art Krener is a Guggenheim Fellow for 2001/02, and Anne Schilling has been awarded a Humboldt Fellowship to work in Germany in 2002/03. Albert Fannjiang is a UC Davis Chancellor's Fellow for 2001/02, and an AMS Centennial Fellow for 2002/03. Alex Mogilner was a Chancellor's Fellow in 2000/01, making the Department of Mathematics the only Department in the University that has had a Chancellor's Fellow in the two years since the program's inception. Craig Tracy and Bruno Nachtergaele are invited speakers at the upcoming International Congress of Mathematicians in Beijing, Sept 2002. They are both speaking in the session on Mathematical Physics, which has only 12 invited speakers, two of whom are from UC Davis.

In other good news, the Department has heard from the National Science Foundation that our proposal (led by PI

Bruno Nachtergaele) for a VIGRE program will be funded. This 5 year, \$3,000,000 grant will support graduate students, postdocs and bring undergraduates into research. The VIGRE program will be organized around Research Focus Groups that will bring together undergraduates, graduates, postdocs, and faculty members to work on research areas of common interest.

Several of our current and former Ph.D. students have received awards. Carmeliza Navasca (advised by Art Krener) won first place in the Best Student Poster Prize contest at the 2001 ACM symposium in Houston. Shannon Star (advised by Bruno Nachtergaele) is an NSF Postdoctoral Fellow at Princeton University. Lisa Korf (advised by Roger Wets, and now an Assistant Professor at the University of Washington) won the competition for the best paper by a graduate student or postdoc with a Ph.D. less than 5 years old at the International Conference on Stochastic Programming in Berlin, 2001. The runner-up was Sergio Lucero, another recently graduated student of Roger Wets. Tyler Evans (advised by Dmitry Fuchs) received a UC Faculty Fellowship, and is taking up a position at Humboldt State University.

In a major development, we learned last Fall that the Department will be moving into a brand new building. The building will be located in the South area of campus, on the site between Academic Surge, the Crocker Nuclear Laboratory, and the Engineering III building. We are currently in the first stages of planning for this new Mathematical Sciences Building. With the continued growth of the Department and the University, we are desperately in need of additional space. Even though we will miss Kerr Hall, the new building will be a great improvement. The budget for the project is \$22,000,000 and the building is scheduled for completion in August, 2004.

There have been several changes during the past year in the administration and Department staff. I have taken over as Chair from Motohico Mulase, who did a wonderful job of leading the Department in the previous three years. As I started my new position, the Department's MSO, Tracy Ligtenberg, and business manager, Tracey Brooks, both received well deserved promotions, and left the Department (a possibility Motohico somehow neglected to mention while lining me up as his replacement!). Tracy Ligtenberg is now an Associate Dean in the College of Letters and Sciences, and Tracey Brooks (who spent 11 years in the Department of Mathematics) is now

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the MSO of Biomedical Engineering. Fortunately, we were able to hire excellent replacements: Dan Slauson, our new MSO, joins us from the Department of Pediatrics in the UC Davis Medical School, and Linda Potoski, our new Business Manager, joins us from Graduate Studies.

The coming year promises to be an equally active one for the Department. If you are in the area, please drop by and say hello, or let us know how you are doing.

New Faculty

Craig J. Benham, A Mathematical and Computational Biologist

Suppose we have a loop-like DNA strand. Although most DNA molecules do not form a loop, a loop-like substructure exists on many large DNA molecules, and the same analysis applies to such substructures. As a model, we can imagine a loop made of two tightly intertwined fibers. It is intuitively obvious that when we further twist the strand and then form a loop, the two fibers will be woven tighter. On the contrary, if we untwist the strand before making a loop, then the threads will get loose. Does this intuition have any biological significance?



It required a tremendous insight of Professor Craig J. Benham to discover a mechanism that connects this intuitive mathematical information with biological outputs.

The mathematical quantity in question is the topological winding number. When a double helix forms a loop, the two chains of nucleotides wind one another, and the winding number, which is an integer, determines the topological structure of the loop-like strand.

It has been known that there are enzymes that increase or decrease the topological winding number of a loop-like DNA. These enzymes must be doing something biologically important. To the astonishment of the scientific community, Dr. Benham is able to calculate, for every loop-like substructure of a DNA and a given topological winding number, the minimal separation energy for each base pair on the loop. Based on his calculation, he can predict exactly which base pair would be separated to what extent, and also he discovered that the separation site moves as the winding number changes.

What is the mathematical apparatus that connects the topological winding number and the minimal separation

energy of a nucleoside pair? It is indeed a work of a genius. Dr. Benham identified that the hidden link between topology and biology is statistical mechanics. He uses deceptively simple, elementary statistical mechanical models of a one-dimensional finite system to calculate the minimal separation energy of every base pair in DNA, with the topological winding number as an input. The precise predictions of his beautiful method have been experimentally verified, both in vivo and in vitro.

Since the work of Watson and Crick, the information stored in DNA has been considered to be essentially a linear sequence of nucleotides. Dr. Benham has proven that DNA is a dynamic object that has a mechanical structure that allows creation of topological information, and this very topology governs biologically important functionality of the molecule.

Dr. Benham joined the Department of Mathematics in March 2001. He is also jointly appointed in the Department of Biomedical Engineering, and serves as Interim Director of the UC Davis Genome Center. He received his Ph.D. in Mathematics (for his work in Algebraic Geometry!) in 1972 from Princeton University. Since 1988 he has been Professor of Biomathematical Sciences at the Mount Sinai School of Medicine in New York.

Craig and Marcia Benham live in Davis, with one of their daughters currently attending the Davis High School.

Maury Bramson earned his Ph. D. from Cornell University in 1977, and since has had a post-doctoral position at Courant Institute, followed by faculty appointments at University of Minnesota and University of Wisconsin.

Maury's research interests lie in various areas of probability theory, and his main focus can be loosely described as studying "complicated random systems with many interacting components." Such systems originate from physics, biology, chemistry, or computer science. Maury was one of the founders of probabilistic analysis of interacting particle systems, and, together with his coauthors, introduced and sharpened such techniques as renormalization, random walk asymptotics, and distributional and hydrodynamic limits. One classic tour de force is his work with Joel Lebowitz, in which they study diffusing particles of two types which annihilate upon collision, in the matter—antimatter style. One of the results states that the two types of particles separate in three dimensions, so that only one type can be



seen locally.

More recently, Maury has devoted his attention to queuing systems, with many deep and surprising results which seem paradoxical even to the experts. For example, it may happen that lines in a poorly designed queuing network will grow even when customers are served faster than they arrive, due to the fact that some servers are starved for work while others are overwhelmed.

