THE
Common Denominator
UCLA DEPARTMENT OF MATHEMATICS NEWSLETTER
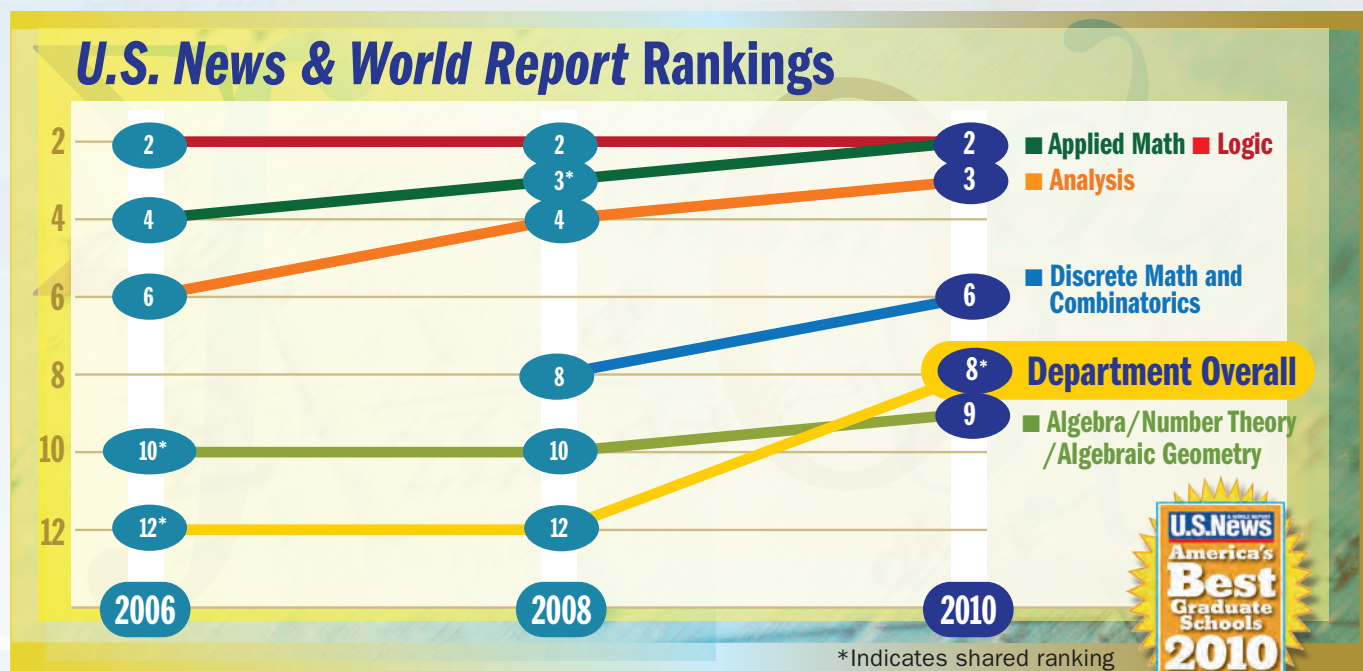
U.S. News & World Report Rankings

Applied Math ■ **Logic**
■ **Analysis**

■ **Discrete Math and Combinatorics**

Department Overall

■ **Algebra/Number Theory /Algebraic Geometry**

*Indicates shared ranking

U.S. News America's Best Graduate Schools 2010

UCLA Math on the Rise

Capping several years of extraordinary momentum in the Department, *U.S. News & World Report* released its **2010 Best Graduate Schools rankings**, propelling UCLA Math to its highest historical ranking: number eight (shared) overall in the nation. In five of seven research specialties, the Department ranked in the top 10. This widely recognized national survey was followed by the summer 2010 release of **Academic Ranking of World Universities (ARWU)** in which UCLA Math took the number six spot among U.S. universities and the number 10 spot among mathematics departments worldwide.

