UCDAVIS 2007

newsletter

DEPARTMENT OF MATHEMATICS

contents

new Faculty

Becca Thomases received her Ph.D. from UC Santa Barbara in 2003. Her adviser was Thomas Sideris and her thesis work was on analysis of partial differential equations. She then spent four years as a Courant Instructor and Assistant Professor at the Courant Institute at New York University. There she worked with Michael Shelley on viscoelastic fluid dynamics. Her research interests mesh well with those of our applied mathematics faculty. Becca is an accomplished teacher, having won the Academic Senate Outstanding Teaching Assistant Award while at UCSB. She joins the Department as an Assistant Professor, and will be teaching Linear Algebra this Fall and a graduate Analysis course in the Spring.

Becca is thrilled to be part of the faculty at UC Davis and happy to be returning to California. She lives with her partner of ten years, Kyung, and their two dogs, Charlie and Juju. When not doing math or playing with her dogs, Becca likes running, bicycling, and hiking in the local hills.

Brian Osserman received his Ph.D. from MIT in the Winter of 2004, under the direction of Johan de Jong. He spent the Spring of 2004 at RIMS in Kyoto, and the following three years as a postdoc just down the road from here, at UC Berkeley. Brian joins UC Davis as an Assistant Professor.

Spanning many areas of algebraic geometry, Brian's research ranges from positive characteristic to real and complex geometry, with an emphasis on the use of moduli theory, and in particular degeneration and deformation arguments. Recurring topics include enumerative problems, vector bundles and connections, and maps between curves. His research already borders on parts of discrete math, topology, and string theory, and he looks forward to making use of the extensive expertise at Davis to explore these directions further.

When not working, Brian enjoys playing video games with his wife, practicing aikido, dabbling in photography, and writing about himself in the third person. The Sierra mountains are his favorite part of California, and he plans to take full advantage of their proximity to Davis.

Fu Liu received her Ph.D. from MIT in June 2006, under the guidance of Richard Stanley. She spent the fall of 2006 at MSRI as a postdoc in the program on Computational Applications of Algebraic Topology, and then joined UC Davis as a Krener Assistant Professor, working with Jesus De Loera. She now joins the faculty as an Assistant Professor.

Fu's research interests are in enumerative and algebraic combinatorics. A major focus of her work has been volume, lattice points and Ehrhart polynomials of polytopes. This includes a closed formula for the Ehrhart polynomials of cyclic polytopes, which she subsequently generalized to a new class of polytopes called lattice-face polytopes. More recently, Fu has used triangulations and perturbation methods to study the volumes and Ehrhart polynomials of Birkhoff polytopes and more generally central transportation polytopes. However, she is also interested in enumeration on trees, as well as connections between combinatorics and representation theory and algebraic geometry.

Fu has been interested in contest mathematics since elementary school and hopes to continue her involvement as a mentor in the future. In her leisure time, Fu likes to play video games with her husband. She also enjoys basketball and ballroom dance.

new Krener Assistant Professors

Bremer

James Bremer received his Ph.D. from Yale in 2007. He studied under Ronald Coifman. James' research interests are centered in the area of computational harmonic analysis. He solved problems on low-rank matrix decompositions and his research strives to find the best algorithm to analyze data given the format of a matrix. He was hired to fill the campus Universe@UCDavis Initiative position, where he will be using his mathematical background and skill on the Large Synoptic Survey Telescope (LSST) project. This project is set to generate more than 30 terabytes of images every night for a decade. The goal will be to organize, process, and analyze the huge amount of data and enable new discoveries from the telescope to be made available to the public and researchers in real time. This is an exciting project for James to be part of at this stage of his career.

In addition, he will be teaching Linear Algebra and Optimization in the Spring. At Yale, James proved himself to be a talented teacher by receiving much praise for his class preparation and ability to clearly explain theories and concepts. These abilities plus his personal qualities of being pleasant and approachable bode well for his success in the classroom.

Zhu

Dianwen Zhu received his Ph.D. in Mathematics from Northwestern University in June 2005. His research interests are in partial differential equations and their applications. His work has been focused on hyperbolic conservation laws, but he is also interested in stochastic differential equations and asymptotic analysis. He is now working with Professor John Hunter as well as other faculty members in related areas.

Outside of mathematics, Dianwen is interested in table tennis, Tai-Chi boxing and travel.

Fukuda

Motohisa Fukuda received his Ph.D. from Cambridge University in July 2007. His current interest is in quantum information theory (QIT). However, his Ph.D. thesis was written on the additivity conjectures, which are unsolved mathematical problems and play an important role in QIT. He is working with Professor Bruno Nachtergaele.

He enjoys listening to music.

Visitor Kaminker

Jerry Kaminker is visiting the Department for another year. He says he feels very fortunate to be able to spend more time here in such a pleasant and stimulating environment. He is continuing some projects on K-theory and characteristic classes from an analytic point of view, and is also looking into relations between matrix integrals and von Neumann algebras with Motohico Mulase. Moreover, he is also starting work on an introductory book on Noncommutative Geometry. To top it off, he has two granddaughters in San Francisco who, he believes, are even more fun than mathematics.

Visitor Saintenoy

Albane Saintenoy is visiting this year from the Earth Sciences Department of Université Paris Sud at Orsay. She received her Ph.D. in geophysics from the Institut de Physique du Globe de Paris, and is currently conducting her research at the Land and Water Resources Department of UC Davis on the usage of Ground Penetrating Radar to monitor moving interfaces such as the water table. Among other things, she has been teaching mathematics to undergraduate students in geology for seven years, and will be teaching calculus in Spring Quarter.

With renewed verve & VIGRE

For the past five years the Department of Mathematics at UC Davis has held a VIGRE grant (pronounced "vigor") and we are proud to announce that this grant has been renewed for another five years! This large scale grant from the National Science Foundation is aimed at "Vertical Integration of Graduate Research and Education." Its main goal lies in increasing the number of US students who successfully pursue a Ph.D. in the mathematical sciences and to better prepare them for career paths open to mathematics Ph.D.'s.

Graduate school is just one phase in the career of a mathematician, and the "Vertical" in VIGRE emphasizes that becoming a successful professional mathematician requires integrated action in the phases that come before and after graduate school, namely mathematics undergraduate education and the postdoctoral experience. To facilitate initiatives that streamline this process, the VIGRE grant provides funds to specific individuals and activities. For instance, it provides stipends for undergraduate students, fellowships for graduate students, and part-time fellowships for postdocs combined with a teaching appointment.

The VIGRE grant also contributes funds for the "Research Experiences for Undergraduates" (REU's), a popular program that allows undergraduate students a chance to glimpse the world of mathematics research. In recent years, the UC Davis Department of Mathematics has offered several REU's every summer with topics reflecting the expertise of our faculty and postdocs. Not surprisingly, during these years the number of undergraduate mathematics majors has risen noticeably. There are now roughly 385 mathematics majors at UC Davis.

For graduate students, VIGRE fellowships mean the freedom to work on thesis research and to pursue related activities such as attending conferences and outreach. As a result, the number of graduate students in our department has grown substantially. There are now roughly 130 mathematics graduate students at UC Davis. Graduate students also benefit from the new VIGRE funded mini-grants providing funds for individuals or groups. For instance, a group of combinatorics students applied for and was awarded a mini-grant (in addition to a more substantial grant from the National Science Foundation) enabling the (third annual) Graduate Student Combinatorics Conference to take place here at UC Davis.

The postdoctoral program too has been expanded with VIGRE funds. These funds, along with a generous donation by Professor Emeritus Art Krener and his wife Jeanne Reese, provided the foundation for negotiations with the University that resulted in the new Krener Assistant Professorships. These assistant professorships provide for a much improved postdoctoral experience. Specifically, they offer higher salaries, lower teaching loads and travel funds.

