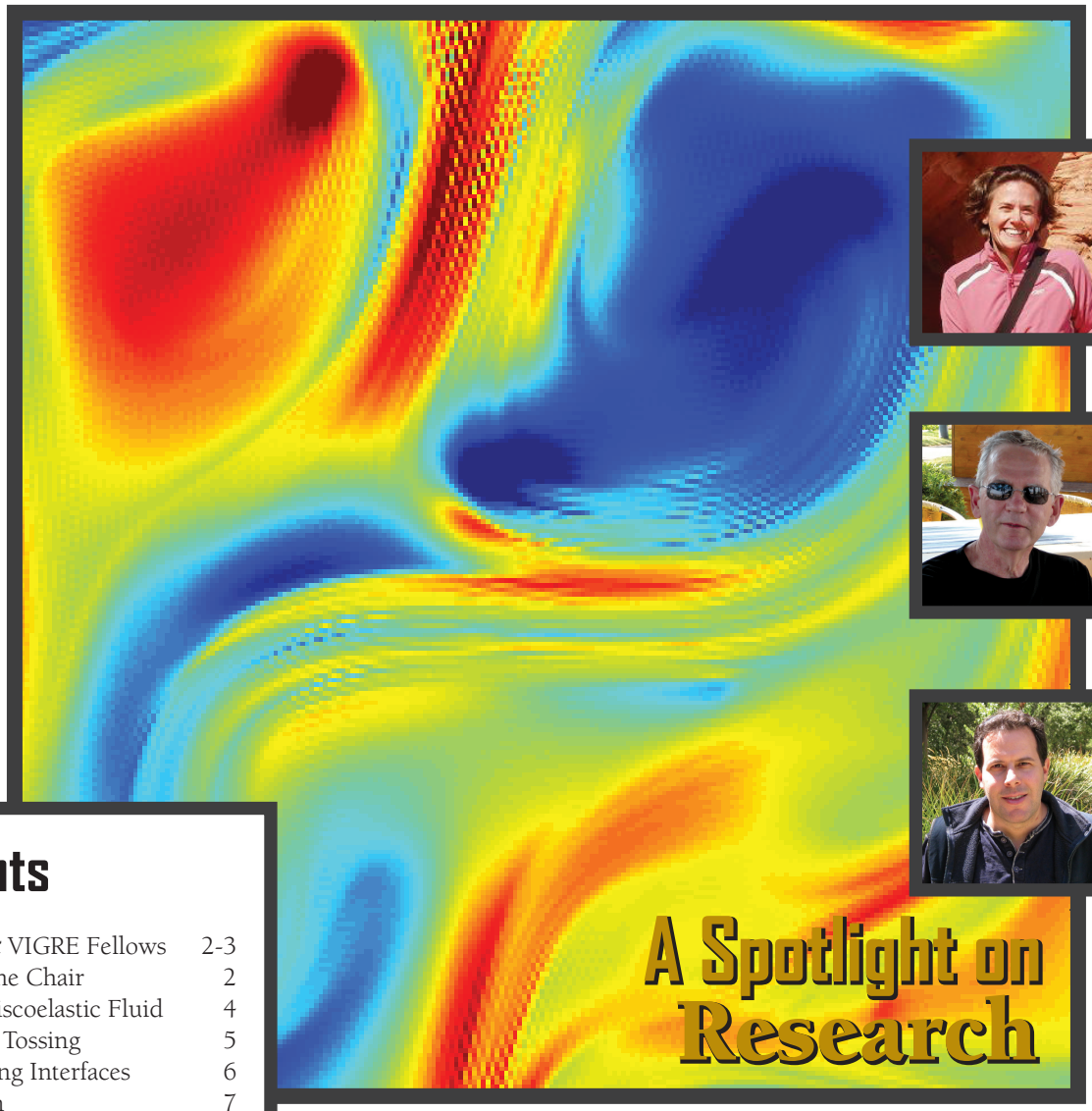
UC DAVIS
MATHEMATICS NEWSLETTER



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Letter from the Chair

by Joel Hass

An old story talks about a new Chair of Mathematics walking into his office and finding three envelopes, with a note to open each in turn when faced with a crisis. About a year into his tenure came the first crisis and he opened the envelope, which said "Blame your predecessor." So he did, and a year later came another disaster. Opening the second envelope, he found the advice to "Talk about an unprecedented crisis that could not have been anticipated." That got him to year three when the next crisis hit. The final envelope read "Prepare three envelopes."

It's a good story, but it has little relevance for Mathematics at UC Davis, where we are lucky to have a history of successful chairs. Outgoing chair Bruno Nachtergaele, recently elected to be Vice-President of the International Association of Mathematical Physics, is currently enjoying a sabbatical leave at the Mittag-Leffler Institute in Stockholm.

Departmental faculty continued to win honors and prizes. In addition to those described in the included articles were the 2010 ICS Prize award to Jesús De Loera, the plenary lecture invitation given to Alessandro Pizzo for the International Congress on Mathematical Physics in Prague, and the UC Davis Academic Senate Distinguished Teaching Award given to Abigail Thompson. Graduate students Michael Schwemmer, Tami Schlichter, Rohit Thomas and Matthew Rathbun also won prestigious awards.

Included below are some numbers that reflect developments over the last few years. These numbers reflect a continuing long term upwards trend.

This past year has seen several recognitions of the Department's growing prominence. Most notable was the top 20 rankings achieved in the report of the National Research Council, an arm of the National Academy of Sciences that reports on the nation's research universities every 10-15 years. See the article on page 14 of this newsletter for a breakdown. Other recent rankings confirm these results. For example, the 2010 US News and World Report Graduate Rankings put the Topology group 13th in the nation.

The pressures on the state budget continue to exert a challenge on all parts of the University of California. Fortunately we have seen a gradual trend of increasing contributions from alumni and supporters. These gifts make a critical contribution to our students and to the mathematical environment. A highlight last year was the creation of the Yueh-Jing Lin Fund by a generous donation from Yueh-Jing (Jean) Lin and Chau-Hsiung (Mike) Chuang. This fund will provide scholarships to high-achieving mathematics students. I hope that you consider adding a gift to the Department to your giving plans. Gifts can be designated towards scholarships, research, lecture series or general uses. See the Department's web page or contact us to learn about donation possibilities. And please keep in contact to let us know what you're doing after leaving Davis.

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

	2007-8	2008-9	2009-10	2010-11 (to date)
Math majors	424	453	488	
Math & GGAM PhD's awarded	20	11	14	
Donations and Gifts	$83,170	$43,395	$232,025	$22,927
Research Grants	$5,229,749*	$1,909,311	$2,167,619	$3,707,159

*Includes $3,225,225 from the Department's NSF VIGRE award, headed by Jesús De Loera.

Steven Klee

Krener Assistant Professor

Steven Klee received his PhD from the University of Washington in 2010 under the supervision of Professor Isabella Novik. His research interests lie in the area of geometric combinatorics, and he is interested in studying the underlying combinatorial structure of sphere and manifold triangulations. His faculty mentor at UC Davis is Jesús De Loera.

In addition to his mathematical interests, Steven enjoys hiking, rock climbing, running, and cooking.

Mark Remmel

Krener Assistant Professor

Mark Remmel is interested in PDEs and computational mathematics. He studies nonlinear dispersive phenomena in geophysics. Recently, working with L. Smith, he dissected the nonlinear advective term in PDEs that govern fluid motion in the midlatitudes and derived corresponding physical space models. These PDE models were used in numerical calculations to improve understanding of nonlinear effects. Currently, he is also interested in working with J. Biello on asymptotic models for equatorial dynamics and how equatorial dynamics communicate with those of the midlatitudes.