Claudia Neuhauser joined our department this year as a Professor of Mathematics. She will hold a joint appointment with the Department of Evolution and Ecology. Claudia received Diplom in Mathematics (approximate German equivalent of M.Sc.) at the venerable Heidelberg University, and went on for PhD studies to Cornell. She obtained her Ph.D. from Cornell University in 1990. Richard Durrett, well known mathematician, was her Ph.D.



adviser. She moved a lot after that - true sign of an ambitious scientist - from U. of Southern California, to U. of Wisconsin at Madison, to U. of Minnesota at Minneapolis, stopping by, for few months, at Princeton University. Now, we hope her travels are over - the lure of Davis is irresistible! Claudia's husband, distinguished probabilist Maury Bramson, also joined our department.

Dr. Neuhauser is an applied mathematician. In her early research, Claudia focused on interacting particle systems inspired by biological processes, obtaining many exciting and important results. For example, in her joint work with R. Durrett she developed techniques to prove convergence to reaction-diffusion equations in systems with rapid stirring, while in another work she established integro-differential equations as limits of large-scale models. Lately, Dr. Neuhauser is engaged largely in ecology and genetics, while still doing rigorous mathematics, which makes her unique in the biomath community. (Current trend is to do very simple and heuristic mathematics and very complex biology, see profiles of A. Mogilner and C. Benham.) More specifically, most ecological models of communities do not take into account that individuals interact with each other in a spatial environment. Claudia investigates how space affects community dynamics. In genetics, to interpret population genetic data, genealogical or coalescent methods have proved extremely valuable. This method allows one to estimate population genetic parameter, such as mutation rate. Dr. Neuhauser's research focuses on how selection shapes the genealogical tree of sampled genes.

Besides doing research and teaching, Claudia is involved in a lot of what NSF calls 'synergistic' activities. This year, she is an organizer of the prestigious Gordon Research Conference on Theoretical Biology and Biomathematics. She wrote a novel and unique calculus textbook ("Calculus for Biology and Medicine," Prentice Hall) for biologists and is teaching a new course on campus using this book (MAT17). She is also a PI of an extremely large NSF 'Biocomplexity' grant housed in University of Minnesota. The goal of this grant is to predict the evolutionary and ecological consequences of large range expansions and contractions of plants (like corn and beans) on their associated biological communities. Due to respective obligations, Claudia will spend most of this year in frozen Minneapolis. With luck, we will see more of her next year!

Awards and Prizes

Guggenheim Award to Art Krener

The John Simon Guggenheim Memorial Foundation provides fellowships for advanced professionals in all fields (natural sciences, social sciences, humanities, creative arts) except the performing arts. Professor Arthur Krener was chosen as one of approximately 180 Fellows for the year 2001. He is the fourth member of the Department to be so honored. Roger Wets was a Guggenheim Fellow in 1981, Marc Mangel in 1987 and Blake Temple in 1994.

Krener received his Ph.D. in Mathematics from UC Berkeley in 1971 and immediately joined the department as an Assistant Professor. In 1976 he was promoted to Associate Professor and in 1980 to Professor. He has held visiting positions at Harvard University, the University of Rome, Imperial College of Science and Technology, NASA Ames Research Center, the University of California, Berkeley, the University of Paris IX, the University of Maryland, the University of Newcastle, Australia and the University of Padua.

His research interests are in developing methods for the control and estimation of nonlinear dynamical systems and stochastic processes.

Professor Krener is a member of the American Mathematics Society, the Society for Industrial and Applied Mathematics and is a Fellow of the Institute of Electrical and Electronic Engineers. His 1981 paper with Isidori, Gori-Giorgi and Monaco won a Best Paper Award from the IEEE Transactions on Automatic Control. His 1977 paper with Robert Hermann was recently chosen as one of

25 Seminal Papers in Control published in the last century.

Krener has held a variety of administrative positions including Vice Chair for the Undergraduate Program, Vice Chair for the Graduate Program and Chair of the Department.

With the extra time made available by this Fellowship, Krener hopes to make substantial progress on the study of Normal Forms and Bifurcations of Control Systems

Naoki Saito Receives PECASE Award

Naoki Saito received the Presidential Early Career Award for Scientists and Engineers (PECASE) at the White House on October 24, 2000, for “pioneering work on harmonic analysis and wavelet theory, with application to signal and image processing.” Naoki was among 59 researchers nationwide presented with this award. The PECASE is the highest honor bestowed by the United States government on young professionals at the outset of their independent research career.

Naoki and his wife Mayumi went to the White House to receive this award. Unfortunately, Naoki and others could not meet President Clinton due to his busy schedule, in particular, his meeting with King Abdullah of Jordan on that day.

The ceremony was conducted by Dr. Neal Lane, then Assistant to the President for Science and Technology (currently University Professor at Rice University). Dr. Lane not only congratulated the awardees but also highly praised their spouses and families for their support. Naoki had a good time chatting with Dr. Lane at the reception after the ceremony. It turned out that Dr. Lane is a saxophone player and shared some musical interests with Naoki, who is a guitar player.

With this award, Naoki will conduct research on computational harmonic analysis, in particular, its application to characterization and model building of high-dimensional stochastic processes (e.g., faces, hyperspectral images, seismic data), extraction of features insensitive to geometric transformations (e.g., translations, rotations, dilations), and segmentation of images into homogeneous textured regions. He will also investigate the use of the uncertainty principle developed in harmonic analysis for the above-mentioned applications as well as for computational neuroscience.

Official White House release page of the Office of Science and Technology Policy for PECASE: (see Department of Defense) http://www.ostp.gov/html/001030_2.html. Dr. Neal Lane’s speech at the award ceremony: http://www.ostp.gov/html/001030_3.html

PECASE award photo web page: <http://math.ucdavis.edu/~saito/pecase.html> Naoki Saito’s home page: <http://plane.math.ucdavis.edu/~saito/>.

Alex Mogilner and Albert Fannjiang named Chancellor’s Fellows

Alex Mogilner has been selected to be a Chancellor’s Fellow for 2000-2001 and Albert Fannjiang was selected for 2001-2002. The Chancellor’s Fellow Program was established to honor the achievements of outstanding faculty members early in their careers. Both Alex and Albert were chosen for their demonstrated excellence in academic pursuits, as evidenced by the quality and significance of their research and teaching.

Tyler Evans named Faculty Fellowship Researcher

Tyler Evans was appointed to the position of Faculty Fellow Researcher just after he completed his Ph.D. dissertation under the direction of Professor Dimitry B. Fuchs. It is a two year appointment. Quoting from the memo distributed by the office of the Vice Provost Patricia Turner, “The Faculty Fellows Program for UC Ph.D.s provides mentored training and experience in the design and conduct of instructional courses and research.”