Mathematicians at all stages have and will continue to benefit from the VIGRE sponsored Research Focus Groups. Each year four topics are selected from proposals by the faculty. They represent broad areas of active research in the Department. In addition to the formal seminars on topics selected, the faculty, postdocs,

Catching up Stevelman

Seth Stevelman (B.S. 1998 in Math, B.A. in Poli. Sci.) continued his education at Harvard Law School. He is now an Attorney at Mitchell Silberberg & Knupp in Los Angeles. He is also co-owner of the Trifecta Studios production company. He married his wife, Jennifer, in 2006, and their baby daughter Chloe was born later that year. Seth was terribly saddened by the news of the passing of Dr. Evelyn Silvia. She was a great teacher and a great mentor to him during his time at UC Davis.

graduate and undergraduate students participate in informal seminars and reading groups covering both introductory and advanced material on the topic. Last year's topics were: Spectral properties of random operators; Geometric group theory; Applications of quantum algebra; and Water waves, fluid interface motion, and mass transport. This year's topics are: Geometry and topology of 3-manifolds and geometric group theory; Combinatorics in algebra and geometry; Quantum information, operator spaces, and quantum spin structures; and Probability.

The spectacular expansion and improvement achieved in the Mathematics and Applied Mathematics Ph.D. programs in our Department have not gone unnoticed. In a recent study, conducted by the National Academy of Sciences, our Department proved to be an important case study demonstrating the utility of such a large scale grant to a department. At a panel reviewing this study, lead principal investigator Jesus De Loera received praise for our accomplishments from the highest quarters.

Looking back on our VIGRE supported accomplishments, we renew our commitment to the goals that have engendered this success: Our commitment to serving our students at all levels, our young colleagues, the subject of mathematics and the many activities related to mathematics!

For more information and updates on current activities in the VIGRE project see:

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

new VIGRE Fellows

Wise

Derek Wise comes to us from UC Riverside, where he recently completed his Ph.D. as a student of Professor John Baez.

Derek's research is motivated by fundamental physics, particularly in the areas of classical and quantum gravity. He collaborates with both mathematicians and physicists, believing strongly in the interaction between math and physics as a means of driving both subjects in fruitful directions. He is particularly interested in applications of geometry, topology, and higher category theory to physics. More specifically, his recent research has focused on relationships between Cartan geometry, general relativity, and (categorified) topological gauge theories.

Before studying mathematical physics at UC Riverside, Derek obtained undergraduate degrees in both physics and math at Abilene Christian University, Texas, where he also engaged in research in experimental particle physics. He then spent four years doing mathematical modeling in industry. When he's not thinking and talking about math, Derek loves playing guitar (jazz, blues, fusion, ...), juggling, and traveling and participating in outdoor activities with his wife.

Jones

Brant Jones received his Ph.D. from the University of Washington in May 2007. His research focuses on combinatorics related to Coxeter groups and Hecke algebras. He is working with his faculty mentor, Monica Vazirani, as well as other faculty members and postdocs to investigate the combinatorics of Kazhdan-Lusztig polynomials associated to Weyl groups, which arise in representation theory as well as the algebraic geometry of Schubert varieties.

In addition to mathematics, he enjoys hiking, bicycling around Davis, and playing improvised music with friends.

Catching up Penkava

Michael Penkava (Ph.D. 1995, under the supervision of Motohico Mulase), currently Full Professor at the University of Wisconsin-Eau Claire, received a 2007 Fulbright Scholar Award to conduct research in Hungary.

new Postdoc Malkin

Our new IBM postdoc (through an IBM OCR grant for Prof. De Loera) and lecturer is Dr. **Peter Malkin**. Peter completed his undergraduate degree at the University of Melbourne, Australia, in 2001. He received a Bachelor of Science (Mathematics) and a Bachelor of Engineering (Software Engineering). Afterwards, Peter worked for a year and a half as a software engineer on real time simulation systems. In 2007 Peter completed his doctorate in Applied Science at the Université catholique de Louvain in Belgium. His doctoral dissertation discussed an alternative algebraic approach to integer programming called Groebner basis methods or Test Set methods. Peter's current areas of research interest include solving the integer feasibility problem (determining whether there is an integer point inside a given polyhedron) and polyhedral computation (converting between different representations of polyhedra and related problems). Peter will be in charge of the software development of the IBM-UC Davis project.

Peter and his wife are at the same time getting used to California and to parenthood; their young daughter was born only shortly before they arrived in Davis.

Visitor Zagrebnov

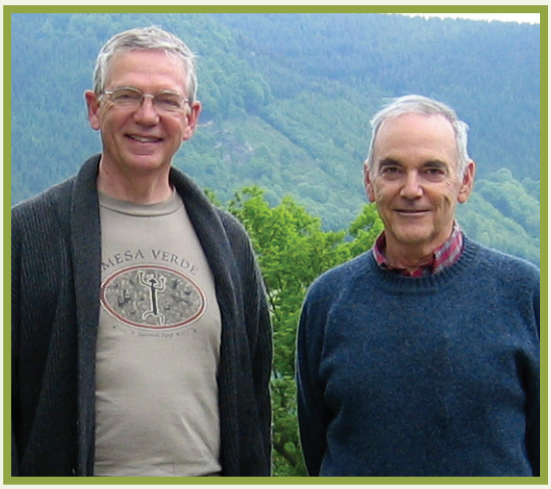
Valentin Zagrebnov from the University of Marseille will be visiting us in Spring 2008. Professor Zagrebnov works in quantum statistical mechanics and functional analysis and is very well known for his work on Bose-Einstein condensation. He is a member of the Centre de Physique Théorique-Luminy. In Davis, he will be collaborating with Bruno Nachtergaele and other researchers in mathematical physics. He will also teach a graduate level course in Mathematical Statistical Mechanics.

Craig Tracy awarded Wiener Prize

from Notices of the AMS, Volume 54, Number 4, Apr 2007

The Wiener Prize is awarded every three years to recognize outstanding contributions to applied mathematics in the highest and broadest sense. The recipient of the Wiener Prize is chosen by a joint AMS-SIAM selection committee.

The 2007 Wiener Prize was awarded to Craig Tracy and Harold Widom. Craig Tracy and Harold Widom have done deep and original work on Random Matrix Theory, a subject which has remarkable applications across the scientific spectrum, from the scattering of neutrons off large nuclei to the behavior of the zeros of the Riemann zeta-function.



Courtesy of the Archives of the Mathematisches Forschungsinstitut Oberwolfach

The contributions of Tracy and Widom center around a connection between a class of Fredholm determinants associated with random matrix ensembles on the one hand, and Painlevé functions on the other. Most notably, they have introduced a new class of distributions, the so-called Tracy-Widom distributions, which have a universal character and which have applications, in particular, to Ulam's longest increasing subsequence problem in combinatorics, tiling problems, the airline boarding problem of Bachmat et al., various random walker and statistical mechanical growth models in the KPZ class, and principal component analysis in statistics when the number of variables is comparable to the sample size.

The committee also recognizes the earlier work of Craig Tracy with Wu, McCoy, and Barouch, in which Painlevé functions appeared for the first time in exactly solvable statistical mechanical models. In addition, the committee recognizes the seminal contributions of Harold Widom to the asymptotic analysis of Toeplitz determinants and their various operator theoretic generalizations.

Craig Arnold Tracy was born in England on September 9, 1945, the son of Eileen Arnold, a British subject, and Robert C. Tracy, an American serving in the U.S. Army. After immigrating to the United States as an infant, Tracy grew up in Missouri where he attended the University of Missouri at Columbia, graduating in 1967 as an O. M. Stewart Fellow with a B.S. degree in physics. He began his graduate studies as a Woodrow Wilson Fellow at the State University of New York at Stony Brook, where he wrote his doctoral dissertation under the supervision of Barry M. McCoy. After postdoctoral positions at the University of Rochester (1973-75) and the C.N. Yang Institute for Theoretical Physics (1975-78), Tracy was at Dartmouth College for six years before joining the University of California, Davis, in 1984. He is currently a Distinguished Professor of Mathematics at UC Davis. In 2002 Tracy was awarded, jointly with Harold Widom, the SIAM George Pòlya Prize. He is a member of the American Academy of Arts and Sciences. Tracy has two daughters and three grandchildren. He is married to Barbara Nelson, and they reside in Sonoma, California.

Letter from the Chair

by Bruno Nachtergaele

Front: Rohit Thomas, Tracy Ligtenberg, Marion Moore
Back: Andrew Waldron, Joel Hass, Bruno Nachtergaele, Thomas Strohmer, Naoki Saito

After serving as Department Chair for two three-year terms, Motohico Mulase is currently enjoying a well deserved sabbatical year. In fact, the Department opened this academic year with an almost entirely new leadership team. Not everyone is new; for example, Tracy Ligtenberg has served as Department Manager for 8.5 years and most others have plenty of experience in leadership positions as indicated at the right.