Incoming Academic Staff

Matthew Dixon

Krener Assistant Professor & Postdoctoral Scholar

Matthew Dixon holds a joint appointment as a Krener Assistant Professor and postdoctoral scholar working with Steve Shkoller on simulating regularized compressible Euler equations. He has previously held postdoctoral appointments in the Institute for Computational and Mathematical Engineering at Stanford University and the UC Davis Computer Science Department. He graduated with a PhD in Applied Mathematics from Imperial College, London in 2007, a MSc in Parallel and Scientific Computation (with distinction) from Reading University in 2002 and a MEng in Civil and Environmental Engineering from Imperial College in 1999.

Olivia Dumitrescu

VIGRE Fellow

Olivia Dumitrescu received her Ph.D from Colorado State University in 2010 under the supervision of Professor Rick Miranda. Her main interest in mathematics lies in the area of algebraic geometry. More specifically, she uses the degeneration theory for studying interpolation problems. Olivia's postdoctoral mentor is Professor Brian Osserman.

In her free time, she enjoys drawing, word games, poetry, biking, traveling and spending time with friends. She is fascinated by the beauty of Californian surroundings and for her every walk in the mysterious nature is irresistible and a great source of energy.

Arvind Ayyer

VIGRE Fellow

Arvind Ayyer received his Ph.D. from Rutgers University in 2008 under the joint supervision of Joel Lebowitz and Doron Zeilberger. His research interests are in enumerative combinatorics and statistical physics. He spent 2008 to 2010 as a postdoctoral researcher in CEA Saclay, France.

He is particularly interested in physical systems which are kept out of equilibrium by an external force, and aims to understand quantitative features of such systems rigorously. On the combinatorial side, he finds alternating sign matrices and their various cousins such as fully packed loop models and descending plane partitions fascinating.

In his spare time, he likes reading, hiking, racket sports and solving puzzles, from classic crosswords to the more recent "culture independent" Japanese teasers from Nikoli like shikaku and nurikabe.

Amitabh Basu

VIGRE Fellow

Amitabh Basu received his doctorate from Carnegie Mellon University, under the supervision of Prof. Gerard Cornuejols. His thesis work was on cutting plane theory for mixed-integer linear programs and used tools from convex analysis, geometry of numbers and polyhedral theory. He has recently gotten interested in applying techniques from algebraic geometry, commutative algebra and generating function theory in optimization and complexity theory.

Besides mathematics, Amitabh is interested in music and philosophy and tries to find time to play classical piano.

Honors and Awards

Becca Thomases

Becca Thomases, an Assistant Professor since 2007, was awarded a research grant for 2010-11 by the UC Davis Hellman Fellowship Program to help further her research on multi-scale models of viscoelastic fluids.

The San Francisco-based Hellman Family Foundation has funded the fellowship program annually since 2008. Its goal is to provide support and encouragement for the research of promising Assistant Professors who exhibit potential for great distinction in their research and who have documented a need for funding.

Research Spotlight .....

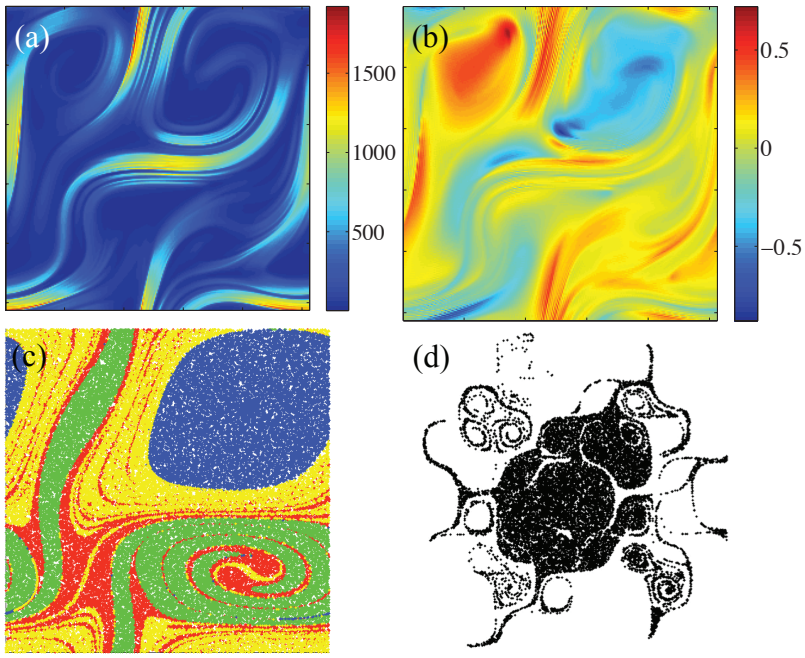
The Study of Viscoelastic Fluid

by Becca Thomases

From food items like mayonnaise and chocolate to personal care products such as lipstick and hair gel, complex fluids arise everywhere in our world. My current research involves the analysis and simulation of such complex fluids. Understanding the behavior, properties, and stability of complex fluids is essential for innovating and optimally designing certain industrial products (e.g. extruders like drug delivery systems and tubes of toothpaste).

An example of a complex fluid is a viscoelastic fluid which is an intermediate between a fluid like water and a solid like rubber. The polymers immersed in a viscoelastic fluid can be idealized as two beads on a spring (elastic dumbbell model) that become stretched by the motion of the fluid. The beads exert forces on the fluid: viscous drag, the elastic spring force, and a random Brownian force. The internal elastic energy stored by these polymers can cause effects like rod climbing, shear thinning or thickening, and other unusual behaviors. In my research, I leverage macroscopic models such as the Oldroyd-B and FENE-P to examine and study these types of forces and energies.

Some sample results from numerical simulations of the Oldroyd-B and FENE-P models are presented below. Panel (a) shows a contour plot of the trace of the polymer stress which measures the extension of polymer coils. Large contours correspond to high areas of stress. Panel (b) shows the resulting vorticity, which is the circulation per unit area, in the fluid. Red corresponds to clockwise rotation and blue to counter-clockwise. Panel (c) shows particle tracers in the flow. Areas of mixing and folding arise after concentrations of highly stretched polymers cause a break in symmetry. Panel (d) shows particles diffusing in the plane. In my current work, I am examining such observable mixing, highly time-dependent behavior, and instabilities in viscoelastic fluids.



(a) - (b) The polymer stress and vorticity at t = 500 after the onset of a symmetry breaking transition in the fluid. (c) Particle tracers in the fluid; they start out separated into four quadrants and over time (t = 500) become highly mixed by the flow. (d) Particle tracers diffusing in a 16-roll mill.

Mathematical Curiosities

Efficient Coin Tossing

by Dan Romik

Random numbers are used in virtually all areas of applied mathematics and computer science, as a way of modeling the effects of noise and uncertainty, and as inputs for randomized algorithms that perform certain computations with a speed that cannot be matched using known methods by deterministic algorithms. The random inputs required for such algorithms and simulations need to have specific statistical distributions, which are often different from the distribution of the sources of randomness available to the hardware — these are in many cases simply a stream of statistically independent unbiased random bits that are 0 or 1 with equal probabilities (In reality, due to hardware limitations these random bits are usually not truly random but are generated by so-called pseudo-random number generators). There is therefore a need for algorithms that convert random samples from some given distribution to a sample from another distribution. Such a process of conversion is often referred to by probabilists, a bit confusingly, as "coin tossing."

I will illustrate this notion with two examples, and an amusing puzzle. Perhaps the simplest example of coin tossing was considered by the great Hungarian-American mathematician John Von Neumann, who asked in 1951 how to take a sequence of independent samples of a *biased* coin with some bias p (a number between 0 and 1, where 0.5 represents a fair or unbiased coin) and use it to produce a sample of a fair coin. To make life even more difficult, in Von Neumann's scenario we are not told the bias p (which can be a realistic assumption, say, if someone whom you don't trust hands you a coin of unknown provenance to use for your experiment), so our algorithm needs to work no matter what the value of p is, as long as it is not 0 or 1, in which case the coin would obviously be of no use at all. Von Neumann gave a simple algorithm to solve this problem, which can be described as follows: Toss the biased coin twice. If the results are "Heads then Tails," output 0. If the results are "Tails then Heads," output 1. If the results are "Tails then Tails" or "Heads then Heads," try again — that is, toss the coin another two times, check the results, and try again if necessary until a result is obtained. It is easy to see that when a result is finally obtained, it is equal to 0 or 1 with equal likelihood, since the results "Heads then Tails" and "Tails then Heads" both have the same probability, equal to $p\,(1\text{-}p)$.