Behind the Numbers

Applied Mathematics: Ranked #2. The group has moved from a number four ranking in 2006 to number two in 2010. Researchers primarily work with differential equations based methods with connections to computational linear algebra and optimization. The last few years have seen the group's shift from a physical sciences applications base to more of an information theoretic structure, although physical applied mathematics remains a key strength of the program. The interaction of the group with other research groups on campus is extensive. Within the Department, applied math faculty members interact with pure mathematicians in analysis, probability and differential equations. Other UCLA and outside collaborators include researchers from anthropology, engineering, computer

UCLA

UCLA Math on the Rise

science, the humanities, criminology, biology and medicine, among others. These collaborations involve interdisciplinary interactions with the NSF-funded Institute for Pure and Applied Mathematics, the Institute of Geophysics and Planetary Physics, the California Nanosystems Institute, the Institute for Digital Research and Education, the Center for Computational Biology, and the Applied Mathematics Laboratory. The majority of the Department's graduate students and postdocs work in the applied area. This year, researchers have received extensive media attention for their research in crime modeling. The 2010 International Congress of Mathematicians (ICM) invited National Academy of Sciences member Stanley Osher to present one of 20 plenary lectures.

2 **Logic: Ranked #2.** The group has maintained its number two ranking over the last five years. In recognition of its achievements, the UCLA Logic Center was formally established in 2004 to foster teaching and research in logic to include all areas of mathematical and philosophical logic as well as the applications of logic to philosophy, linguistics and computer science. The research interests of the Department's logicians cover most of the active areas of logic, including set theory, model theory, and some parts of recursion theory, proof theory and philosophical logic. There has been consistent interaction between logicians and the functional analysis group, and more recently with ergodic theory, rigidity and group theory. Going forward, model theorists expect to forge strong interactions with algebraists. Two postdocs from this group were awarded the Association for Symbolic Logic's 2009 Sacks Prize for best dissertation in logic worldwide, an award that has been previously received by other UCLA logicians.

3 **Analysis and PDE/Functional Analysis: Ranked #3.** In four years, the group has raised its standing from number six in the nation to number three. Analysis is a fundamental mathematical discipline with strong connections to many other parts of mathematics. The analysis group has roughly five subgroups: harmonic analysis, differential equations, complex analysis, dynamics

and functional analysis. Altogether, this represents one of the largest disciplines in the Department, attracting numerous international researchers to its vibrant seminar program. Members frequently collaborate and interact with mathematicians from other areas in the Department, including applied mathematics, combinatorics, geometry, logic, mathematical physics, number theory and probability. Terry Tao, the group's most visible member, received the Fields Medal in 2006 and has garnered multiple awards this year for his versatility across a number of mathematical areas. Other top analysts received multiple prestigious fellowships and prizes. A new faculty member joins this group in fall 2010. In the area of non-commutative functional analysis, the group is perhaps preeminent in the nation. This area has a broad influence on a wide range of mathematical subjects, including group theory, free probability, operator spaces and related aspects of quantum information theory, ergodic theory and logic. Dimitri Shlyakhtenko gave an invited talk in functional analysis at ICM 2010.

6 **Discrete Math and Combinatorics: Ranked #6.** The group leapt into the top ten rankings in 2008 at number eight, moving to a number six ranking in 2010. Combinatorics is a fundamental mathematical discipline that focuses on the study of discrete objects and their properties. This field experienced tremendous growth during the last 50 years and has matured into a thriving area that interacts with many other fields, including computer science, number theory, analysis and information theory. There has been a long tradition of combinatorics in the Department with a recent infusion of young talent that has significantly revitalized the group. Combinatorialist Benjamin Sudakov was an invited speaker at ICM 2010.

9 **Algebra/Number Theory/Algebraic Geometry: Ranked #9.** This large, diverse group consists of algebraists, algebraic geometers and number theorists. It moved from number 10 to number nine in the latest ranking. Both the algebra and algebraic geometry groups investigate topics centered in algebraic geometry. From explicit topics, such as the study of quadrics, to innovative new studies on the complexity of structures—as well as a wide-reaching unification project to show how algebraic geometry can give information in representation theory and functional analysis—these groups constitute an international center for these studies. Researchers also intertwine with analytic geometry, topology, number theory, logic, physics and applied mathematics. The number theory group has become one of the most respected research groups in both algebraic and analytic theories. Its work has impacted the proof of the Fermat Conjecture and recently resulted in the solution of a famous conjecture of the renowned mathematician Jean-Paul Serre by Chandrashekhar "Shekhar" Khare. This very active group also interacts with computer scientists. At this year's ICM, algebraist Paul Balmer and number theorist Shekhar gave invited talks, joining the list of six past invitees currently in these groups.