Over the last six years the number of graduate students in the Department doubled (from 65 to 130), the number of undergraduate mathematics majors increased by about 35%, and 19 new professors joined the faculty. These are impressive numbers, but there is more to brag about than just quantity. According to the Chronicle of Higher Education, the UC Davis mathematics faculty have the fourth highest Faculty Scholarly Productivity Index (FSPI) among US mathematics departments. The FSPI is based on the number of research articles and books published, research grants received, citations to recent publications and awards. You can read about the Department members who have been recognized for the excellence of their work with honors and awards in this newsletter.

Mathematics is a thriving discipline. The past few years have seen some remarkable breakthroughs. Perelman's proof of the Poincaré Conjecture is just the most obvious example and a monumental achievement indeed. Perelman's work also serves as a powerful reminder that the boundaries between different areas of mathematics are cultural artifacts due to the human need to classify and label the world. New ideas come more easily to those with an open mind and who are able to look beyond the perceived boundaries. Many important advances in mathematics illustrate this, and I am happy to point out that the UC Davis Department of Mathematics strongly promotes this 'unitary' view of mathematics. It is the engine of its dynamism.

State and Federal government agencies continue to emphasize the need to improve the learning of mathematics in our schools. The shortage of well-prepared mathematics teachers is a major stumbling block to do this. Davis and the other University of California campuses received a mandate to solve this problem. The goal is to deliver a thousand new math and science teachers per year. These teachers are needed to better prepare high school graduates to enter majors in mathematics, science, and engineering, and other majors that heavily rely on mathematics such as economics. The importance of mathematics in the scholarly realm is very well known, even in areas where its widespread use is a relatively recent phenomena such as in the biological sciences.

To respond to these needs, the Department has restructured our course offerings and added new options for our math majors to choose from: Mathematics, Applied Mathematics, and Mathematical and Scientific Computation. This process will continue over the next several years. A group of graduate students created and runs our very successful Explore Math program for high school students as mentioned in the article on page 10. Unfortunately, new mandates often come without adequate accompanying support. To be able to continue on its successful trajectory the Department has to find the necessary resources. I would like to mention three priorities: graduate student fellowships, research support for our most creative faculty, and stipends for the graduates students taking leadership roles in the Explore Math project. If you are able to give, please consider some of these priorities or make a general gift.

Our success as a Department depends crucially on the many and important contributions by faculty, staff, and students. Both the abundance and the diversity of talents are essential. As always, we build on the achievements of a large number of faculty and staff, who have retired or moved on to other positions, and students who have graduated. Our continued growth and success depends on their support, too. Our best accomplishments rely on a collaborative effort toward a set of shared goals in research, education, and service to the community. Let's keep in touch!

Joel Hass, Professor and Chair of the Faculty Representative Committee, 2007-08, served as Chair of the Graduate Program and has been with the Department since 1988.

Thomas Strohmer, Professor and Chair of the Graduate Program Committee; Department member since 1998.

Naoki Saito, Professor and Chair of the Graduate Group in Applied Mathematics, 2007-10, most recently was Chair of the Faculty Representative Committee; Department member since 1997.

Andrew Waldron, Associate Professor and Chair of the Undergraduate Program Committee; Department member since 2000.

Marion Moore, President of the Galois Group, 2007-08; graduate student since 2004.

Rohit Thomas, Vice-President & Treasurer of the Galois Group, 2007-08; graduate student since 2005.

Good News

Bruno Nachtergaele was elected Fellow of the American Association for the Advancement of Science this year. Bruno was honored for his work on mathematical physics, especially quantum spin systems, and for his editorial contributions to journals in mathematical physics.

Jesus De Loera was awarded one of the new IBM Open Collaboration Grants to support his research in new algebraic techniques in discrete optimization. With this money, he hired an IBM postdoc, Dr. Peter Malkin. News concerning these awards appeared in the Chronicle for Higher Education and in the New York Times Business section.

Naoki Saito and Thomas Strohmer joined the Editorial Advisory Board of "Applied and Computational Harmonic Analysis," a premier journal in this field. Misha Kapovich joined the editorial board of "Groups, Geometry and Dynamics," a new journal issued by the European Mathematical Society. Monica Vazirani gave a week long mini-course at the Centre de Recherches Mathématiques in Montréal in May 2007.

Matthew Herman presented his research at the "2007 von Neumann Symposium on Sparse Representation and High-Dimensional Geometry," held in July in Snowbird, Utah.

Explore Math received a Golden Service Award, which distinguishes the group as being in the top 20% of campus community service groups. Chancellor Vanderhoef praised the graduate and undergraduate students who are working together in Explore Math to inspire local students to find a love for mathematics. For more about Explore Math this year, see page 10.

In general, Math Principal Investigators were awarded 14 new grants totaling $2.2 million across budget years. (This does not include the VIGRE—5 years, $3.2 million.)

Schilling selected Chancellor's Fellow

Professor Anne Schilling was selected for the 2006-07 Chancellor's Fellow program, a program established to honor achievements of outstanding faculty members early in their careers. Only five other faculty on the Davis campus were selected as fellows based on their strengths and achievements in research, teaching and service. Given Professor Anne Schilling's record in all of these areas, she was the perfect choice for this honor.

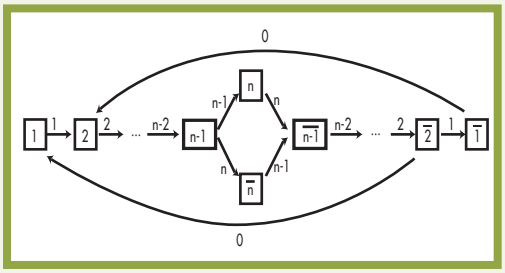
Anne's research expertise ranges widely including discrete mathematics, algebraic combinatorics, representation theory, and statistical mechanics. She has over 30 peer-reviewed journal articles along with several other refereed contributions and book chapters. Her research addresses two main areas, mathematics and physics, which gives her a unique position in the area of representation theory and discrete mathematics. Anne has presented her research at many prestigious institutions and international conferences during her career. She has also organized several successful workshops and conferences extending her research activities to the broader professional community.

As a teacher she excels at both the undergraduate and graduate levels. Her student evaluations are consistently high and the praise is uniformly positive. Her concern for their learning is evident in how she conducts herself in front of the classroom and in working with them individually. Together with Isaiah Lankham and Bruno Nachtergaele, she produced lecture notes for the students taking MAT 67, which are available for free on the Department website.

In addition to her strong research and teaching records, Anne's service has been extraordinarily strong. She serves as a referee for over a dozen journals, reviews grant proposals for outside funding agencies, and she just completed a three-year term as the Vice Chair of our Undergraduate Program Committee in the Department of Mathematics. In all respects, Anne Schilling has been exemplary in her efforts as a junior professor and is most deserving of the recognition of Chancellor's Fellow. She will receive a $25,000 award to be used to support her research activities for the coming year. In particular, she will spend the Winter and Spring Quarters at the Mathematical Sciences Research Institute at Berkeley to organize and participate in the program on "Combinatorial Representation Theory" and support visitors and students. Congratulations Anne!

Getting Focused

A few years ago, the National Science Foundation (NSF) initiated a program dedicated to Focused Research Groups (FRG) with the stated goal of "allowing groups of researchers to respond to recognized scientific needs of pressing importance, to take advantage of current scientific opportunities, or to prepare and solidify the ground for anticipated scientific developments in the mathematical sciences." Each year, this small but prestigious program supports only a handful of such groups. For this reason, we are especially proud to announce that two such grants were awarded to groups based partially in our Department. The first group includes Anne Schilling (who shares this grant with Jennifer Morse from Drexel University and Mark Shimozono from Virginia Tech). The second includes Roman Vershynin (who shares this grant with several other researchers from Case Western Reserve University, Kansas State University, Kent State University and the University of Missouri at Columbia).