It is also interesting to see how efficient this algorithm is. In other words, how many tosses of the original coin will be required on the average to produce an unbiased 0-or-1 result? If we denote this number by t, it is not hard to see that t satisfies the equation

$$t = p(1\text{-}p) \bullet 2 + p(1\text{-}p) \bullet 2 + p^2(2+t) + (1\text{-}p)^2(2+t)$$

since, according to which of the four possible results were obtained in the first two tosses, the total number of tosses we will end up needing will either be 2 (if we get a result immediately) or 2 plus a number whose average is also t, if the two first tosses do not produce a result and are wasted. Solving the above equation for t we obtain $t = 1 / p\,(1\text{-}p)$. Thus, for example, if p is close to 0.5 then t is approximately 4, so the algorithm is fairly efficient, but if p is very close to 0 or 1 then t is very large, which makes sense since in that case the coin is extremely biased and thus does not give very much useful statistical information.

Next, consider the roughly inverse problem of producing a sample from a coin with bias p when given as input a sequence of independent *unbiased* coin tosses (here, in contrast to the previous example, the value of p is known). An algorithm for this problem was suggested and analyzed in a paper by Donald Knuth and Andrew C. Yao from 1976, though it was probably known earlier as a "folk result." First, expand the number p as a real number written in base-2 (binary) notation. For example, if p=1/3 then, in binary notation, we would write $p = (0.01010101\ldots)_2$. Now start sampling the unbiased coin tosses from our randomness source. Treat these random inputs as bits spelling out the infinite expansion of a random number x written in binary notation, i.e., $x = (0.a_1a_2a_3\ldots)_2$, where a_1 is the result of the first coin toss, a_2 is the result of the second, etc. The algorithm returns the result "Heads" for the biased coin if $x<p$, and returns "Tails" if $x>p$. It is an exercise to the reader to understand why the result Heads will be returned with probability exactly equal to p. Furthermore, although this algorithm seems to require an infinite computation time, a bit of head-scratching reveals that in reality we will only need a finite number of coin tosses to determine if $x<p$ or $x>p$. In fact, as soon as we get a sample a_k which differs from the k-th digit in the binary expansion of p, we can stop and output a result. Thus, this algorithm is extremely efficient, and a small computation similar to the computation above for Von Neumann's algorithm shows that on the average it only uses 2 fair coin tosses to produce a biased coin toss — and this is true even if p is a complicated irrational number, like $\sqrt{2}$-1 or $1/\pi$!

I conclude with a challenging puzzle for the probabilistically-inclined reader. Let a positive integer N be given. Find a probability value $0<p<1$ and an integer M (both depending on N) such that one can devise a coin tossing algorithm with the following property: the input for the algorithm is a single toss of a coin with bias p, and M additional independent tosses of an *unbiased* coin; and its output is a sample of an "N-sided die" — or, in other words, a uniformly random number from 1, 2, …, N. (As a small hint: N=7 is the first interesting case.)

Honors and Awards

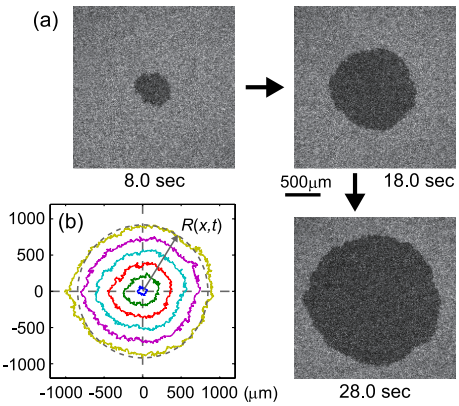
Dan Romik

Professor Romik, an Assistant Professor since 2009, was awarded a grant by the Faculty Early Career Development Program (CAREER). The Program was created by the National Science Foundation (NSF) to support junior faculty who exemplify the role of teacher-scholars through outstanding research, excellent education and the integration of education and research. Romik will study combinatorial models that arise in connection with certain structures on two-dimensional lattices, such as domino tilings, Young tableaux and alternating sign matrices.

Honors and Awards

Craig Tracy

Distinguished Professor Craig Tracy was selected by the Israel Academy of Sciences and Humanities as one of its 2009 Batsheva de Rothschild Fellows. The honor included an invitation to travel to Israel and give a series of lectures at several Israeli universities, among them the Hebrew University of Jerusalem and the Technion in Haifa.



Growing DSM2 cluster. (a) Images. The time indicated for each photo is the elapsed time after the emission of laser pulses. (b) Snapshots of the interfaces taken every 5s in the range 2s <= t <= 27s. The gray dashed circle shows the mean radius of all the droplets at t = 27s. The coordinate x at this time is defined along this circle.

Research Spotlight

Universal Fluctuations of Growing Interfaces

by Craig Tracy

The Kardar-Parisi-Zhang (KPZ) equation, introduced into the physics literature in 1986, is a stochastic nonlinear partial differential equation that models a randomly growing interface. The interface is described by a (random) height function $h=h(x,t)$ and the KPZ equation for h is (we restrict to one spatial dimension)

$$\frac{\partial h}{\partial t} = -\frac{1}{2}\left(\frac{\partial h}{\partial x}\right)^2 + \frac{1}{2}\frac{\partial^2 h}{\partial x^2} + \dot{W}$$

where $\dot{W}$ is space-time white noise. The difficulty mathematicians have with the KPZ equation is that it is ill-defined due to the presence of the nonlinear term.

Recent work by two groups, T. Sasamoto and H. Spohn and G. Amir, I. Corwin and J. Quastel, have shown how to make good mathematical sense out of the above equation as a certain scaling limit of the discrete interacting particle system called the *Asymmetric Simple Exclusion Process* (ASEP). ASEP, introduced by F. Spitzer some forty years ago, is an interacting particle system where particles move on the integer lattice $\mathbf{Z}$. In this process, each particle at position x waits for a random time until an internal "clock" rings, then chooses y with probability $p(x,y)$ and tries to move to y. If y is vacant at the time it makes the move, while if y is occupied it remains at x and resets its clock. The adjective "simple" refers to the fact that the allowed jumps are only one step to the right, $p(x, x+1)=p$, or one step to the left, $p(x, x-1)=q=1-p$. The word "asymmetric" refers to the fact we are assuming $p \neq q$. (For convenience we choose $\gamma=q-p>0$ so there is a net drift of the particles to the left.) A rigorous construction of this process was given by Liggett in the early 1970s. The process is completely specified once the initial configuration is given.

The *step initial condition* is the state with all sites 1, 2, 3, ... occupied at time $t=0$ and all sites 0, -1, -2 vacant at time $t=0$. Since particles cannot go around each other, it makes sense to speak of the (random) position of the mth particle from the left, $x_m(t)$, at time t. Harold Widom of UCSC and I derived an exact formula for $\mathbf{P}(x_m(t) \le x)$, the probability that the position for the mth particle lies in the interval $(-\infty, x]$. From this formula we derived a *limit law* for $x_m(t)$:

$$\lim_{t\to\infty} \mathbf{P}\left(\frac{x_m(t/\gamma) - c_1 t}{c_2 t^{1/3}} \le s\right) = F_2(s)$$

where c_1 and c_2 are explicit constants and F_2 is a distribution function first arising in random matrix theory (called the GUE Tracy-Widom distribution). For the special case of $q=1$, $p=0$ this result was first proved by Johansson in 2000. Note that the fluctuations are of order 1/3, not the usual 1/2 from the central limit theorem. This one-third exponent is one of the main predictions of KPZ theory.