The Teaching Resource Center hosted a dinner, attended by all 6 Faculty Fellows, corresponding mentors and department chairs and the college Deans. The purpose was to discuss the ways in which the fellows were being utilized in strengthening undergraduate education at UC Davis.

Dr. Evans was offered, and accepted, a tenure track position at Humboldt State University.

Humbolt Fellowship to Anne Schilling

Anne Schilling won an Alexander von Humboldt Fellowship for 2002/03. She plans to spend from June to December of this year at the Bergische Gesamthochschule Wuppertal working with Prof. Peter Littelmann and at the Max-Planck-Institut für Mathematik in Bonn, Germany. In terms of her research Anne says, “I have been working on affine crystals which are the combinatorial structures underlying quantum algebras associated with affine Kac-Moody algebras. Affine crystals provide a grading of tensor product spaces, also known as charge. Peter Littelmann in Bonn/Wuppertal

introduced the now famous path model. The fundamental combinatorial objects in this theory are piecewise linear maps in the vector space spanned by the weights of an symmetrizable Kac-Moody algebra. However, it is not yet known how to define the charge in the path model setting. It is the hope that during my stay in Bonn/Wuppertal we can merge our ideas and make progress on this problem.”

Five Visiting Research Assistant Professors Join Us this Year

Raymond Hemmecke joined the department as a Visiting Research Assistant Professor in July of this year. In 1997, he received his diploma degree in mathematics from the University of Leipzig, Germany, and in 2001, his doctoral degree in mathematics from the University of Duisburg, Germany. At UC Davis, he collaborates with the group of Jesus De Loera.



Raymond’s research interests are computational algebra, combinatorics, and primal methods in integer programming. His favorite notions are test sets, Groebner bases, and Hilbert bases.

In his spare-time he likes to travel, to play games like Tantrix, to drink café latte in a cozy place, to chat with friends in nice pubs, and to think about the meaning of life.

Aaron A. King recently joined the department as a half-time VRAP. His other half is an NSF Mathematical Sciences Postdoctoral Research Fellow. He studied at Rice, Hawai’i, and Arizona, taking his Ph.D. there in Applied Mathematics in 1999. After a postdoctoral stint at Arizona, he came to Davis in the summer of 2000. His work has both theoretical and experimental components. On the theoretical side, he uses the mathematics of dynamical systems, bifurcation theory, and stochastic processes to understand spatial and temporal patterns in animal population fluctuations and their role in community organization. On the experimental side, he works with populations of flour beetles, whose cannibalistic lifestyle leads to mathematical nonlinearities and thence to exotic fluctuations.



When not engaged in research or teaching, he enjoys life in Davis with his artist wife, Carrie, and 10 year old son Sequoyah.

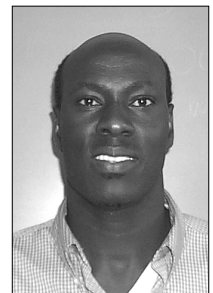
Xiaoping A. Shen is half time VRAP and half time ONR Fellow working with Naoki Saito. She received her MS degree in mathematics from Chinese Academy of Sciences, Beijing, China in 1987, MA degree in mathematics from University of Toledo in 1993, and Ph.D in applied mathematics from University of Wisconsin—Milwaukee, in 1997. She held faculty or visiting faculty positions at Tianjin University (China), Tsinghua University (China), University of St. Thomas (USA), Naresuan University (Thailand) and Eastern Connecticut State University (USA). She also has extensive industrial experience as a consultant.



Her research interests include numerical methods for integral equations, wavelet analysis and their applications. She will work on computational harmonic analysis, in particular, applications of the prolate spheroidal wave functions with Naoki Saito.

Her non-research interests include reading and sewing. She has already found the atmosphere of Davis suitable for her because she likes small towns, cozy settings and loves animals.

Issa A. Tall joined the department as a Visiting Research Assistant Professor. He received his PhD in December 2000 at the Institut National des Sciences Appliquées de Rouen in France. He worked in control theory under the supervision of Professor Witold Respondek who was a postdoctoral scholar at UCD in 1985.



Tall’s research interests are concerned with normal and canonical forms of control systems, their symmetries and the important subclass of feedforward systems. Before receiving his PhD in France, he did graduate work in his native country at the University of Senegal where he received the certificate (DEA) in Differential Geometry. While at Davis, he will be collaborating with Professor Arthur Krener.

Daniel Ueltschi graduated from the Ecole Polytechnique Fédérale de Lausanne, Switzerland, in 1998. He comes



here from Princeton University where he spent two years as an Instructor. His work in mathematical physics focuses on the mathematical description of equilibrium states of quantum lattice systems. Dr. Ueltschi's faculty mentor will be Bruno Nachtergaele. Daniel already feels quite at home in Davis. The bike friendliness of Davis and the good medicine of the Napa Valley

are helping a lot!

News from the Undergraduate Program in Mathematics

By James Diederich

Vice Chair for Undergraduate Matters

The Undergraduate Program Committee was very active this year. Among its many activities, two are particularly noteworthy.

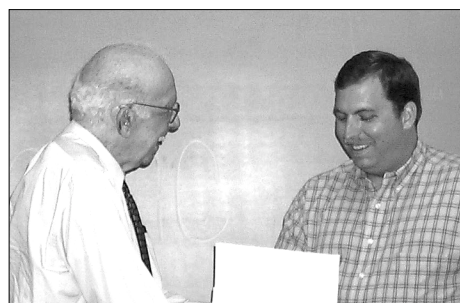
A new course, "Calculus for Biology and Medicine," Math 17ABC was developed and proposed in cooperation with Prof. Claudia Neuhauser, who will be joining our faculty this Fall and is an expert in mathematical biology, mathematical ecology, and biocomplexity. The course will be based on Prof. Neuhauser's new text, which has abundant applications of calculus in the biological sciences. Math 17A will be offered the first time beginning in the Fall Quarter, 2001. Math 17B and 17C will be offered in Winter and Spring, 2002, respectively.

Within the last decade, the research interests of the Department's faculty have expanded significantly into applied mathematics and into mathematical computation. Over 31 of our regular faculty work in applied and/or computational mathematics, 5 of whom work in mathematical and computational biology. The demand for understanding mathematical computation and applied mathematics comes increasingly from non-traditional sectors these days such as biology, economics & finance, design, and the like. Opportunities for students in applied and computational mathematics continue to expand as well. Consequently, two new majors in mathematics have been proposed, a Bachelor of Science in Applied Mathematics and a Bachelor of Science in Mathematical and Computational Mathematics. These new majors will provide considerable flexibility to students who desire

strong mathematical training but also wish to focus on particular areas of application of mathematics. We anticipate that these majors will be approved by Fall, 2002.