An example of affine Schubert calculus

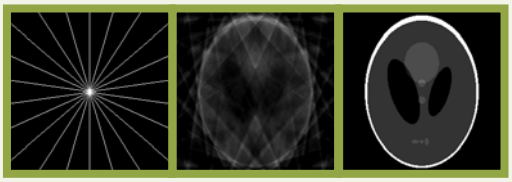
Anne Schilling's group will investigate problems from combinatorics, geometry, representation theory, physics and computation. As stated in the abstract: "This project concerns the development of a vast extension of Schubert calculus to affine Grassmannians and affine flag varieties, called 'affine Schubert calculus' ... The main questions that will be addressed can be viewed from several points of view: a geometric perspective (... 'how many lines are there satisfying a number of generic intersection conditions?'), a combinatorial perspective ('how many elements are in given sets and what properties do these sets have?'), a physics perspective ('how do fields correlate?'), and computational aspects ('are there efficient algorithms for calculating these numbers or objects?')."

Roman Vershynin's group aims to "bring together tools from Fourier analysis, affine convex geometry, geometric functional analysis, probability theory, and combinatorics to attack problems arising in geometry, analysis, and in various areas of applied mathematics and computer science ... Specific sample directions of planned research are to the slicing problem, the Mahler conjecture, the Gaussian correlation conjecture, combinatorial dimensions of classes of functions, singular numbers of random matrices, signal reconstruction (notably, compressed sensing), and links to quantum information theory."

One other such grant is currently being held in our Department. It was awarded last year to a group including Michael Kapovich (who shares this grant with John Millson, Thomas Haines, both from the University of Maryland, and Shrawan Kumar and Prakash Belkale, both from UNC Chapel Hill).

For the full abstracts, search for 0652652 or 0652617 at NSF:

http://www.nsf.gov/awardsearch/



Example of compressed sensing signal reconstruction from computerized tomography.
Sparse projections with 11 radial lines. Left to right: available portion of the spectrum; back-projection estimate; estimate after convergence.

From Egiazarian, Foi, and Katkovnik, "Compressed Sensing Image Reconstruction via Recursive Spatially Adaptive Filtering", 2007.

Visitor Thiéry

Nicolas Thiéry is visiting this year from the Laboratoire de Mathématiques d'Orsay, Université Paris-Sud, working with Anne Schilling on the NSF Research Focus Group project "Affine Schubert Calculus: Combinatorial, geometric, physical, and computational aspects." Nicolas received his Ph.D. from the Université Claude Bernard in Lyon in 1999 under Maurice Pouzet on topics of invariant theory. His expertise lies in the interplay between mathematics and computer science. In particular, he is the founder and one of the main developers of the combinatorics computer library MuPAD-Combinat. He is currently working on combinatorial questions concerning affine Schubert calculus, symmetric functions, and Hecke algebras.

new Postdoc Bandlow

Jason Bandlow is a postdoc funded by the NSF Research Focus Group project "Affine Schubert Calculus: Combinatorial, geometric, physical, and computational aspects" working with Anne Schilling. He just finished his Ph.D. on "Combinatorics of Macdonald polynomials and extensions" under the guidance of Adriano Garsia at UCSD. He is currently working on combinatorial questions concerning affine Schubert calculus and relations to symmetric functions and Macdonald polynomials.

Catching up Coomes

Jacqueline Coomes (B.S. 1993 in Math) earned her Ph.D. in Mathematics Education at Washington State University in 2006. She is presently an Assistant Professor at Eastern Washington University. She feels that the support she received in the Department of Mathematics at UC Davis was instrumental in her recent successes.

Visitor Rubini

Francesco Rubini visits us from the Department of Astrophysics at the University of Florence in Italy. Until 2007 he also held a visiting research position at the University of Chicago Alliance Center for Astrophysical Flashes. Earlier in his career, he worked in industry (Fiat) for some years before deciding that the academic research life better suited his tastes.

His expertise is in computational fluid dynamics and he currently focuses on astrophysical fluids. However, his interests range from stellar convection simulations (low mach number) to astrophysical jets (extremely high mach number). His most recent paper details the formation of hypersonic "optical knots" which have been observed in jets which emanate from the envelopes of young, massive stars; it appeared in the Journal of Astronomy and Astrophysics vol. 472, in September 2007. While at the ASCI Flash Center at Chicago he worked on equilibria of classical stellar novae.

Professor Rubini will be guiding his research back to more terrestrial applications as he begins a collaboration with Professor Joseph Biello of our Department on moist convection in the Earth's troposphere.

Francesco hails from Bari in southern Italy, but has lived throughout Italy, in France for some time and in Chicago. He enjoys hiking, writing, drinking good wine and driving across the USA in old cars on older roads. The first time he saw the Central Valley he likened it to Sardinia, his favorite place on Earth.

Sharing Our Love of Mathematics with the Community

an update about Explore Math

Graduate students from the Department of Mathematics reach out to local undergraduate and high school students in several ways, most notably through activities affiliated with Explore Math. The 2007 Explore Math Program kicked off a new year with its annual Fall Quarter MME (Math Modeling Experience) and will continue with Math Circles in Winter Quarter and training for the ARML (American Regions Mathematics League) annual competition in Spring Quarter. Several local high school students attend the weekly Saturday workshops. This year, 46 of these local students participated in the HiMCM (High school Mathematical Contest in Modeling) in a 36 hour competition on November 10-11. The 2nd Annual Explore Math Open House, held on October 27, brought together parents, local high school teachers, UC Davis faculty and graduate students as well as Math Circle organizers from the Bay Area.

Prof. Nachtergaele discusses a student's work at the MME Open House

A high school team showing off their completed report for COMAP.

The Saturday workshops also feature lectures for undergraduate students taught by graduate students and UC Davis faculty. This year's faculty lecturers are Joseph Biello and Alex Mogilner. Topics include stochastic disease models, agricultural pest control, storm simulations, and cell crawling models. These activities introduce undergraduate students to the process of research and included a Student-Run Seminar on December 5, where five teams of undergraduate students gave 15 minute presentations.

In addition, the professors and graduate students from the Department of Mathematics reach out to the community in a variety of ways. Every January, the Explorit Science Center, a local hands-on science museum aimed at the young and inquisitive, hosts its "Math Mania" Family Exploration. These events are made possible by volunteers from the Department of Mathematics. This year's Explorit Math Mania ran under the title "From Codes to Crystals: Patterns All Around" and featured discussions of snowflake symmetry, tilings, stable and unstable fluid structures, the mathematics of Sudoku, creating fractals, Monty Hall and mathematical puzzles and mind-benders.

The Department of Mathematics also participates in Picnic Day, a large scale event held annually in April at UC Davis. In 2007, the tables featuring mathematical objects and materials and the generous volunteers staffing the tables had to be moved indoors, due to heavy rain. Despite the rain, the event was well attended and featured the first Picnic Day Mathematics Reunion for graduates of COSMOS (California State Summer School for Mathematics and Science), MAST (Mathematics and Science Teaching Programs) and other programs. This was not the only departmental tradition started this year; another, Math Fest, also an example of outreach, is discussed on the following page.

Finally, Jesus De Loera organized a group of mathematical tables at the César Chávez Elementary School's Science Festival. With activities aimed at K-6 students, this event provided opportunities for students to explore mathematics. These events and others show how effective the Department of Mathematics can be at making the subject accessible and engaging for the community as a whole.

a festival in Math!

On July 26, 2007, UC Davis held its first annual Math Fest. The event demonstrated both the fun and relevance of mathematics to the public, in particular to high school students. "Our goal is to attract young people so they will consider pursuing a background in mathematics," said Professor Jesus De Loera. "It's a great subject with great career opportunities."

The event kicked off with an amazing presentation, "Math in the Movies," by Dr. Tony DeRose, senior scientist and research group leader at Pixar Animation Studios. An alumnus of UC Davis, Dr. DeRose has been credited on films including "Monsters Inc.," "Finding Nemo" and "The Incredibles." In 2006, he won an Academy Award for his work on representing surfaces in computer animation.

It was standing room only. Over 300 people attended the presentation, which was followed by mathematical puzzles and games and information about careers in mathematics. Kids and parents alike played mathematical games, constructed interesting polytopes and geometric surfaces, and wrestled with brain-teasers until darkness fell.