Starting with our formula for the distribution $\mathbf{P}(x_m(t) \le x)$, Sasamoto and Spohn and Amir, Corwin and Quastel made precise sense out of solutions to the first equation and found an exact formula for the distribution of the height function $h(x,t)$ which for long times reduces to F_2.

The main interest in these results lies in the fact that these fluctuations are expected to be *universal* for a large class of randomly growing interfaces. In a most impressive recent experiment, K. Takeuchi and M. Sano study the growing interfaces of turbulent liquid crystals. The liquid crystal DSM1 when pulsed by a laser undergoes a transition to DSM2 which appears as a growing droplet. The experiment measures the radius $R=R(x,t)$; see the figure at left.

Takeuchi and Sano conclude, "*measuring the growth of DSM2 nuclei in the electroconvection, we have found the circular interface roughening clearly characterized by the scaling laws of the KPZ class in 1+1 dimensions. Moreover, we have shown without fitting that the fluctuations of the cluster local radius asymptotically obey the Tracy-Widom distribution of the GUE random matrices and revealed the finite-time effect.*"

If the interface evolves from a flat surface then the expected fluctuations will be the GOE Tracy-Widom distribution. Experiments by Takeuchi are under way to test this prediction.

Continuing to Explore
Explore Math, Year 5

The *Explore Math* program begins its fifth full year of activities, continuing full steam ahead in bringing outreach to students from all over the greater Sacramento area. With the new year comes new recognition for the program's community outreach and service to the UC Davis Mathematics Department. Each of the 2010-11 subprogram directors received the Yueh-Jing Lin Scholarship in Mathematics for outstanding service.

The *Math Modeling Experience* (MME) is pleased to be kicking off another quarter with new undergraduate and high school participants. In addition to undergraduates from the Mathematics Department, recent MME students represent the Ecology, Physics, and Computer Science departments. High school students participating this year will come from schools as far west as Fairfield and as far north as Esparto. MME research topics for 2010 will include disease transmission models, dynamic programming, communication networks, optimization, and much more! Last year's program once again culminated in an Open House poster session in November, as well as the HiMCM math modeling contest. MME was pleased to have one of their teams - Amanda Chen, William Liu, Saraf Nawar, and Peter Wang - receive the designation of "Outstanding" in the 2009 competition. We look forward to another fun and successful season!

Math Circle enjoyed a very successful 2010 season and is looking to continue introducing new generations of interested high school students to exciting mathematics. This past winter, Math Circle attracted over 20 students from areas as far as 75 miles apart to travel here to the UC Davis Math Department and learn the mathematics behind several topics, including game theory, chaos and fractals, and a hodge-podge of topology. The program ended with a day of Puzzlemania in which the high school students participated in a contest composed of questions about the different subjects they learned throughout the program. This year's Math Circle topics will be the Mathematics of Finance, Mathematical Biology, and more, each of which will be taught by graduate students. We are looking forward to another successful year with hopes of reaching even more students at more schools.

Our *American Regions Mathematics League* team successfully competed in the ARML competition. In preparation, during Winter and Spring, 30 high school students from throughout the Sacramento area learned a potpourri of challenging mathematics during fun-filled weekly training sessions. In the Spring quarter, a team of undergraduate students participated in mock competitions with the undergraduates in preparation for the national competition. In June 2009, the students' hard work paid off as they and their graduate student coaches traveled to Las Vegas for the two-day competition. The UCD-trained team joined participants from throughout the country in an enriching mathematical experience. We are planning for another successful year to come.

Continuing outreach in a variety of areas, Picnic Day this year featured puzzles and different hands-on ways of exploring math for all ages to show people that math can be seen in all areas of life, if you know where to look.

Updates from The Undergraduate Program

The Department's Math Majors excelled again at their coursework and research, and their achievements were celebrated at the Departmental Award Ceremony. Some of their research accomplishments can be admired by reading the senior theses posted at

www.math.ucdavis.edu/undergrad/research/thesis

Moreover, the Department awarded 49 undergraduate degrees this past academic year.

The Undergraduate Program Committee has been active in evaluating our syllabi, especially as an increasing amount of open source learning materials become available. Many of these are created by our own Davis faculty. Along similar lines, the Department has been making extensive use of the open source online homework system WeBWork:

http://webwork.math.ucdavis.edu/

In conjunction with traditional modes of assessment, WeBWork is an extremely useful resource since it allows students to gain immediate feedback on their mathematical skills.

Mathematics Placement Requirement

The Mathematics Placement Requirement (MPR) has been significantly streamlined in both how it's administered and who must take it. The Precalculus Diagnostic Exam (now referred to as the Math Placement Exam) is now administered by the Department of Mathematics, and testing takes place online using the web-based software WebWork. All students taking beginning calculus are now required to take the exam, regardless of test scores or prior course experience.

Shifting Enrollments... Math 16 to Math 17

Beginning Fall 2010, the College of Biological Sciences will remove MAT 16ABC from the choice available to the majors and put into place a consistent requirement for MAT 17ABC or 21AB (C recommended). This change brings a rather substantial shift in our enrollments. We anticipate over 550 students moving from the 16 series to the 17 series.

Updates from The Graduate Program

Mathematics welcomes 13 new students to the program this year. Math now consists of 58 graduate students.

In addition to the awards listed in the Department Awards Ceremony article, our continuing students were recognized. Rohit Thomas received the 2010 Outstanding Graduate Student Teaching Award. Joseph Grimm received the 2010-11 UCD & Humanities Graduate Research Award in Mathematics.

We granted 6 Ph.D. degrees. 5 MA degrees were awarded, of which 4 of these candidates are continuing with their Ph.D. objectives.

The Graduate Group in Applied Mathematics (GGAM) welcomes 7 new graduate students to the program this year, and during 2009-2010, we added 3 new faculty to its membership: Tim Ginn (Civil and Environmental Engineering); Albert Schwarz (Math); and David Woodruff (Graduate School of Management). GGAM now consists of 58 students and 87 faculty members.

As for our continuing students, Jia-Ming "Frank" Liou received the 2010-11 UCD & Humanities Graduate Research Award in Mathematics and Matthew Reed received a 2010-11 grant award from the Scholarship Foundation of Santa Barbara.

By the end of Summer 2010, we granted 7 Ph.D. and 2 MS degrees in Applied Mathematics. Michael Schwemmer who completed his Ph.D. dissertation this summer also received the 2009-10 Alice Leung Scholarship.

The fifth Annual GGAM Mini-Conference was held on January 9, 2009. In an informal day-long forum, 9 faculty members described their research interests, giving our students an opportunity to experience the broad directions available to them in Applied Mathematics. The departments and units represented at the conference included: Agricultural and Resource Economics; Biomedical Engineering; Computer Science; Economics; Environmental Science & Policy; Graduate School of Management; Land, Air, and Water Resources; and Mechanical and Aeronautical Engineering.A record number of guests, 78 people, attended the dinner, which followed the conference and was held in our large colloquium room. This was another opportunity for faculty and students to get to know each other.

On May 7-8, 2010, the UC Davis SIAM Club held its third annual Davis SIAM Student Research Conference. More than 60 conference attendees from UC Davis and CSU Sacramento saw 8 student talks and 7 student poster presentations on applied mathematics and related topics ranging from biology and computer science to probability, statistics, and networks. Keynote speakers, Professor Jamie Sethian (UC Berkeley) and Professor Hector Ceniceros (UC Santa Barbara), gave great talks followed by the panel discussion with our students. The conference was supported by SIAM and an NSF VIGRE mini-grant. More information on the UC Davis SIAM Club can be found on the SIAM Club webpage:

http://siam.math.ucdavis.edu/

The second joint Mathematics-Statistics colloquium was held on May 28, 2010. The speaker this year was Professor Iain Johnstone (Stanford) who discussed the properties of the largest eigenvalues and eigenvectors arising in multivariate statistics and their relationship with the random matrix theory, and in particular the Tracy-Widom laws, which were quite suitable for the audience from our two departments.