Henry L. Alder Prize for Excellence in Teaching Awarded to James P. Peirce

At the Department's Annual Awards Ceremony on June 7, 2001, the second award of the Henry L. Alder Prize for Excellence in Teaching was presented. The award was established in 1999 by Professor Henry L. Alder as an endowment for the Department to be used primarily for an annual prize of \$2,000 for the graduate student who is deemed to be the top teacher among all graduate students in mathematics.



This year's award was presented to James P. Peirce. He has done a remarkably effective job in his teaching ever since he taught his first class in the mathematics department in the first summer session of 1998. A faculty member visiting his Math 22B class in the fall of 1999 wrote that he "was impressed by the excellent organization of his work on the board and the clarity of his verbal explanations to the class."

The student evaluations for the classes he has taught confirm the impressions of this faculty member. In each of the classes he has taught recently, the average score of students' responses to the question asking for an overall evaluation of the instructor's teaching (on a scale from 1.0 to 5.0) ranges from 4.2 to 4.5, the latter being achieved in the most recent course he taught in the summer of 2000. Most noteworthy is that this latter score was achieved in a calculus course for non-majors which for almost all the students in the class is a required course and, therefore, typically not a favored one.

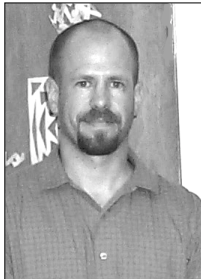
Many students added individual comments to their evaluations of the classes he has taught of which words like "a great teacher," "always willing to help," "overall a fantastic teacher," "one of the best ... I've ever had" are

typical. Many comments praise his clarity of presentation, his availability to students, and his care for student learning.

The department has previously recognized his special talents as a teacher by awarding him the William Karl Schwarze Scholarship in Mathematics for the academic year 2000-01.

In presenting the award, Henry Alder noted that the selection committee was impressed with the many graduate students who had an outstanding teaching record and that it would have been easy to give several prizes if this had been possible. He mentioned this for two reasons: 1. To show why the many graduate students with such superb teaching records should feel proud of their achievement by means of which they make a substantial contribution to the teaching mission of the department, and 2. to indicate why James Peirce should feel particularly good about having emerged as the recipient of this year's award among so many highly qualified graduate students.

*Michael Scott is the Wm. Karl Schwarze
Scholarship Recipient for 2001*



Michael Scott has been a graduate student in our Math Department for four years, since he received his master's degree in Mathematics from the CSU Northridge. His teaching career began even before that, as a tutor in community college. At Northridge, he was the only undergraduate allowed to be a physics teaching assistant. While pursuing his master's degree he was able to teach developmental math on his own for the first time.

Since coming to Davis, Michael has been an Associate-In for seven quarters, teaching classes which range from Math 16A to Math 22B. Currently he is working on his thesis under Blake Temple who enthusiastically recommends him. In addition to all of these efforts, for the past year he has served as a strong and effective President of the Galois Group.

Mr. Scott's letters of support stress both his mathematical competence as well as his teaching ability. Dr. Carole Hom, who was his first mentor when he began as an Associate-In commented "his presentation was superb, especially for a new instructor" and "He is head-and-shoulders above the average first-time Associate-In."

Students are equally enthusiastic. Here are some typical comments:

"Best instructor I have had in the Math 21 series." (21D student)

"This is the best math teacher I have ever had." (22B student)

"This was the most interesting math course I have taken at UC Davis, and most of the credit goes to Mr. Scott's manner of teaching." (22A student)

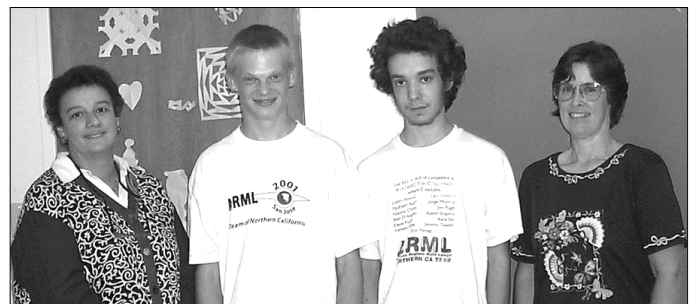
"Our instructor was always open to talk to and patient with dealing with lots of questions. The best math teacher I've had thus far." (22A student)

With all of these positive comments about his teaching ability and with his commitment to students, it is with great pleasure that we present the 2001 William Karl Schwarze Scholarship to Michael Scott.

The 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 from 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.

*Two Winners of the Eighth
Robert Lewis Wasser Prize*

The Robert Lewis Wasser Prize was presented to two students this year, **Austin Shapiro** and **Jeremy Tauzer** by Vice Provost for Undergraduate Studies Patricia Turner and by Cheryl Booth, Robert Wasser's mother, at the Mathematics Department Awards Ceremony held on June



7, 2000. The Wasser Prize of \$500 is awarded to the freshman or sophomore with the highest score in the Department of Mathematics Spring Math Contest.

Austin and Jeremy were Davis High School students who were enrolled in math classes at UC Davis. Jeremy was last year's winner of the Spring Math Contest. Both had perfect scores on the exam.

Mike Booth, Robert Wasser's step-father, also attended the ceremony. Vera May Wasser, Robert's grandmother was unable to attend due to an illness. She has faithfully attended all previous ceremonies since the inception of the Wasser Prize.

The Robert Lewis Wasser Memorial Fund, in excess of \$10,000, is named in honor of Robert Lewis Wasser and was initiated by Vera May Wasser. Prior to his tragic death in an automobile accident in September of 1993 just before the beginning of his junior year as a math major, Robert showed high promise as a developing mathematician, having taken some of the most challenging of our Junior-Senior courses as a sophomore and having impressed his instructors.

2001 Spring Mathematics Contest

What are the last four digits of 2001^{2001} ? Twenty-five participants in the Spring Mathematics Contest, held on May 19, spent two hours pondering over this and other questions. The contest is open to all undergraduates and high school students taking mathematics courses at UC Davis.



Seth Dutter, Austin Shapiro, and Jeremiah Tauzer presented complete solutions of all problems. Austin Shapiro and Jeremiah Tauzer shared the Wasser prize, which carries a cash award of \$500 for each winner. Austin Shapiro and Jeremiah Tauzer are Davis High School seniors with strong interest in mathematics. This year they are freshman at UC Berkeley.

Seth Dutter, a fourth-year student at UCD, won the first prize and a cash award of \$250. His other honors include

a departmental citation and a place on the Top 100 list in the Putman examination. Seth plans to enter the Berkeley graduate program in mathematics.