To the delight of the audience, Dr. DeRose started his presentation with entertaining clips from recent Pixar films. He also showed clips from all stages of a film's production and described many of the steps that go into their creation. Underlying it all was mathematics. As Dr. DeRose explained in his talk, "the movies are really motivating the creation of new math." He described how recent research in subdivision surfaces gave animators algorithms that efficiently describe curves and surfaces that model the clothing or skin of an animated character. Dr. DeRose showed the ideas and equations from linear algebra and calculus that drive the algorithm, and then demonstrated it at work on a simple curve. "Computer graphics is math," said Tony DeRose. "I can't think of an aspect of computer graphics that doesn't involve some kind of mathematics."

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

Many thanks to all those who attended (notable attendees included Dean Ko and Interim Provost and Executive Vice Chancellor Horwitz). A special thank you to the impressive turn-out of volunteers from faculty (especially Jesus De Loera), staff, MAST, the graduate and undergraduate math students, and COSMOS.

Left: COSMOS students explore how different geometry floats.

Below: Dr. Tony DeRose answers questions after his presentation.

Visitor Suhov

Yuri Suhov, Professor of Applied Probability, University of Cambridge and St John's College, Cambridge, Great Britain, will visit the Department during the Winter Quarter, 2008. Professor Suhov is known for his numerous outstanding contributions to Mathematical Physics, Dynamical Systems and Probability Theory. Members of the Department and Ph.D. students from a wide range of interests will be given an opportunity to discuss rapidly developing directions in one of the most exciting areas of modern research, namely, quantum information theory. In addition, he will teach Applied Linear Algebra and Real Analysis. Professor Suhov was a visiting professor in the Department in Fall 2005, and we are looking forward to having him around again this Winter.

SIAM at Davis

A SIAM student chapter is starting up at UC Davis. The SIAM (Society for Industrial and Applied Mathematics) Club, mentored by Joseph Biello, is committed to promoting the interests of students pursuing all forms of applied mathematics at UC Davis. We have several events planned for the upcoming year including a career night and a student research conference.

Graduate Student Teaching Award

The Department of Mathematics made campus history this year by nominating and receiving three Outstanding Graduate Student Teaching Awards. We've always known our graduate student teaching cadre was extremely talented, now we have further proof as acknowledged by the receipt of these three awards. As you will read in the following articles, each recipient has developed his/her own unique strengths that they bring to the classroom. Proudly, we recognize they have earned an excellence that will carry them forward in their careers as teachers of mathematics.

Left to right: Brian Wissman, Corrine Kirkbride and Yvonne Lai at the Chancellor's reception, May 1, 2007.

Corrine Kirkbride, M.A., June 2007

Corrine began her studies in Fall 2005. During her two years as a graduate student in our masters program, she had several opportunities to show her adeptness in front of a class. She has been a teaching assistant every quarter of her enrollment. Her student evaluations for MAT 16A during Summer 2006 were exceptionally strong. Corrine was nominated by Lecturer Dad-del with supporting recommendations from Professors Gravner and Sallee and two students. To follow are just a few of the many noteworthy comments received on her behalf:

"Ms. Kirkbride's skill at consistently finding multiple ways to articulate topics ranging from derivatives to natural resource models is incomparable, and I would rank her among the top teachers in my student experience."

"I loved her class, and as nerdy as this may sound, I actually had fun doing calculus!"

"Corrine's communication skills are impeccable. She naturally functions as a leader and a role model for other TAs and young teachers. Her future as an educator looks bright indeed and she deserves every support and recognition that this University can give her."

Per Corrine: "Spring 2007 was during the final push of my Masters degree course work. When I received the e-mail saying I was a recipient of the OGTA, I felt as if all my hard work was going towards the right goal, and I was able to finish out the year with a renewed sense of purpose. In July 2007, I spent a month in Mexico teaching Mathematical Modeling through Johns Hopkins University Center for Talented Youth Summer programs, an intense three weeks where I taught seven hours a day. For Fall 2007 I am teaching a Math 16A class funded through an NSF grant aimed at improving mathematics and science instruction for incoming freshman. While teaching this quarter I am also applying to various community colleges in the area and have no doubt my Outstanding Graduate Student Teaching Award will only help me in that pursuit."

Brian Wissman, Ph.D., June 2007

Brian began his graduate work in Fall 2002, earning a Masters in 2004 and ultimately his Ph.D. in Spring 2007. During his career as a graduate student, he taught as an Associate Instructor several times, and served as a Teaching Assistant on many occasions. His nomination was led by Professor Jennifer Schultens with supporting recommendations from Associate Professor Monica Vazirani, and three students. To follow are just a few of the many noteworthy comments received on his behalf:

"Brian generously gave his time (beyond his posted office hours, on frequent occasion) to help us learn material or prepare for exams. The day before our final exam, he happened upon a group of students studying and at the request of one of the students, he freely stayed with us for over an hour to go over the material one last time."

"Brian is the most responsible and reliable TA I have had. He is a natural teacher who is able to motivate and relate to students, and he maintains high academic standards."

"Brian is the most conscientious, thorough and personable TA I have ever met. During his discussion sections, he provides extra information to his students to stimulate their interest in the subject. He speaks to both the mathematically gifted and to those whose fear is on the verge of overwhelming their mathematical abilities."

Per Brian: "It was certainly an honor for me to even be nominated for the OGSTA let alone being one of the recipients. Receiving the award has inspired me to continue to improve my teaching methods and think of new teaching strategies that would enhance my teaching style. At the moment, there are two particular things directly related to mathematics instruction of which I'm a part. One is that I'm a Project NeXT Fellow, a program sponsored by the MAA specifically for first and second year math professors aimed to improve all aspects of new faculty, including teaching and research. Secondly, I'm working with Reni Ivanova here at the University of Hawai'i at Hilo on an enhanced calculus program aimed at science majors. Overall, it was an honor to be recognized with the OGSTA and I hope to continue improving my teaching throughout my career."

Yvonne Lai, Ph.D. Candidate, 2007

(Yuan-Juang) Yvonne began her Ph.D. studies in Fall 2002 and she is currently ABD (All But Dissertation) as of Fall 2007. She has held several Teaching Assistant positions, an Associate Instructorship, and been heavily involved with the Explore Math program during her graduate career. Yvonne was nominated by Associate Professor Tim Lewis, with supporting recommendations from 14 students in her MAT 22B course, and Mikaela Huntzinger of the Teaching Resources Center. To follow are just a few of the many noteworthy comments received on her behalf:

"Our class was held at the early hour of 8 o'clock in the morning, and thus, we found it hard to be excited about learning math. However, Yvonne's cheery demeanor and eagerness to teach helped get us engaged and willing to learn the material, despite what our bodies were telling us."

"The creativity and additional effort Yvonne displayed throughout the quarter was very evident in everything she did. Most outstanding was the fact that she made up her own homework assignments. The problems she created were unique, challenging, and very informative."

"Her teaching is versatile – she is able to both create games and activities to help students understand concepts better and to lecture clearly. I find both of these skills to be essential components of Yvonne's magnetic teaching style."

Per Yvonne: "I am now searching for a post-doctoral position, and I have proven a result addressing representations of Coxeter groups into the isometry groups of higher-dimensional hyperbolic space. Personally, I have found it's crucial to find something you like doing and to work hard at it, and it's at least as critical to develop confidence in your own abilities and perspective."