Donations Mathematics for the Future

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

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

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

Your gift can be used towards undergraduate and graduate support, research support, or Departmental initiatives. Many thanks to all our donors in these days of difficult budget cuts. Your gifts ensure our future success.

Give Online by Credit Card

Please go to the UC Davis secured giving site at: http://giving.ucdavis.edu/fund and type in "Department of Mathematics" to the gift designation box, and follow the prompts.

2009-2010 Graduate Degree Recipients

Julie Blackwood, PhD, Applied : Postdoctoral, Ecology & Evolutionary, Univ. of Michigan
"Management-Based Models in Ecology," Alan Hastings

Matthew Herman, PhD, Applied : Postdoctoral Scholar, Mathematics, UCLA
"Perturbations and Radar in Compressed Sensing," Thomas Strohmer

Edward Kim PhD, Math : Postdoctoral Reseracher, Technische Universiteit Delft
"Geometric Combinatorics of Transportation Polytopes and the Behavior of the Simple Method," Jesús De Loera

Bradley Marchand, PhD, Applied : Research Scientist, Naval Surface Warfare Center
"Local Signal Analysis for Classification," Naoki Saito

Marion Moore, PhD, Math : RTG instructorship, Univ. of Texas at Austin
"High Distance Knots in Closed 3-Manifolds and A-SL Generalized Heegaard Splittings for 3-Manifolds," Abigail Thompson

Alexander Papazoglou, PhD, Applied :
"Tverberg Partitions and Equivariant Obstructions," Eric Babson

Steven Pon, PhD, Math : Assistant Professor in Residence, Mathematics, Univ. of Connecticut
"Affine Stanley Symmetric Functions for Classical Groups," Anne Schilling

Matthew Rathbun, PhD, Math : Postdoctoral, Michigan State Univ.
"Tunnel Number One, Fibered Links and High Distance Knots," Abigail Thompson

Igor Rumanov, PhD, Applied : Postdoctoral Researcher, Math & Science Research Institute
"Integrable Equations for Random Matrix Spectral Gap Probabilities," Craig Tracy

Michael Schwemmer, PhD, Applied : Postdoctoral, Applied & Computation Math, Princeton
"The Influence of Dendritic Properties on the Dynamics of Oscillatory Neurons," Tim Lewis

David Sivakoff, PhD, Applied : Postdoctoral Researcher, Complex Networks, SAMSI
"Random Site Subgraphs of the Hamming Torus," Janko Gravner

Tyler Skorczewski, PhD, Applied : Research Assistant Professor, Mathematics, Univ. of Utah
"A Computational Fluid Dynamics Study of Suction Feeding Fish Using Chimera Overset Grids," Angela Cheer

Zeke Vogler, PhD, Applied : Self-Employed
"The Numerical Simulation of General Relativistic Shock Waves by a Locally Inertial Godunov Method featuring Dynamical Time Dilation," Blake Temple

Qiang Wang, PhD, Math : Postdoctoral Scholar, UC Davis Medical Center
"Promotion Operators in Representation Theory and Algebraic Combinatorics," Anne Schilling

Jeffrey Anderson, MA, Math : Continuing with PhD program

Emi Arima, MA, Math : Continuing with PhD program

Brandon Barrette, MA, Math : Oakland Teaching Fellows

Roberto Martinez, MS, Applied : Continuing with PhD program
"A Survey of Volume-of-Fluid for Material Boundary Reconstruction," Kenneth Joy

Bassem Saad, MA, Math : Continuing with PhD program

Adam Sorkin, MA, Math : Continuing with PhD program

Daniel Wuellner, MS, Applied : Freelance Writer
"Robustness and Dynamics of Layered Technological Networks," Raissa D'Souza

Shaofeng Xu, MS, Applied : Continuing with PhD program in Economics
"A Generalized Optimal TransportProblem with Application to Firm Location," Qinglan Xia

Dr. Steven Pon with current grad David Cherney

Dr. Edward Kim and Dr. Marion Moore

Dr. Matthew Rathbun and Dr. Julie Blackwood

2009-2010 Department Awards Recipients


Mihaela Ifrim


Mohamed Omar


Michael Schwemmer


Sean O'Rourke

William Karl Schwarze Scholarship in Mathematics

Recipient – Mihaela Ifrim

Mihaela began her graduate studies at UC Davis in the Fall of 2007, and from that first day, she has sought for ways to improve her understanding of mathematics as well as gain valuable experience in teaching mathematics. She notes, "I have always been a hard working student, and I have obtained very good results due to my perseverance and intelligence."

Among Mihaela's goals as a Ph.D. student, she hopes to enhance her knowledge in partial differential equations under the guidance of her current faculty mentor, Professor John Hunter. She is already making progress, having proved a result on the short-time existence for the spectral form of the asymptotic limit of the Burgers-Hilbert equation. In the near future, she hopes to use this information to understand the lifespan of the Burgers-Hilbert equation.

With respect to Mihaela's teaching experience, she has served as a teaching assistant for both undergraduate and graduate courses as well as serving as an Associate Instructor. She has learned many valuable "tools of the trade" with each teaching endeavor, such as engaging students by providing simple problem-solving techniques to stimulate critical thinking and enable them to learn more independently. As she describes, "I learned that teaching must be tailored to different class audiences. Providing students with the tools and concepts that will enable them to learn will generate enthusiasm in their study of mathematics."

Eric C. Ruliffson Scholarship in Mathematics

Recipient – Bach Nguyen

Bach is poised to make a difference in the world as well as serve as a strong, positive role model for those who know him or will come into contact with him. Reflecting back on his training as a math tutor and student mentor, he notes, "Teaching math is not an easy job. If there is one thing that I learned the most from watching my math teachers it would be that patience and love can help me become all that I want to be."

Bach is currently a transfer student from American River College in Sacramento, where he compiled an impressive GPA of 3.88. When he leaves ARC this Spring, he will earn associate's degrees in mathematics, physics, and general education. He has worked very hard for these accomplishments and faces new challenges in the same manner he approaches another favorite pastime … soccer, a sport that he loves to play because it tests his mental endurance and his physical strength.

We congratulate Bach as this year's recipient of the Ruliffson Scholarship, and wish him continued success when he begins his studies at UC Davis this Fall.

Alice Leung Scholarship in Mathematics

Recipients – Mohamed Omar, Michael Schwemmer

Since becoming a PhD candidate in Fall 2008, Mohamed quickly demonstrated his strengths as a research mathematician. His contributions to mathematics have focused on using tools from higher mathematics to further our understanding of the complexity and asymptotics of combinatorial problems. This has proved to be a promising research area that has seen much success, both theoretically and in strengthening state of the art algorithms. In 2009, Mohamed attended an intensive one week conference at Oberwolfach, Germany, with other pioneering researchers in the area of algorithms in Real Algebraic Geometry. Noting this as one of his most influential experiences, this opportunity allowed him to share his work produced at UC Davis as well as develop meaningful collaborations with some of the top minds in his field.

Mohamed has been a recipient of many previous awards, scholarships, and fellowships such as the Alexander Graham Bell Canada Graduate Scholarship, the Ontario Graduate Scholarship in Science & Technology, the UC Davis Graduate Student Research Grant, and the Canadian Millennium Scholarship. As a leader in our community, Mohamed has been a Teaching Assistant, an Associate Instructor, an ARML Program Director and Instructor, and has served as a graduate student representative for both the UC Davis Graduate Student Association and the Department's Graduate Program Committee. As one faculty member notes, "Mohamed is truly a cosmopolitan person. He is a wonderful citizen whose qualities make him a terrific colleague and teacher."

Michael Schwemmer has been with the Department nearly four and a half years, and in that time he has become one of the top students in the Applied Mathematics Program, especially in the areas of mathematical neuroscience and mathematical biology. His successes in these areas have taken him to several conferences where he has been both presenter and contributor. He was also invited to participate in distinguished programs such as one in computational biology at the Cold Spring Harbor Laboratories and another in computational neuroscience at the Marine Biology Laboratory in Woods Hole, MA.