Ting Xi Liao and Kenneth Waters shared the second prize and received cash awards of \$150. Luke Donev, Samuel Merritt, and Josephine Yu won the third prize and cash awards of \$50 each. The hardest problem of the contest was probably the following:

A knight's journey is a sequence of squares connected by knight's moves that visits each square exactly once. Is there a knight's journey on a 4 by 4 chessboard?

Bori Mazzag wins the 2001 Alice Leung Prize

The Alice Leung Prize is an endowed prize in the Department given to one or more graduate students who have shown exceptional promise in all aspects of scholarship in mathematics, in particular, strong research potential. The winner receives a certificate and a cash prize of \$1,000.

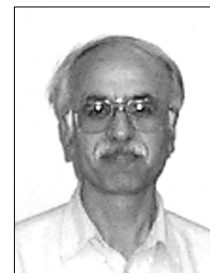
Bori Mazzag is currently working in Mathematical Biology jointly with Profs. Alex Mogilner, Abdul Barakat, and Geoff Goodhill. She is involved in a very complex interdisciplinary research in microbiology, where realistic mathematical models help experimentalists to unravel the mysteries of nature. Specifically, Bori models the process of chemotaxis (how bacteria find the optimal level of oxygen, and how growing neurons find their proper place in the nervous system). Bori is an excellent representative of a new generation of interdisciplinary minded, truly applied, mathematicians. She was nominated by Alex Mogilner.



Lower Division Teaching Award

Ali Dad-del, a lecturer in the Department, was the recipient the 2001 Prize for Outstanding Teacher of Lower Division Mathematics. During the period under review he taught a large number of the lower division courses offered.

After very lengthy deliberations the Committee unanimously chose Ali Dad-del as the recipient of this year's Lower Division Teaching Award. They were particularly impressed by



the fact that he teaches very large classes with remarkable success and that he has made very significant contributions to the teaching of Math 22A.

Dr. Dad-del received a 4 out of 5 rating in Math 16C with 333 students, a 4.7 out of 5 in Math 16A with 215 students and a 4.3 out of 5 in Math 22A with 63 students.

The students' comments are uniformly positive, and the following are representative: "Dr. Dad-del is a very tough professor," "I enjoyed the class, teacher very helpful in office hours," "I wish all teachers would hold review sessions like Dr. Dad-del does - they're very helpful."

He is doing a great job for the Department and he clearly deserves this distinction.

Picnic Day 2001

This year Picnic Day occurred on a pleasant spring day, no rain, wind or heat, just perfect weather. Crowds of people of all ages visited our display. Children accompanied by their parents, groups of youngsters, and alumni of the mathematics department all attempted math problems, tried puzzles, and enjoyed the challenges. Teachers and parents collected problems and information about our mathematics department, about studying math, and about careers related to mathematics. Many stopped to read about the research activities of faculty in our department. It was really very enjoyable to see so many different people show so much interest and challenge themselves with math problems.

The display opened at 10 AM and closed at 3 PM, when groups of people were still busy with the puzzles and doing problems. The whole display was a collective effort of undergraduates, graduate students and faculty. Many undergraduates devoted their time and effort for a big part of the day to set up, to stand behind tables and interact with visitors, and to clean up. Several graduate students helped to set up the display, including James Peirce and Genevieve Walsh. Inspired by an article of New York Times: "Why Mathematicians Now Care About Their Hat Color" published on Tuesday April 10, 2001, Wolfgang Spitzer, a visiting faculty member, and Genevieve Walsh made their own table for playing "What color is your hat?" Two undergraduates unexpectedly showed up in costumes as "Super MATH Man and Woman." Mikhail Khovanov set up his own table to play some pebble problems. He was a tremendous help in setting up the display.

Ali Daddel was the principal organizer of the display this year. Abby Thompson who was on sabbatical at Princeton

sent us a collection of interesting problems for children. These problems were printed on table napkins to entertain children in one of the local pancake houses in Princeton. In the past three years Ali Dad-del and Abby Thompson organized the display together.

The Math Department display has established its own place in many people's minds as a great place to visit on Picnic Day and is a terrific opportunity for the department to reach out and demonstrate the fun applications of math with many different people. Our special thanks go to the following students: Josephine Yu, Elaine Mi, Sandy Tu, Leopoldo Ocampo, Daisy Raymondson, Hiroshi Miyazaki, Jeffery Garberson, Joshua Damoth, Verity Sharp, Jennifer Cordial.

Graduation and Departmental Citations

This year a record 7 seniors received Departmental Citations, which were presented at the Annual Mathematics Department Awards Ceremony on June 7. These citations recognize students of exceptional ability who have achieved superb records in mathematics and have taken very strong programs in mathematics. Their grade point averages in mathematics were at or above 3.6 out of a possible 4.0 and their overall grade point averages were similar. They all received very strong support from the



faculty. They are Seth Dutter, who also won the Spring Math Contest; Heidi Arnold, who had one of the best records in two of our full year core sequences, Math 127ABC and Math 150AB; Lee Martin, who received the highest award for a graduating senior in the College of Letters and Science and is a double major in Mathematics and Linguistics; Lawrence Pack, who is a double major in Mathematics and Physics and has published a joint paper with Prof. Nactergaele; Ricky Burnett, who is a double major in Mathematics and Computer Science; Zachary Hannan, who is a double major in Mathematics and Physics; and Jennifer Cordial, who is a double major in

Mathematics and Economics and who wrote a thesis in Economics.

Undergraduate Degrees Conferred in 2001

AB

Katherine S. Allard
Michelle Z. Dulude
Jennifer C. Hung
Eva Elizabeth Rieder

Sara E. Day
Lisa Brooke Gassner
Everett L. Louis
Sarah B. Treadwell

BAS

Jennifer L. Cordial
Robert A. Lynds
Hoang M. Pham

Allen Liu
Lee M. Martin

BS

Matthew Steven Anderson
Heidi Jeanette Arnold
Ricky G. Burnett
Jeremy Thane Clark
Richard Robert Collins
Erin E. DeWeese
Janice D. Dudensing
Jeremy G. Dybdahl
Nicole M. Fleming
Steven T. Hess
Jesse R. Holman
Hoa T. Khuu
Jessica J. Kuang
Frances E. Lee
Karim Magdi Mahrous
Christopher R. Marsh
Tyrrell B. McAllister
Mark H. Nassi
Randall Everett Orr
Ram Puri
Daisy A. Raymondson
Bridget L. Riggs
Verity S. Simmons
Georgia L. Toland
Mariana Uribe
Zeke K. Vogler
Paul M. Wilson
Agnes M. Yik
Stacey Ann Zuccaro