2006-07 Graduate Degree Recipients

Leonard Choup, Ph.D., Math : Visiting Asst. Research Professor, Univ. of Alabama-Huntsville
"Edgeworth Expansion of the Largest Eigenvalue Distribution Function of GUE and LUE" under Tracy

Jeremy Clark, Ph.D., Math : Postdoctoral, KU Leuven, Belgium
"Weak Coupling Limit for a Tracer Particle with Rapid Scatterings by Light Particles with Point Interactions" under Nachtergaele

Jeffrey Housman, Ph.D., Applied Math : NASA
"Time Derivative Preconditioning Method for Multicomponent Flow" under Hafez

Isaiah Lankham, Ph.D., Math : Assistant Professor, Simpson University
"Patience Sorting and Its Generalizations" under Tracy

Ben-Shan Liao, Ph.D., Applied Math : Advanced Software Engineer, UGS Corporation, NX Nastran
"Subspace Porjection Methods for Model Order Reduction and Nonlinear Eigenvalue Computatation" under Bai

Damien Pitman, Ph.D., Math : Asst. Professor at SUNY College at Cortland, NY
"Clustering in Random Fitness Landscapes: Conformity and Incompatibility" under Gravner

John Steinberger, Ph.D., Math : Postdoctoral, Univ. of British Columbia
"Tilings of the Intergers, Vanishing Sums of Roots of Unity, and Cyclotomic Arrays" under Kuperberg

Phil Sternberg, Ph.D., Math : Postdoctoral Fellow, Lawrence Berkeley Laboratory
"Applications of Crystal Bases to Current Problems in Representational Theory" under Schilling

Shaowu Tian, Ph.D., Applied Math : Postdoctoral, UC Davis
"Continuous Distributions and Time: Equivalent Martingale Measures" under Wets

Sarah Williams, Ph.D., Applied Math : Postdoctoral, Univ. of North Carolina-Chapel Hill
"A Multiscale Hybrid Algorithm for Fluctuating Hydrodynamics" under Bell

Brian Wissman, Ph.D., Math : Assistant Professor, Univ. of Hawai'i-Hilo
"Global Solutions to the Ultra-Relativistic Euler Equations" under Temple

Jiadong Xu, Ph.D., Applied Math :
"Algorithms for nonlinear problems in digital communication" under Strohmer

Xiao Dong "Allen" Xue, Ph.D., Applied Math : Pursuing a position in Finance Engineering or Quantitative Analysis
"On a Fast Algorithm for Computing the Laplacian Eigenpairs via Commuting Integral Operators" under Saito

Wei Yu, Ph.D., Applied Math : Biostatistician, Genentech
"Nonparametric and Dimensional Reduction Method for Longitudinal and Survival Data" under Wang

Zhihua Zhang, Ph.D., Applied Math : Postdoctoral, UC Davis
"High Dimensional Data Approximation and Wavelets" under Saito

Andreas Bazos, M.A./M.A.T., Math : Adjunct Professor, Los Rios Community College
Eaman Fattouh M.A./M.A.T., Math : Educator, Learning Skills Center, UC Davis

Casey Davis, M.A.T., Math : Educator, Angelo Rodriguez High School, Fairfield, CA
Sara Hawkes, M.A.T., Math : Educator, Learning Skills Center, UC Davis
Corrine Kirkbride, M.A.T., Math : Pursuing M.A. in Mathematics, UC Davis
Julianne Kopriva, M.A.T., Math : Pursuing M.A. in Mathematics and Teaching Credential in Education, UC Davis
Lola Muldrew, M.A.T., Math : Pursuing Ph.D. with Department of Education, UC Davis
Matthew Schutte, M.A.T., Math : Educator, Los Rios Community College
Leslie Young, M.A.T., Math : Educator, Pioneer High School in Woodland, CA
Xiaoni "Sunny" Zhang, M.A.T., Math : Pursuing an M.A. in Linguistics, UC Davis

Austin Calder, M.S., Applied Math : Mathematical Analyst, U.S. Department of Defense

For Fall 2007, The Department of Mathematics welcomes 16 new students in the Graduate Group in Applied Mathematics and 15 new students in the Graduate Program in Mathematics.

2006-07 Annual Awards Ceremony


Robert Sims


Kristen Freeman


Lauren Lui


Christopher Neff


Nicholas Nguyen


Vinh Kha Nguyen

On June 5, 2007, the Department honored its best undergraduate students and its best teachers among the faculty and graduate students. The ceremony aside, the Department also awarded 57 undergraduate degrees this past academic year. Of those 57 students, one graduated with honors and another graduated with highest honors. Congratulations to all of our degree and award recipients.

G. Thomas Sallee Mathematics Teaching Award

Formally known as the "Outstanding Teacher of Lower Division Mathematics" award, the G. Thomas Sallee Mathematics Teaching Award was named in recognition of Professor Emeritus Tom Sallee's 40 year career with the Department. Recipients of this award are drawn from instructors who have taught the Department's lower-division courses over the past year. Associate instructors, visiting instructors, lecturers, and regular faculty are eligible.

This year's award went to Robert Sims, who was selected by the Department's Awards Committee after having reviewed course evaluations and student comments. Robert is the first Visiting Research Assistant Professor to receive this award from the Department.

Dr. Sims taught 21D, 22B and 16B in the Spring and Fall quarters of 2006. In their evaluations, students rated his overall performance at 4.4, 4.8 and 4.1 (on a scale of 5) respectively. One student wrote, "Dr. Sims is an excellent instructor with a clear style and dry sense of humor. I only hope to see more instructors like him."

Departmental Citations

These citations recognize the very top graduates of our undergraduate program, who have taken a very strong selection of mathematics courses, distinguished themselves with exceptionally high grade point averages, and received enthusiastic endorsements from the faculty. Brian Bell, Kristen Freeman, Lauren Lui, Christopher Neff, Nicholas Nguyen, and Vinh Kha Nguyen were this year's winners.

William Karl Schwarze Scholarship in Mathematics

In honor of William Karl Schwarze, a Mathematics student with the Department and a lifelong humanitarian, this award is given to graduate students in Mathematics who have demonstrated outstanding mathematical scholarship and exceptional promise of making a strong professional contribution as a mathematics teacher and educator at the pre-college or college level.

This year's award went to Hillel Raz, who exemplifies the goals of the Schwarze award perfectly. The faculty letters of support praised his great mathematical strengths and his superb teaching skills, but his contributions to education go far beyond that.

Hillel taught with great success in a variety of settings. Before coming to UC Davis he taught at High Tech High (in San Diego). Since coming to UC Davis, he went on to teach 16C and 21D as an Associate Instructor as well as having spent countless hours as a member of the Explore Math Program. There, he conducted workshops as a Math Circle instructor. For his performance as an Associate Instructor, his students gave him a rating of 4.6 (on a scale of 5) for both classes.

Robert Lewis Wasser Prize

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

After his tragic death in an automobile accident in 1993, his grandmother initiated the Robert Lewis Wasser Endowment in his memory. Its goal is to benefit promising mathematics students at UC Davis.

The Department was pleased to award this year's prize to Matthew Vicksell.

Spring Mathematics Contest and G. Thomas Sallee Prize Winners

Held annually and funded through two endowments, the Spring Mathematics Contest and the G. Thomas Sallee Prize are open to all undergraduate students enrolled at UC Davis. Winners of these competitions are determined after having completed an exam designed by the Department's Mathematics Contest Committee.

The G. Thomas Sallee Prize was presented to Andrey Goder. Prizes for the Spring Mathematics Contest were awarded to Nicholas Nguyen and Travis Taylor.

Henry L. Alder Prize for Excellence in Teaching

Professor Henry Alder was an active member of our Department from 1948 to 1994. Even in his retirement, Professor Alder continued to teach and be a strong advocate for quality teaching almost until his death in 2002. Part of Professor Alder's legacy is an endowment known as The Henry L. Alder Graduate Fellowship in Mathematics, providing support for our graduate students through the Henry L. Alder Prize for Excellence in Teaching. This prize is given each year to the person who is deemed to be the top teacher among all graduate students in mathematics.

This year's recipient was Eaman Fattouh. Eaman taught MAT 16B twice as an Associate Instructor: In the Summer of 2006 and Winter of 2007. In their evaluations, students rated her overall performance at 4.8 and 4.9 respectively (on a scale of 5). This is a terrific achievement since student evaluations for MAT 16 tend to be on the lower side. Moreover, this is the highest score among evaluations of all the Associate Instructors this past year.

Eric C. Ruliffson Scholarship in Mathematics

Eric Ruliffson attended UC Davis from 1964-1968, loved the study of math, and excelled in it. After graduation, he joined the actuarial department of Pacific Mutual Insurance. After serving in the Navy, Eric attended graduate school in demography at UC Berkeley. He later was a benefits consultant at Coopers and Lybrand. He became a partner with the firm, achieving the status of Fellow in the Society of Actuaries. He was elected to the Board of Partners for Coopers and Lybrand, the first actuary to be so honored, and served on the Board of Partners for PricewaterhouseCoopers, the world's largest consulting firm.

In recognition of academic accomplishments and the Awards Committee's evaluation of his potential for future achievement, this year's award was given to James Pfeiffer.