But his aptitude doesn't end with just research and scholarship. Michael has shown leadership among his peers and colleagues. He has served as a Teaching Assistant to several courses in the Department as well as serving as an Associate Instructor. He has also served a leadership role in the local student chapter of SIAM, was a research mentor with the CLIMB program, and co-organized a mini-symposium at the SIAM Life Sciences meeting in Pittsburgh, PA, to name a few.

Michael will be graduating with his PhD in Applied Mathematics this September. He will then be moving

on to begin a postdoctoral position at Princeton this Fall. In summary, Michael has proven himself to be a "very bright, exceptionally hard-working, and intellectually curious" individual. We truly wish him the best!

Henry L. Alder Award

Recipient – Sean O'Rourke

Almost from the very moment Sean began his studies in the Department, he was appointed to his first teaching assignment starting with MAT 21D in the Summer of 2007. Since then, he has become one of our more reliable graduate instructors whose assignments have been widely varied from teaching college-level trigonometry to pre-calculus to linear algebra. This past year, his instructor ratings averaged no less than a 4.9/5.0 for both teaching knowledge and overall course quality.

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

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

Yueh-Jing Lin Scholarship in Mathematics

Recipients – David Renfrew (Math Modeling Experience), Emi Arima (Math Circle) and Matthew Stamps (ARML)

Yueh-Jing (Jean) Lin and Chau-Hsiung (Mike) Chuang created the Yueh-Jing Lin Fund in 2009. This endowment serves to provide scholarship support to one or more math students each year in perpetuity. The scholarships are available to high-achieving mathematics students and can be awarded to either undergraduate or graduate students. Mr. and Mrs. Chuang are both alumni of UC Davis and met while they were graduate students on campus. Jean received her master's degree in mathematics in 1971, and Mike received his master's degree in agricultural education in 1969.

This year, our Department Chair has decided to provide each 2010-11 Explore Math Director with a $500.00 award. This award recognizes the talent of our Explore Math Directors and their involvement in outreach to the youth in our community.

Evelyn M. Silvia Scholarship for Future Mathematics Teachers

Recipient – Christopher Broski

Christopher's passion to teach began when he and his father used to read the works of Roald Dahl, C.S. Lewis and Ian Fleming. As he put it, their stories encouraged him to learn more about other places, people, and cultures. It wasn't until the fourth grade that he began to show an interest in mathematics, and once he did, there was no looking back. He notes, "I was completely enchanted by the ideal nature of mathematics which sparked the flame of scholarly dedication for me. After taking AP calculus in my senior year of high school did it dawn on me that my relationship with math would last a lifetime."

Since coming to UC Davis, Christopher has done very well in his studies, currently averaging a 4.00 GPA, and he has been an integral part of his community. Christopher has also participated in MAST (Math And Science Teaching Program) and MURALS (Mentorship for Undergraduate Research in Agriculture, Letters, and Science). Each program has enabled him to learn more about himself and what it means to pursue a career in teaching.

As a future teacher, Christopher hopes to prepare his future students to think for themselves and take responsibility for creating a world they wish to see, live and thrive.

G. Thomas Sallee Mathematics Teaching Award

Recipient – John Chuchel

There were a number of people with excellent lower division teaching records over the previous year, but one person stood out above everyone else, both for the quality of his teaching and his knowledge of the subjects. John Chuchel has taught six lower division classes in the past year, with overall student evaluations averaging no less than 4.75 out of 5.0.

What is perhaps most remarkable is that his evaluations in large classes are every bit as good as his evaluations in smaller classes — for example, he received an extraordinary rating of 4.9 in a 16B class where the enrollment numbered 260 students.

Students praise John's clarity, his challenging but fair tests, and especially his use of colored chalk! Many say he is the best math teacher they have ever had, and one student sums it up by saying "he is simply awesome!"

G. Thomas Sallee Mathematics Prize

Recipient – Maria Timofeyeva

Honorable Mention – Kevin Chapman, Reuben La Haye

Given in recognition of Professor Emeritus Tom Sallee, all undergraduate students enrolled at UC Davis are eligible to receive this prize, and winners are determined after having completed an exam designed by the Department's Mathematics Contest Committee.

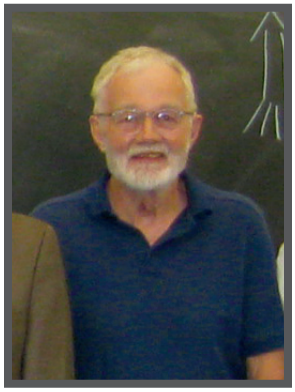
Robert Lewis Wasser Memorial Scholarship in Mathematics

Recipient – George Barnett

Made possible by an endowment that was initiated with a contribution from Robert Lewis Wasser's grandmother, Vera Mae Wasser, this award recognizes exceptional undergraduate students of freshmen or sophomore standing. The winner was determined after having completed an exam designed by the Department's Mathematics Contest Committee.

Emi Arima


David Renfrew


John Chuchel


Maria Timofeyava

Life After Davis

Adam von Boltenstern

B.S. 2008

I give my students a survey the first day of school every year. One of the questions is," Have you been to UC Davis?" I love sharing my stories of locking myself in the Department till 3 in the morning with fellow undergraduates and tackling whatever assignment I have to get in the next morning. I also tell them that I expect no less from seventh graders.

The summer following my graduation I worked for COSMOS at UCD and found that it was a great experience, not only for the students but also for the resident advisors who were sitting in the classes. I really loved the sight of watching professors taking time during their summer to teach high school students. This really excited me because I love breaking down complex ideas into simple concepts that people can understand.

I entered into the Single Subjects Credential program at CSU Fresno the following Fall. This was a great opportunity for me because I was able to work in classes with a lot of English Language Learners and improve on being more of a visual teacher. I also was able to help my father by being home. I wasn't expecting so many of my close friends to be bragging to others that I had gone to such a great college. It was great to be back in Fresno for another year.

The following summer of '09 I found myself back in Davis working for COSMOS again because I really didn't see myself ready to teach for the summer. I had gone to Davis with my credential all ready to go, but no job because so many schools had their hands tied that they weren't hiring new teachers till they could figure out their budgets. The first week of the camp I had been offered a job in Pleasant Hill teaching at Sequoia Middle School. I ran into the Math Department the next day telling all the staff, grads, and anyone else I could about the great news.

I've been teaching at Sequoia for the past year, and I just started my second year. I am teaching a math projects class and I've started to use a lot of ideas that I'd picked up from helping at Picnic Day in front of the Department. I still plan on going into a master's program for General Mathematics next fall, because the Department in Davis left me with a desire to gain more knowledge in math.

Annie Oppman-Schultz

B.S. 2007

During my first two years at Davis I had the pleasure of working with Dr. Evelyn Silvia. She told her students to always remember that math is not a spectator sport, and encouraged us to become involved in our own learning. She also emphasized that we needed to understand the language of math and how it related to our lives. Working with her not only made me realize I wanted to teach math at the college level but also gave me the confidence to apply for graduate school.

After graduating from Davis I moved from California to Wisconsin to continue my education. I received a teaching fellowship from the University of Wisconsin Milwaukee. During my time there I was not only a full time student but I had the pleasure of teaching a variety of math classes as well. Earlier this year I graduated from UW Milwaukee and started a full time teaching position at Alverno College.

My teaching style at Alverno reflects the learning style Dr. Evelyn Silvia introduced me to at Davis. Alverno has a collaborative based learning style, emphasizing that learning in not a spectator sport. I rarely lecture in my classes; instead I focus on active learning, reflection and collaboration. The faculty here feels that connecting the students' outside lives to the classroom is a must and our textbooks reflect this. The problems in the books contain real life data and situations that our students may encounter outside of the classroom.

Dr. Silvia's words and teaching methods have made me the teacher I am today, and I am grateful to her for that.

Life After Davis

Brian Wissman

Ph.D. 2007

It is hard to believe that I was a student at UC Davis for a total of seven years. While being a college student is a whole lot of work, for me it was so much fun too. Certainly the saying applies, "time flies when you are having fun."