Ikenna Patrick Anyaso
Parsa Bakhtary
Nhi T. Cao
Brian J. Coburn
Veronica S. Davis
Martin J. Donegan
Seth C. Dutter
Minda Marie Flanary
Zachary W. Hannan
Edward C. Ho
Christine Ironfield
Mark Kenneth Knapp
An Hoang Le
Scotland C. Leman
Harjit K. Mangar
Danielle B. Martinez
Brandon I. Muranaka
Loi M. Nguyen
Lawrence William Pack
Ivan C. Rankenburg
Matthew S. Renquist
Adrian J. Scherger
Ranjani Singh
Thao Trinh
John E. Van Veen
David M. Whitbeck
Olivia M. Wright
Rani K. Zahr

Graduate Program News

By Joel Hass

I am glad to report that the graduate programs at Davis are in a very healthy condition, with increasing numbers of applications, rising international recognition, and strong accomplishments by our students. In a major development, in Fall 2001 we learned of the award of a VIGRE (Vertically Integrated Graduate Research) grant to Davis from the National Science Foundation, through an effort spearheaded by Prof. Bruno Nachtergaele. This will result in major new resources for our graduate programs, in particular quite a few fellowships. It supplements our continuing Department of Education GAANN grant, which provides a half-dozen or so fellowships each year.

The 2000-2001 academic year saw six students completing Ph.D. degrees in Mathematics. Our students are the center of our graduate program, and I will now describe their achievements.

Jennifer Henry, working with Prof. David Barnette, completed a thesis titled "On Generating a Diminimal Set of Polyhedral Maps on the Torus." **Regina Parsons**, working with Prof. Tom Sallee, wrote on "The Effects of Increased Attention to the Calculus Foundations When Teaching Definite Integrals." She is currently working as a lecturer at UCD. **Shannon Starr**, whose adviser was Prof. Bruno Nachtergaele, wrote a well received thesis on "Some properties for the low lying spectrum of the ferromagnetic quantum XXZ spin system." He received a prestigious postdoc appointment at Princeton, as well as a highly competitive NSF postdoctoral fellowship. **John Thoo's** thesis was titled "Nonlinear Waves in Random Media," directed by Prof. John Hunter. John is on the Math Faculty at Yuba College, CA. **Eiko Tyler's** thesis, "Topology of Algebraic Varieties," was supervised by Prof. Motohico Mulase. She too is a lecturer at UCD this year. Finally, **Tyler Evans** (who really finished in 2000, but filed in 2001) wrote a thesis on "Deformations of infinite dimensional Lie Algebras" under the guidance of Prof. Dmitry Fuchs. Tyler taught this year, as a lecturer at UCD, and is now moving to a tenure track job at CSU Humbolt. Finishing with Master's degrees this year were Laimi Cong-Huyen, Tom Craven, Debbie Hill, Nichole Hoover and Michelle Lin. Debbie is an instructor at Sierra College. Michelle Lin is doing a Technical Director Internship at Pixar. Susan Kingston and Gratia Oakley completed MAT degrees. Susan is teaching at Dixon High, not far from Davis. Congratulations to all our graduates.

We welcomed ten new students this fall to the Mathematics program and seven to the MAT program. There has been steady growth, and with the addition of the VIGRE

program we can expect this to continue.

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.

GGAM Program News

By Bruno Nachtergaele

With four new faculty members joining the Graduate Group in Applied Mathematics, the group continues to expand its variety of expertise in mathematics and its applications. Craig Benham, Maury Bramson, and Claudia Neuhauser are members of the Department of Mathematics and Susan Tucker is in the Department of Chemistry. She works in theoretical chemical kinetics, energy transfer processes in and between molecules, and computer simulations of these phenomena.

Our program continues to grow with eleven new students arriving in the Fall of 2001.

Two student received their PhD degrees in 2000-2001. **Michael Casey** wrote his dissertation on "Stochastic Limit Laws for Stochastic Programming." His advisor was Professor Wets. Michael is now a Visiting Assistant Professor at the University of Arizona. **Matthew Williams'** advisor was Professor Puckett. The title of his dissertation is "Numerical Methods for Tracking Interfaces with Surface Tension in 3-D Mold-Filling Processes." Matt accepted a postdoctoral position at Los Alamos National Laboratory.

The following students received Masters degrees: **Wenlong Jin**, **Nicole London**, and **Barbara Mazzag**. They are now pursuing their PhD degrees.

Carmeliza Navasca, won first place (shared with Diane Jamrog, Rice University), in the Best Student Poster Prize contest at the ACM's First Richard A. Tapia Symposium, 2001, Houston, Texas, Oct 18-20, 2001. She presented a poster entitled "Local Solution of the Dynamic Programming Equations in Discrete-Time," co-authored with Arthur J. Krener, her dissertation advisor.

MAT Program News

By Evelyn Silvia

The third phase of the MAT Program in Mathematics is now well underway. We are pleased to report that the

professional development courses, Curriculum Development in Mathematics (MAT302), Pedagogical Issues (MAT303) and Mathematics Practicum (MAT301) have been reinstated so that all of the requirements for our MAT Program again can be completed within the department. This makes it easier for people who already hold teaching credentials to complete our program while providing more flexibility for graduate students who would like to double major (MAT/MA, MAT/Credential, etc.).

The MAT302 and MAT303 courses will be meeting every other week, on Monday evenings, for two hours and may be taken through concurrent enrollment. Anyone in the area who would like to join us for reflective and hopefully lively discussions is welcome. This can be a nice way to renew and/or enhance personal levels of enthusiasm for striving to meet the challenge of successful teaching.

A really exciting outgrowth from the program reorganization has been a return to an original cornerstone of our program, namely, an intensive extended experience with large group Socratic instruction at the elementary level. The elementary teaching component of the program is in progress at Markham Elementary School in Vacaville. We have been enjoying an enthusiastic reception from both the teachers and students. The ongoing interaction has also enabled us to offer assistance to teachers who have been struggling to implement new text adoptions. For the remainder of this academic year, we will be conducting 5-7 classes at different grade levels. Anyone wanting to observe some of our classes is welcome; times for observations can be set-up by contacting Evelyn Silvia (emsilvia@math.ucdavis.edu).

In addition, our program requirements still offer flexibility for students to pursue a special emphasis on a mathematics-education topic or issue of interest. Consequently, students are still afforded the opportunity to focus on such things as technology in mathematics instruction, the use of history of mathematics to motivate and/or inform instruction, assessment, curriculum development projects, etc.

Finally, while we are on the critical topic of mathematics-education, we are wondering if you would like to contribute a phrase for us to consider including in a MAT Program Bill of Mathematics Learning Rights (the title needs a bit of work.). What kind of view of mathematics do we believe each child is entitled to see? Are there certain ways of thinking mathematically that we should seek to engender in every child or student. If you have a short relevant phrase that you think should complete the opener "Every student has the right to ___", send it to Evelyn at the email address given above.