Evelyn M. Silvia Scholarship for Future Mathematics Teachers

A new scholarship has been established by generous donations from family and friends of the late Professor Evelyn Silvia. Evelyn was hired by the Department in 1973, just following receipt of her Ph.D. from Clark University. During her career at UC Davis, she served as a role model for female faculty. She was extremely generous with her time whether it was as a campus committee member or an adviser assisting a student needing help.

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

Presentation of the Galois Group Award

Known as "the official voice of the graduate students in Mathematics," the Galois Group is how graduate students in mathematics collectively communicate with the Department faculty and staff. Every year, the Galois Group presents an award to recognize outstanding service and/or sustained commitment to the graduate group. Proudly, this year's award went to Professor Tim Lewis with a special recognition going to Professor Jesus De Loera.

Department Acknowledgements of Other Campus Awards

Professor Jesus De Loera was one of this year's recipients of the Graduate Student Association Award, which recognizes members of the staff, faculty, or administration who have demonstrated outstanding commitment and resolve in pursuing graduate student interests.

The UC Davis Golden Service Award, which distinguishes campus groups and its members as being in the top 20% of campus community service groups, was given to the Explore Math Program. This year's program was coordinated by Professor Tim Lewis and Brandy Wiegers.


Hillel Raz


Matthew Vicksell


Andrey Goder


Travis Taylor


Eaman Fattouh


Andrea Vanbuskirk

Visitor Santos

This year we are happy to have Professor **Francisco Santos** visiting from the Universidad de Cantabria (in Northern Spain, next to the Basque region). His research area is Geometric Combinatorics. More specifically, he has very closely studied several questions concerning triangulations of polytopes: how many are there, how to find a "good" one, how complicated or simple can you make them, how to modify them, etc. Despite the specialized appearance of this topic, it is one that has several ramifications in branches of mathematics as diverse as algebraic geometry, linear optimization or representation theory, to name a few. Other research interests include oriented matroids and rigidity theory of graphs.

One of his reasons for coming to UC Davis this and next quarter is to finish the book "Triangulations of Polytopes: Applications, Structures and Algorithms" that he is co-writing with Professor Jesus A. De Loera and with Jörg Rambau from the University of Bayreuth. This is the third time he has visited University of California campuses: He was a visiting professor at UC Davis in the Fall of 2001, and he was a research professor at MSRI Berkeley for the "Discrete and Computational Geometry" special semester in 2003. Among his many distinctions, Francisco was an invited speaker in the last International Congress of Mathematicians (Madrid, 2006).

Francisco's family is enjoying California, and his two children are quickly catching up with their knowledge of both "American" and "Mexican".

Life After Davis

Ian Agol

Postdoctorate, 1998-2000

One of the strengths of our Department lies in recognizing talent early on. This strength manifests itself at several levels, including, but not limited to, our postdoctoral program. From 1998-2000, Ian Agol participated in our postdoctoral program. He recalls this time fondly, particularly the convenience of living near the Co-op, being able to walk or bicycle to the Department and having the opportunity to discuss his ideas with leading researchers in low-dimensional topology and related topics. Genevieve Walsh, a graduate student in our Department during those years, recalls the inspiration she experienced when seeing the dedication (and long hours) Ian poured into mathematics. Ian's years in our Department provided a strong foundation for his future successes.

Ian grew up in Northern California. He received his undergraduate degree from CalTech and then pursued a graduate degree at UC San Diego. There he worked with Mike Freedman (who was, in fact, transitioning to Microsoft at that time). Ian obtained his Ph.D. in 1998 with a dissertation entitled "Topology of Hyperbolic 3-manifolds." Since then he has continued to astonish his colleagues with his ingenuity and his breadth of knowledge.

After his postdoc in our department, Ian spent a year at the University of Melbourne in Australia working with Hyam Rubinstein (a frequent visitor to our Department). He then moved to a tenure-track position at the University of Illinois at Chicago. In 2005 he was awarded a Guggenheim Fellowship, a rare honor for a mathematician. In 2006, he gave an invited address at the International Congress of Mathematicians, an event that takes place once every four years, held that year in Madrid, Spain.

This year is a special one for Ian: He got married to Michelle McGuinness, and returned to California to join the distinguished faculty in the Department of Mathematics at UC Berkeley. We congratulate him on his successes and look forward to seeing him at the Bay Area Topology Seminars.

Catching up

Peterson

Elizabeth (Faanes) Peterson (B.A. 1987 in Math) has taught math in California, then was Editor/Supervisor at McGraw-Hill, in Monterey. She has just returned to California after living in Scotland with her family for 4 1/2 years. She is looking forward to catching up with what is happening with mathematics education in California.

Young

Shawn Young (B.S. 1996 in Math) presently works for the Department of Defense as an applied research mathematician, which he attributes to Carole Hom's sparkling letter of recommendation. He recently enrolled in the masters program for applied and computational math at Johns Hopkins. Shawn hopes to finish his degree by next Spring.

Life After Davis

Rebecca Noonan Heale

B.S. in Mathematics, 2000

Since graduating from UC Davis, I have travelled through space and time. Those who know me well would have predicted the travelling. When in high school, I spent my junior year at a school in Germany and while at Davis, I studied in Budapest, Hungary. But what has surprised me about my travels since Davis is the extent to which mathematics has woven itself into the journey.

Becoming a mathematician was far from my radar when I entered Davis. I was interested in political science and languages, but decided to take Calculus 21B as an elective my first quarter. Wow!

Grad student Jo Good taught an enthralling course, so I enrolled in math for the Winter, and then for the Spring. Since I wasn't classified as a math major, I had no official mathematics adviser, but I had the best unofficial one in Carole Hom. She seemed to know what classes would be just right, and pointed me towards Evelyn Sylvia's "Introduction to Proving Things" (my title for the class), Tom Sallee's Euclidean geometry, and Art Krener's real analysis. I remember their countless explanations, their reassurance that math was a process and understanding would take time, and how they encouraged study groups. Countless hours flew by with fellow students as we laughed, cried, and figured out our (mostly mathematical) problems. However, as I came close to finishing my degree in political science, I was not sure what to do. I was contemplating a math minor. Then I walked into Dr. Sylvia's office. She scrutinized my transcript and then remarked, if you stay an extra two quarters, you can major in mathematics as well. So it was.

But when it came to post-graduation plans, I wanted to be a pilgrim. Really. I hoped to work at Plimoth Plantation, a living history museum where costumed interpreters depict life in the 1627 Massachusetts settlement. Finished at Davis, I moved to the 17th century, dividing my time between period tasks like cooking and gardening and conversations with visitors. There may have been little explicit connection to mathematics, but the logic of presenting living history reminded me very much of the general set-up of a proof. When beginning a proof, you first define the terms. As a historical interpreter, my "definitions" were the world view of a woman in the 17th century. It was a challenge to incorporate this world view in a way that would be clear to the visitors, but not cause me to break character.

Then I started getting the itch to return to Hungary. During my first stay, I had met a mathematics teacher at Karinthy Frigyes Gymnazium, a bilingual high school in Budapest, where Hungarian students study their core subjects in English. I contacted Karinthy and was offered a half mathematics (in English), half English teaching position. Learning to teach was bumpy and very exciting. (I remember a class on simplifying algebraic fractions when my freshmen were jumping out of their seats to be called upon). In the process, I learned about the Hungarian teaching methods, a different mathematics curriculum, and a few cool math tricks.

Next it was back to California to join my soon-to-be husband, Bret Heale, whom I had met when we studied together for David Barnette's Convex Sets class. I enrolled in the mathematics masters program at Cal Poly Pomona. It was great to be a student again, to revisit analysis and algebra. In my final year, I had my first glimpse of semigroup theory. Guided by Karen Linton and Berit Givens, I wrote my master's thesis on a problem connecting semigroups with graph theory. At the same time, Bret was working to finish his Ph.D. in biology at the City of Hope-Beckman Research Institute. With graduation inching closer, we talked about moving abroad. Scotland was our first choice.