I first arrived at UC Davis as a transfer student from a community college in the San Francisco Bay Area in the fall of 2000. Even after these years, I still remember my first quarter very well. In particular I recall thinking after my Introduction to Advanced Mathematics class taught by Jack Milton that I had learned more in the past ten weeks than I had in the previous year! After completing my undergraduate degree two years later, I began my graduate work at UC Davis. I was a graduate student for five years working with Blake Temple studying relativistic gas dynamics. I feel so lucky to have been able to work with Blake; he provided the perfect balance of mentoring and intellectual curiosity which I still carry with me today.

After graduating, I was hired by the University of Hawaii at Hilo as a tenure track Assistant Professor. UHH is a primarily undergraduate institution located on the Big Island of Hawaii. During my first year at UHH I was selected as a Project NExT fellow. Project NExT is a professional development program from MAA aimed at recent graduates in the mathematical sciences.

My primary responsibility at UHH is as an educator. Like many Ph.D. graduates I had little formal training teaching and managing classes. Even after all these years I am constantly reminded of my time at UC Davis through my teaching style. Both Tom Sallee and Duane Kouba were instrumental in helping me develop the teaching strategies and techniques that work best for me and my students. (Thank you to you both!) Working with students is certainly my favorite part of being a college professor. It makes me happy to be able to share my love and enthusiasm of mathematics with others.

Along with my research studying nonlinear gas dynamics, I have been working with several colleagues at UHH on other projects. One project, headed by Dr. Raina Ivanova, is to initiate a STEM program at UHH. Also, I have been working jointly with Dr. Philippe Binder in the Physics Department, using tools from information theory to analyze chaotic systems; more specifically, comparing the rate at which nearby solutions diverge and the rate at which information is lost.

Outside of work, my wife Carri and I have adjusted to our new life here on the island. Our first child, Mason, was born in April 2009 and this year we purchased our first house here in Hilo. We all love the outdoor activities available to us here on the island including swimming, body-boarding, hiking and ultimate Frisbee. (Thank you to all the other Ultimate players at Davis who introduced me to this awesome sport!)

I will always look back at my time at UC Davis fondly and I am so thankful for all the generous support I received from the university, my fellow students, and the wonderful staff and faculty. I truly feel that it was the people I met and interacted with at UC Davis that made the Math Department such a wonderful place to be. I am proud to be able to take a part of it to the middle of the pacific!

Ronald (R. J.) Briggs

B.A.S. (Economics and Math) 2000, Ph.D. (Economics) 2009, UTexas Austin

After leaving UC Davis, Briggs worked as a Research Programmer for the RAND Corporation. He then studied at UTexas, Austin, in Environmental and Natural Resource Economics and Public Economics, and studied Indoor Air Quality as an NSF-IGERT trainee in Indoor Environmental Science and Engineering. As part of his training, he interned with the Environmental Energy Technologies Division at Lawrence Berkeley National Labs. He's now an Assistant Professor of Energy and Environmental Economics at Pennsylvania State.

Arthur G Fruhling

M.S. 1966

After graduating with his Master's, Fruhling taught at Yuba City High School. He received his Master's of Arts in Teaching Mathematics through Stanford University in 1972, and in 1987, taught at Yuba Community College until his retirement in 2003.

He fondly remembers Henry Alder's passionate teaching, which, though it sometimes resulted in some accidental 'rain', helped inspire him to teach math over his original goal of becoming an engineer.

Kent M. Neuerburg

B.S. 1983, M.A.T. 1985

Neuerburg completed his Master's of Arts in Teaching at UC Davis, and went on to teach at Luther Burbank High School in Sacramento. He then instructed at the Sacramento Cosumnes River College, before joining the faculty at Southeastern Louisiana University. In addition to his faculty position in Mathematics, he is the Director of the Honors Program.

"I attribute my success in graduate school and professionally to the strong foundation I received as an undergraduate at UC Davis."

Mathematics Top 20 Ranked by Survey, of 127

PRINCETON UNIVERSITY
HARVARD UNIVERSITY
NEW YORK UNIVERSITY
UNIVERSITY OF CALIFORNIA-BERKELEY
STANFORD UNIVERSITY
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
YALE UNIVERSITY
PENN STATE UNIVERSITY
COLUMBIA UNIVERSITY, CITY OF NEW YORK
UNIVERSITY OF WISCONSIN-MADISON
CALIFORNIA INSTITUTE OF TECHNOLOGY
UNIVERSITY OF MICHIGAN-ANN ARBOR
BROWN UNIVERSITY
UNIVERSITY OF NOTRE DAME
UNIVERSITY OF CALIFORNIA-DAVIS 15
VANDERBILT UNIVERSITY
INDIANA UNIVERSITY AT BLOOMINGTON
UNIVERSITY OF CALIFORNIA-LOS ANGELES
UNIVERSITY OF TEXAS AT AUSTIN
UNIVERSITY OF CALIFORNIA-IRVINE

Mathematics Top 20 Ranked by Research, of 127

NEW YORK UNIVERSITY
PRINCETON UNIVERSITY
HARVARD UNIVERSITY
UNIVERSITY OF CALIFORNIA-BERKELEY
STANFORD UNIVERSITY
YALE UNIVERSITY
UNIVERSITY OF CALIFORNIA-IRVINE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
COLUMBIA UNIVERSITY, CITY OF NEW YORK
CALIFORNIA INSTITUTE OF TECHNOLOGY
UNIVERSITY OF WISCONSIN-MADISON
UNIVERSITY OF MICHIGAN-ANN ARBOR
UNIVERSITY OF CALIFORNIA-DAVIS 13
PENN STATE UNIVERSITY
UNIVERSITY OF TEXAS AT AUSTIN
UNIVERSITY OF DELAWARE
RUTGERS NEW BRUNSWICK
UNIVERSITY OF MASSACHUSETTS AMHERST
UNIVERSITY OF MARYLAND COLLEGE PARK
UNIV OF ILLINOIS AT URBANA-CHAMPAIGN

Mathematics Top 30 Ranked by Regression Method, of 127

UNIVERSITY OF CALIFORNIA-BERKELEY
PRINCETON UNIVERSITY
HARVARD UNIVERSITY
NEW YORK UNIVERSITY
STANFORD UNIVERSITY
YALE UNIVERSITY
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
UNIVERSITY OF MICHIGAN-ANN ARBOR
UNIVERSITY OF WISCONSIN-MADISON
PENN STATE UNIVERSITY
COLUMBIA UNIVERSITY, CITY OF NEW YORK
UNIVERSITY OF CALIFORNIA-LOS ANGELES
UNIVERSITY OF CALIFORNIA-SAN DIEGO
UNIVERSITY OF TEXAS AT AUSTIN
CALIFORNIA INSTITUTE OF TECHNOLOGY
BROWN UNIVERSITY
RUTGERS, NEW BRUNSWICK CAMPUS
UNIV OF ILLINOIS AT URBANA-CHAMPAIGN
CORNELL UNIVERSITY
UNIVERSITY OF MARYLAND COLLEGE PARK
UNIVERSITY OF CHICAGO
TEXAS A & M UNIVERSITY
INDIANA UNIVERSITY AT BLOOMINGTON
MICHIGAN STATE UNIVERSITY
PURDUE UNIVERSITY MAIN CAMPUS
STATE UNIV OF NEW YORK, STONY BROOK
BRANDEIS UNIVERSITY
UNIVERSITY OF PENNSYLVANIA
DUKE UNIVERSITY
UNIVERSITY OF CALIFORNIA-DAVIS 30

UC Davis Math and Applied Math ranked among the nation's top graduate programs

by Joel Hass, Department Chair

The National Research Council (NRC), an arm of the US National Academy of Science, National Academy of Engineering, and Instutute of Medicine, released a major study on September 28th comparing numerous graduate research programs across the country. UC Davis had separate rankings in Mathematics and Applied Mathematics. The UC Davis Mathematics Graduate Program was evaluated among a group of 127 Mathematics Ph.D. programs while the Graduate Group in Applied Mathematics was compared to 33 Ph.D. programs in Applied Math. Several different methods were used to rank the programs, based on an exhaustive set of data collected in 2006 and 2007. A 296 page report accompanies the data and suggests how to interpret it. The report and data are available for free download at the National Academies Press: http://www.nap.edu/rdp/

There are three key ranking criteria among several that were used. The first, based on a large survey of faculty and administrators with numerous factors given various weights, is called the S-rankings. The second, the R-rankings, uses a statistical regression technique to reweigh the factors. Finally the Research rankings compares departments based on research productivity. For each of these criteria, two numbers are given, representing the 5th and the 95th percentile confidence level for a department's ranking. Thus if a department is given the ranking 5, 24 that means that there is a 5% chance that the correct ranking is 5 or better and a 95% probability that the correct ranking is 24 or better. This means that with 90% confidence, the correct ranking is somewhere between 5 and 24. A total of 127 Mathematics and 33 Applied Math programs were compared in this way. Following are the results.