Keep in mind that “Math is not a spectator sport.” Renew and rejuvenate your mathematical ways of thinking on a regular basis. You may come to need them when you least expect it.

Life After Davis

*Submitted by John Wagner
(BS 1990, MS 1994, Ph.D. 1998)*

I transferred to Davis from Santa Rosa Junior College in 1986, enrolling as a mathematics major. I had started off at SRJC in physiology, but my interests were too broad, so I changed to mathematics after two years. When I got to Davis, my interests broadened again when I discovered computers, thanks in large part to Ron Olsson. Soon thereafter, Gary Kurowski and Dallas Banks showed me The Way—the applied side of mathematics. Then something amazing happened—I lucked out. I met Joel Keizer, the director of the Institute of Theoretical Dynamics, and he hired me as a computer assistant. Within months, I was working with Joel and Ron Fox (GA Tech), computing trajectories of systems of ordinary differential equations in the presence of (thermal) noise. Soon, I found myself working with Angela Cheer and a number of others at the ITD. They had gotten me hooked on an area of research that allowed me to combine my interests and talents—computational science.

After finishing my BS in 1990, I continued working at the ITD. In 1992, I started graduate work in the GGAM, with Joel as my advisor. Again, I lucked out, because around that time, he moved from physical chemistry to mathematical/computational biology. For my MS research, I developed a theory of how calcium is buffered in cells. I then continued on with Joel, developing a model of the fertilization calcium wave in frog eggs, in collaboration with Richard Nuccitelli. Almost all of my coursework was vital to my research, in particular, Angela Cheer’s and Gerry Puckett’s courses in numerical analysis, Alan Edelson’s course in partial differential equations, and Gerry Puckett’s courses in mathematical fluids.

Upon completion of my Ph.D. in September, 1998, I began working with Joel building a prototype beowulf computer cluster at the ITD. Soon thereafter, he became ill, and passed away several months later. I then joined a group Joel and I had collaborated with at the University of Connecticut Health Center. They were developing a computational framework, The Virtual Cell, for modeling cellular phenomena, and their director, Leslie Loew, took me on as a postdoctoral fellow. I now work on The Virtual Cell as a developer, as well as do my own research. I have

a NIH NRSA fellowship, with which I am studying the mammalian fertilization wave—not only modeling, but also in the lab. And, while I don’t currently teach mathematics, I do teach a bit of neurophysiology in the medical school, including a lab. I also collaborate with a number of other experimental biologists, and work half time for a small marketing company in New Mexico.

Life in Connecticut is quite different. I got used to the weather quickly, but I am not certain I will ever adjust to the differences in attitudes and lifestyles. On the other hand, I get to spend a good amount of time on Cape Cod, especially during the summer, and I have taken up fishing again. I’m also finding it quite a challenge being a single dad (more or less—it’s a long story) and working in research. Michael is in preschool, and Robin is in a private kindergarten—though I can’t really afford either. I still follow Aggie football as religiously as before, listening to every game via the web, and taking the kids to games whenever we play on the east coast.

I loved my time at Davis, and my time there was very well spent. While there wasn’t actually any kind of a program in mathematical/computational biology, the GGAM gave me the coursework I needed in mathematics while allowing me to take the coursework I needed outside the department; the flexibility really made a difference. I was also fortunate enough to meet people who were willing to take me under their wings and mentor me, not only coursework but research as well. Much of that I owe to the ITD, and the people there—faculty like Joel, Angela Cheer, Carole Hom, Michael Saxton, and Alan Hastings, as well as graduate students and postdocs, like Kevin Higgins, Greg Smith, Saleet Jafri, Eric Marland, and Chris Fall. But the ITD is almost inseparable from the GGAM, and without that deep relationship, I would have had a difficult time

Staff News

by Dan Slauson, Manager

As many of you may be aware, this has been a year of much transition for the staff within the Department of Mathematics. The most obvious changes were the loss of both managers this past summer. Tracy Ligtenberg was promoted to Assistant Dean in the College of Letters and Sciences and Tracey Brooks received a promotion to Manager of the Department of Biomedical Engineering. On behalf of the Department, we congratulate “the two Tracy’s” on their promotions.

Linda Potoski was hired in September as Business Manager to replace Tracey Brooks. Linda brings with her 14 years of experience working with the University, most of which was within the College of Letters and Sciences in

the areas of undergraduate, graduate and financial support. This experience and knowledge will no-doubt benefit the Mathematics Department and Linda was warmly welcomed by the department upon arriving.

Finally, I would like to thank the staff and faculty for such a warm welcome since I came on board as the Manager for the department on November 13. I feel my prior five-year tenure as Administrative Manager for the Department of Pediatrics at the Medical Center has provided me the experience and the basic tools to make this transition successful. I am very excited to be a part of this department. If we haven't yet met, please feel free to stop by Room 568 and introduce yourself.

I, along with all the staff of the Department of Mathematics, look forward to an exciting year.

Emeriti Update

By Sherman Stein, Professor Emeritus

Henry Alder, who ended his teaching career with the 2000-2001 academic year, is pleased that the number theory course he offered for many years was taught by his excellent student Matthew Nelsen (now Nelsenador). He continued to serve on committees, including chairing the department committee selecting the recipient of the Henry L. Alder Prize for Excellence in Teaching. He also served on the committee preparing the statewide tests that measure students' mathematical achievement. He continued to serve on several MAA committees, including the one selecting the recipients of the MAA Distinguished Service Award and was a member of the Committee on Polya Lecturers. He also continued to serve on the Board of Governors of the Pacific Journal of Mathematics and chair of its investment committee.

Donald Benson is writing a second book under contract with Oxford University Press. It is on the topic of math appreciation and is intended as both a trade book and a college-level text. He expects to finish the manuscript by the end of this year.

Don Chakerian has continued working with Kurt Kreith in the California Professional Development Institutes. They are also collaborating on a technology-oriented high school textbook, *Teaching Mathematics Using Technology*, consisting of activity-based algebra modules, to be published by McDougal Littell in October, 2001. His article, "Central Force Laws, Hodographs, and Polar Reciprocals," appeared in the February, 2001 issue of *Mathematics Magazine*.

Kurt Kreith interrupted his retirement to accept a

position as co-director of the California Mathematics Project. In this capacity he also serves as co-director of the California Mathematics Education Technology Site (CMETS), providing assistance to secondary school teachers who wish to integrate technology into the mathematics curriculum. He also helped establish a Davis site for Cosmos, a program in mathematics and science for high-school students, previously only at Irvine and Santa Cruz. Eighty students from all over California participated for four weeks during the summer, 2001.