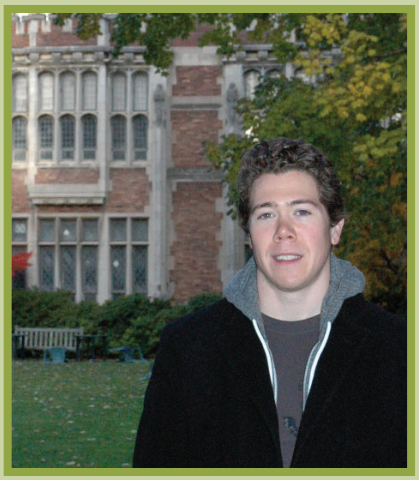
Bret was offered a post-doc at a research center in Edinburgh and I received a scholarship from the Maxwell Institute for Mathematical Sciences to study at Heriot-Watt University (also in Edinburgh). I am now in the middle of my second year, becoming ever more expert in geometric group and semigroup theory. With the help of my supervisor, Nick Gilbert, I've generalized some group constructions to semigroup constructions and have dabbled with the connections between group and automata theory. On a daily basis I am using pictures to think about these concepts and then trying to explain my thoughts clearly. This reminds me very much of Davis. I offer thanks to all the professors, TA's (and graders!) who drew pictures on everything from chalk boards to scraps of paper and who took the time to read and comment on my homework!

Though Bret and I may be travellers at heart, we are happily tied to Edinburgh for the next few years. Studying in Scotland has many perks. My favorites are looking up to the castle on my daily bicycle commute, algebra seminars at James Clerk Maxwell's birthplace (a Georgian house in the town center), and lots of tea and shortbread. I am grateful for the "maths" (British for math) that makes our time here possible.

Life After Davis

Alexander Torgovitsky

B.S. in Mathematics, 2006



After completing my undergraduate degree at UC Davis I began a Ph.D. program in economics at Yale. I am currently in my second year, and am completing my coursework before beginning to teach and research full-time next year. My current interests are in international trade, macroeconomics and econometrics. I would ultimately like to remain in academia and continue doing research in economics.

Even though I majored in mathematics at Davis, my goal was always to pursue advanced study in economics. Sometimes I regret my decision to become an economist. Economics can be hard and depressing—depressing because it is so hard. Given the size of the field, there are a shockingly small number of results in economics that are theoretically nontrivial and yet empirically robust. Many theoretical results cannot be empirically tested and often those that can are rejected. Yet for the same reason, economics is also an incredibly exciting field. The broad relevance of the questions economists tackle can never be in doubt and thus far they have been answered very incompletely. This generates a constant excitement in economics departments that the next big thing is right around the corner. Yale's economics department is heavily influenced by the Cowles Foundation, which has historically been a driving force in the application of quantitative methods to economics. Perhaps the only ideology that is held strongly across the Department is a belief in the structural approach—taking economic theory seriously in order to empirically test falsifiable models. I find this an appealing methodological approach and so feel quite at home here.

As economics has become more quantitative it has evolved into a mathematically sophisticated field. The mathematical background I gained taking classes at Davis has been invaluable to me. Every class I took, except perhaps algebra, had concepts that are directly applicable to my current work. (And I'm sure that, given ten years, economists will find a way of applying algebra to their research as well.) In general, however, mathematics teaches one how to think logically, clearly and scientifically, a skill useful to anybody in any discipline. Since I have been at Yale, I have continued my mathematical education in areas particularly useful in economics like measure theory, probability theory and functional analysis. I will always continue to explore new topics in mathematics, partly because it is useful for conducting research in economics, but mainly because I enjoy it. My education at Davis taught me to see the beauty and purity in sharply reasoned mathematics which is valuable in and of itself.

Davis and Yale are vastly different institutions in environment and emphasis. While both schools are primarily research institutions, Yale spends a lot more resources on the academic and social interests of its undergraduate students. This creates an environment that, unlike Davis, feels more like a patchwork of different schools rather than a large academic community. Yale also balances its research emphasis towards humanities more than Davis, which emphasizes to a large degree the biological sciences. As someone who studies neither humanities nor "hard" science, this doesn't affect me much either way, but it does change the feel of the school. Whereas Davis felt modern and dynamic, Yale often feels ancient and staid. The Yale campus, which is mainly neo-Gothic and Georgian in architecture, helps reinforce this. And yet, there is something appealing to me about being a part of an ancient institution. It is a delightful feeling to think of the famous people who have walked the same steps as you or to hear shrieking undergraduates performing an induction ritual for some secret society or to go to a Harvard-Yale football game. I haven't decided yet whether these things outweigh what made Davis a great place to study: springtime on the quad, the MU (staffed by students, unlike at Yale) and the environmentally friendly community. In the end I'll probably conclude that Davis and Yale are too different to be compared, and I will be glad to have had the chance to experience both.

Are You Alumni?

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

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

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

or send e-mail to:

mso@math.ucdavis.edu

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

Catching up Thomason

Karen Thomason (B.S. 1981 in Math), after starting towards an M.S. in Math, was accepted at the vet school and completed her DVM at UC Davis in 1986. She now owns the Blue Ridge Veterinary Hospital in Virginia. She enjoys helping her 12 year old son with his math homework, and finds that, even though she uses little theoretical math in everyday problems, she still loves math and feels that her major in that subject allowed her to "learn to think," as well as learn to express her thoughts and ideas in an understandable, logical way. She fondly remembers attending Dr. Mead's and Dr. Chakerian's classes, as well as working as a TA for Dr. Alder.

In Memory of Charles Hayes, Jr.

Professor Emeritus Charles Hayes Jr. was born in Winnepeg, Canada, on April 9, 1916 and died peacefully at his home in Davis on Aug. 26, 2007. He moved to Davis shortly following World War II and taught mathematics at UC Davis, where he had a long and distinguished career. He was appointed to the Department in 1947 and served as Chair from 1959-1964. He retired from UC Davis in 1978.

Charles was preceded in death by his loving wife, Lola. They were married for 49 years. He is survived by his son Rodney, daughter Laura and grandsons Max, Jeff and Andrew. He will be greatly missed.

Encore Krener

Professor Emeritus **Arthur Krener** is a Distinguished Visiting Professor in the Department of Applied Mathematics at the Naval Postgraduate School in Monterey. He teaches an occasional course and continues his research program. He will be the Marshall at the L&S Fall Commencement. In the Winter Quarter he will teach a graduate course in nonlinear control at UCSC.

From Peer to Peer

Adam von Boltenstern, our new Peer Adviser for undergraduates, is in his final year for the B.S. degree in General Mathematics. Prior to coming to UC Davis, Adam spent three years at Fresno City College where he completed most of his lower division requirements. He later transferred as a mathematics major to UC Davis in the Fall of 2006.

As the Department's Academic Peer Adviser, Adam is asked to assist the Student Services Office as well as our faculty advisers. His undergraduate mathematics experience speaks well when meeting with other undergraduate math majors, and he offers a unique student perspective that neither staff nor faculty can share with regards to the Department, our programs, and research opportunities.

In general, Adam sums it up best in saying that his "main love with math is that of puzzles. I've always seen math as a big puzzle where all the parts are interconnected. I can only hope to help others see it this way too, and perhaps their own love of math will come through."

After graduation in June 2008, Adam plans on entering a teaching credential program for the following year.

Staff News

By Tracy Ligtenberg, Department Manager

The 2006-07 academic year marked another year of transition with a number of staff departures and new opportunities. We welcomed six new staff members during the year: Tina Denena in Student Services; Jessica Goodall and Connie Dani in the Business Office; Carol Crabill and DeAnn Ronning in Academic Personnel; and Alla Savrassova for general administrative support. With the changes in staff, our senior staff member in the Business Office, Richard Edmiston, was promoted to Business Office Manager and Perry Gee in Student Services was promoted to Staff Student Adviser.

Rebuilding teams is always a bit of a challenge but we met this once again with success! Our six new staff have melded nicely with our remaining staff and a very cohesive team has developed to handle all our faculty and student needs. The computer staff has remained steady with Zach, Leng, and Marianne capably maintaining our systems—for which we are thankful! We are continually utilizing computers and databases for our day-to-day work, which means stability in this area is vitally important. We will be embarking on the online graduate student application system, a much anticipated tool for our advising staff and our business staff are utilizing new systems in effort-reporting, cost-sharing, and travel.

Here's to another good year for our group!

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

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

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

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

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Tracy Ligtenberg, Management Services Officer
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