UCD Mathematics (out of 127)

	5th %	95th %
Research:	5	24
Overall, Survey based:	9	33
Overall, Regression based:	16	47

UCD Applied Mathematics (out of 33)

	5th %	95th %
Research:	4	15
Overall, Survey based:	4	15
Overall, Regression based:	5	16

How can we use this data to compare Davis to other institutions? The NRC did not give a simple numerical ordering of the programs, and recommends against extracting a linear ranking. Nevertheless we will try to extract this more traditional ranking from the data. There are several options to use to get a linear ordering, and we can therefore assume that the number of schools that declare that this data puts them in the top 20 will be strictly larger than 20. The most straightforward way to extract a ranking is to average the 5th and 95th percentile rankings, and use the average to rank each institution. By doing this we get the following results:

UCD Mathematics (out of 127)

Survey based Ranking:	15th
Research ranking:	13th
Regression based ranking:	30th

UCD Applied Mathematics (out of 33)

Survey based Rankings:	9th
Research ranking;	9th
Regression based rankings;	11th

The trend towards UC Davis ranking among the nation's leading departments is clear.

The tables at either side show the top ranked departments nationally, using the above three criteria, for each of Math and Applied Math.

Applied Mathematics Top 20
Ranked by Survey, of 33

PRINCETON UNIVERSITY
UNIVERSITY OF CALIFORNIA-LOS ANGELES
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
BROWN UNIVERSITY
CORNELL UNIVERSITY
NORTHWESTERN UNIVERSITY
UNIVERSITY OF WASHINGTON
UNIVERSITY OF TEXAS AT AUSTIN
UNIVERSITY OF CALIFORNIA-DAVIS 9
HARVARD UNIVERSITY
NEW YORK UNIVERSITY
UNIVERSITY OF COLORADO AT BOULDER
COLUMBIA UNIVERSITY, CITY OF NEW YORK
UNIVERSITY OF ARIZONA
CALIFORNIA INSTITUTE OF TECHNOLOGY
STATE UNIV OF NEW YORK AT STONY BROOK
GEORGIA INSTITUTE OF TECHNOLOGY
UNIVERSITY OF SOUTHERN CALIFORNIA
RICE UNIVERSITY
NEW JERSEY INSTITUTE OF TECHNOLOGY

Applied Mathematics Top 20
Ranked by Research, of 33

PRINCETON UNIVERSITY
HARVARD UNIVERSITY
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
UNIVERSITY OF CALIFORNIA-LOS ANGELES
CORNELL UNIVERSITY
NORTHWESTERN UNIVERSITY
UNIVERSITY OF TEXAS AT AUSTIN
COLUMBIA UNIVERSITY, CITY OF NEW YORK
UNIVERSITY OF CALIFORNIA-DAVIS 9
UNIVERSITY OF WASHINGTON
BROWN UNIVERSITY
NEW YORK UNIVERSITY
UNIVERSITY OF ARIZONA
UNIVERSITY OF SOUTHERN CALIFORNIA
UNIVERSITY OF COLORADO AT BOULDER
CALIFORNIA INSTITUTE OF TECHNOLOGY
STATE UNIV OF NEW YORK AT STONY BROOK
GEORGIA INSTITUTE OF TECHNOLOGY
RICE UNIVERSITY
NEW JERSEY INSTITUTE OF TECHNOLOGY

Applied Math Top 20
Ranked by Regression Method, of 33

PRINCETON UNIVERSITY
UNIVERSITY OF WASHINGTON
BROWN UNIVERSITY
CORNELL UNIVERSITY
UNIVERSITY OF CALIFORNIA-LOS ANGELES
UNIVERSITY OF ARIZONA
NEW YORK UNIVERSITY
CALIFORNIA INSTITUTE OF TECHNOLOGY
UNIVERSITY OF MARYLAND COLLEGE PARK
NORTHWESTERN UNIVERSITY
UNIVERSITY OF CALIFORNIA-DAVIS 11
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
UNIVERSITY OF TEXAS AT AUSTIN
STATE UNIV OF NEW YORK AT STONY BROOK
UNIVERSITY OF SOUTHERN CALIFORNIA
RICE UNIVERSITY
UNIVERSITY OF COLORADO AT BOULDER
COLUMBIA UNIVERSITY, CITY OF NEW YORK
HARVARD UNIVERSITY
UNIVERSITY OF IOWA

Emeriti Update

Mathematics With a Computer at Your Side

by Kurt Kreith

For the first time in ten years, I forewent participation in COSMOS in order to offer a summer course at Columbia Teachers College. Dealing with the role of computer technology in high school mathematics instruction, this course was based on a book (Iterative Algebra and Dynamic Modeling, 1999) with Don Chakerian, materials developed for Cosmos, and on Freshman Seminars offered at UC Davis.

The daunting problem of finding housing in New York led me to a spare room in a 27th floor apartment at 94th Street and Amsterdam Avenue. From there, an evening walk revealed a remarkable coincidence: these digs were just 5 blocks from the 89th Street brownstone where I and my family of immigrants found shelter in the winter of 1939.

Notes for my summer course are available via TC's Moodle site under Math, Science and Technology (I can provide a password enabling you to enroll as a Guest). The course will also be described in a Doceamus column in the January 2011 issue of the *Notices*.

http://tcmoodle.tc.columbia.edu/moodle

Staff News

Keeping Things Running

by Jessica Potts

The 2009-10 year brought furloughs, consolidation, and process streamlining to the staff arena. Student Services Assistant, Connie Dani, retired with 10 years of university service. This position was parceled out to the remaining staff, which provided an opportunity for new training. Department Assistant Alla Savrasova was promoted as part of this consolidation. As we continue to manage with less staff FTE, our programming team works hard to automate business processes in order to streamline the work we do. I truly appreciate the hard work and dedication put forth by each staff member during this difficult time.

In May 2010, Leng Lai welcomed into the world Chloe Sywai Lai. Perry Gee celebrated five years of service in May 2010 and I celebrated my ten years of service in June 2010.

Are You a Graduate?

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

Please complete our Alumni Questionnaire:
http://www.math.ucdavis.edu/news/alumni_quest
or send e-mail to:
mso@math.ucdavis.edu
We will do our best to include it in the next newsletter.

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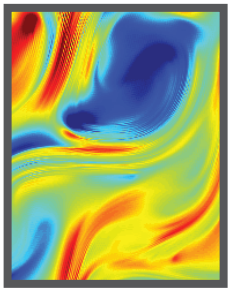

Cover Feature

The cover graphic shows a measurement of the amount of rotational spin or "vorticity" of a thick fluid like shampoo or mayonnaise. Read more in The Study of Viscoelastic Fluids, page 4.

Featuring the 2009-10 Academic Year

Newsletter Committee:

Dan Romik, Editor
Jessica Potts, Management Services Officer
Marianne Waage, Designer