Washkek Pfeffer's new book, *Derivation and Integration*, was published by Cambridge University Press. He gave two lectures at the University of Ulster in Northern Ireland, was a principal speaker at the Conference on Real Analysis in Ogden, Utah, and an invited lecturer at the Workshop on Measure Theory and Real Analysis in Italy. He also spent two weeks as an invited Research Professor at the Center for Theoretical Study of Charles University in Prague and completed an invited paper, *Derivatives and Primitives*, for *Mathematicae Scientifcae Japonicae* (formerly *Mathematica Japonica*).

Sherman Stein's third book since he retired, *How the Other Half Thinks*, was published by McGraw-Hill in July. It is a trade book which uses nothing more than arithmetic and common sense to introduce the reader to several topics in advanced mathematics and the mathematical style of thinking. In addition, he gave several talks on Archimedes, a week's lectures to high school teachers, and a similar contribution to Cosmos. He also made progress in his study of latin transversals of rectangular arrays.

Takayuki Tamura continued his research in semigroups, contributing papers to the Fourth Symposium on Algebra, Languages, and Computation at Osaka Prefectural University and to Colloquia at the Mathematical Research Institute at Kyoto University. In addition, he continued to serve as a reviewer for *Mathematical Reviews* and *Zentralblatt fur Mathematik* as well as a monitor of Radio Japan's World Network. He continues to publish poetry in the traditional Tanka style in the *Meiji Shreine Tanka Monthly* in Japan and in the *Monthly Tanka Group* in the United States, as well as free verse in English in the *Covell Gardens Monthly*.

Life After Davis

Submitted by (Meng Kai) John Hong (Ph.D. '00)

First I would like to thank to Professor Cheer for giving me the opportunity to talk about my life at UC Davis and express my appreciation to people who have helped and inspired me in many ways.

I was a graduate student in the applied math program at UC Davis from 1995 to 2000. Currently I am a post-doctoral researcher in the Mathematics Department at UCLA. It's been more than a year since I moved down to Los Angeles, but I feel like I am still living and working with my colleagues at Davis. I have lots of sweet memories that I would like to share with my friends at Davis.

The first thing I want to talk about is my research life with Professor Blake Temple in Davis. I will say that he is the professor who had the most influence in my learning of mathematics. To me, he is not only my thesis advisor but also a good friend who encouraged me when I was stuck in my research. I finished my master's degree in mathematics at UC Santa Cruz before I came to Davis. I was sort of aware of which research field I wanted to focus on in mathematics. I like Partial Differential Equations and Differential Geometry. After I talked to some professors in Mathematics Department, they suggested to me that I talk to Professor Temple. After a short talk with him, his research field and brilliant way of thinking impressed me, so I decided to learn shock waves theory from him. After all these years of working with him, I believe I was very lucky to have him as my advisor and friend. Here I want to thank him with all my heart.

Another thing that I really enjoyed in Davis was the courses that I took in the Mathematics Department. In most of these courses the instructors really cared about what students needed and were willing to help students out. They also taught students to understand general concepts as well as computing skills. This dedication provides me with a nice example to follow when I teach at the university level. I am thankful to those professors who contribute their time and effort in their teaching in the Mathematics Department of UC Davis.

In the end I would like to thank my friends at Davis who shared their experience of life with me in my last five years at Davis, especially to Youn-Sha Chan, Eric Lau, Long Li and Wenlong Jin. I still remember many nights of hard-work in offices with those fellows. Without them, life in Davis would have been boring for me. I will cherish those wonderful memories that they gave me in Davis.

Alumni News

- **Kirk Athanasiou** (BA, 1998), is in his third year of law school at Boalt Hall (at the UC campus down the road). Upon completing his J.D., he anticipates moving to Seattle with his fiancée.
- **Leeann Bent** (BS, 1998) completed a Master's in Computer Science at our sister campus, UC San Diego (Spring 2000). She currently is a doctoral student and works on high performance computing software. Leeann still maintains ties to Davis via co-authorship of a manuscript with her undergrad thesis advisor, Professor Alex Mogilner. Now that she lives in Southern California, she has taken up snowboarding.
- **Jason Gonzales** (BS, 1997) and **Aileen Co Gonzales** (BS, 1997) are the proud parents of Matthew Co Gonzales, born Wednesday, 12 September. When not changing diapers, Jason is a doctoral student in chemistry at the University of Georgia and Aileen did database work and programming for researchers in the health sciences.
- **Anne Goodchild** (B.S., 1995) left a position with the London office of PriceWaterhouse Coopers and began a doctoral program in Operations Research at UC Berkeley this fall. While in London, she successfully trained for and completed her first marathon. She and husband Bill Cahill (Engineering, 1998) returned to the US by way of several mountains and fjords in Scandinavia.
- In April 2001, **Nikki Levine** (a.k.a. Leslie N. Levine, B.S., 1996) and husband Ben Willis became proud parents of a little girl, Emily Rose. Nikki currently enjoys the tasks associated with both being a mom and writing a master's thesis. She should receive her degree from the University of North Carolina this year. Nikki, Ben, and Emily Rose have returned from the east coast and now live in Carson City, Nevada, just a few hours from Davis.
- Since graduation, **Becky Noonan** (B.A., 1999) has spent much of each year working at Plimouth Plantation, a historical re-enactment park in Massachusetts. Most recently, she portrayed the pilgrim woman "Lucretia Brewster." In August 2001, Becky moved to Budapest to teach high school mathematics and English. In case you're wondering, Becky speaks modern English, 17th century English, Spanish, German, and Hungarian well enough to get by in a variety of cultures.
- **Seth Stevelman** (B.S., 1998) exchanged writing and

grading mathematics homework at Davis for research- ing and writing legal papers in law school. As a result of his labors, including a 100 page treatise on Casey Martin v. PGA Tour, Inc., Seth graduated from Harvard Law School in June 2001. He spent the summer preparing for the New York Bar exam and began a clerkship with a federal judge in Riverside, CA, after Labor Day. His efforts paid off -- he recently learned that he passed the New York bar. Seth currently anticipates spending the winter studying for the California Bar Exam. He really knows how to have a good time.

- **Peter Storm** (BS, 1997) has been busy since graduation. He married former UC Davis math major Cheryl Bickford and began work at MIT's Lincoln Laboratory in Sept of 1997 doing research on radar systems for Ballistic Missile Defense. Cheryl and Pete have two sons, Jeremy and Will. Current students and recent grads may know Pete because he visits UC Davis at least once a year to recruit for Lincoln Labs.

The Department of Mathematics Newsletter

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As always, we would like to hear from former Davis mathematics students about what they are presently doing and how they are applying their mathematical skills.

Please return the complete Alumni News Update Form to:

Dan Slauson, Newsletter Editor
Department of Mathematics
University of California
One Shields Avenue
Davis, CA 95616-8633

or access the form on the Department's Home Page at:

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

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