Report from the International Congress of Mathematicians 2010, Hyderabad, India

Applied Math – Plenary Lecture

Image processing expert **Stanley Osher** spoke on new, revived and improved algorithms in information science, including the level set method, partial differential based image processing, ℓ_1 optimization methods, nonlocal means, compressive sensing and other techniques that continue to revolutionize the special effects industry, medical imaging and hyperspectral imaging, to name a few. Most recently in the area of hyperspectral data analysis, Stan and his collaborators have developed efficient methods for clustering, classification and detection, which have applications in land and environmental monitoring, mining, military and civil search-and-rescue operations.

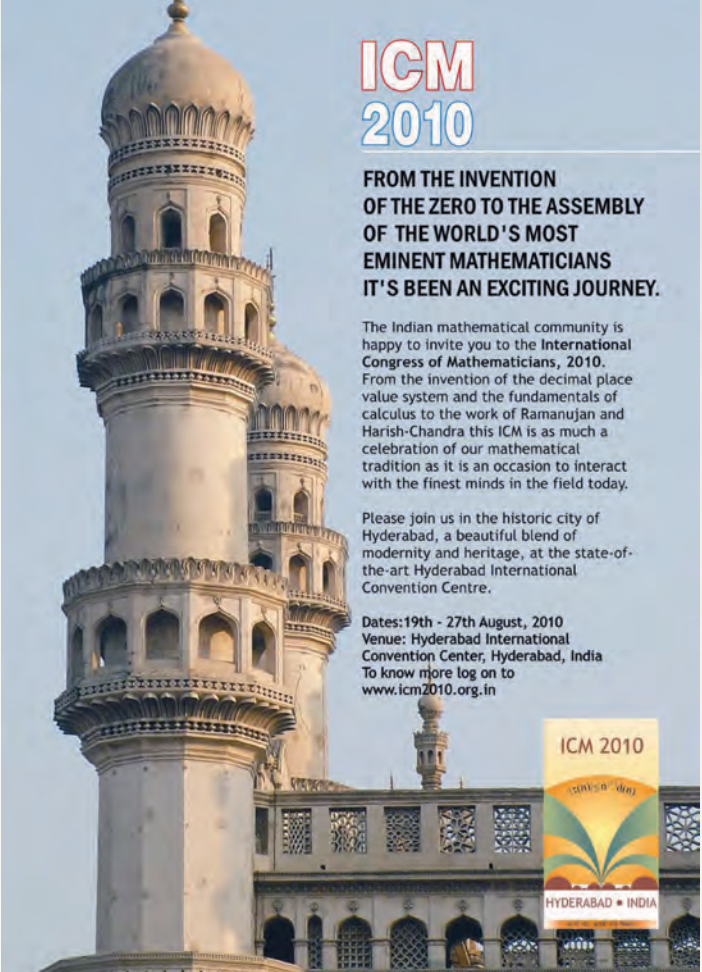### Functional Analysis – Invited Talk

Analyst **Dimitri Shlyakhtenko** presented his work, "Free Probability, Planar Algebras, Subfactors and Random Matrices." Classical probability theory deals with quantities called random variables and computes the likelihood that they achieve certain values. For example, tomorrow's high temperature T for Los Angeles, or tomorrow's value of the Dow Jones Industrial average M are random variables. One can try to compute the probability that T=70 or that the product MT>70000. Random variables could be more complicated; rather than having as value a number, they could be matrix-valued. An example of such a variable would be a randomly chosen rotation in space. Free probability, introduced by Voiculescu in the 1980s, accurately predicts the behavior of large randomly chosen matrices. A variety of statements from classical probability theory turn out to be true, in a modified form, in the free probability setting. For example, the famous bell curve (the Gauss law) of the classical central limit theorem becomes the semicircular law in free probability. Dimitri's talk dealt with the appearance of unexpected quantum symmetries in certain random matrix models.

Combinatorics – Invited Talk

Combinatorialist **Benjamin Sudakov** spoke on "Recent Developments in Extremal Combinatorics: Ramsey and Turan Type Problems." Extremal combinatorics is one of the central branches of discrete mathematics and has experienced an impressive growth during the last few decades. It deals with the problem of determining or estimating the maximum or minimum possible cardinality of a collection of finite objects (e.g., numbers, graphs, vectors, sets, etc.), which satisfies certain restrictions. Often such problems are related to other areas, including theoretical computer science, geometry, information theory, harmonic analysis and number theory. In his talk, Benny discussed some recent advances in this subject, focusing on two topics which played an important role in the development of extremal combinatorics: Ramsey and Turan type questions for graphs and hypergraphs.

Algebra – Invited Talk

Algebraist **Paul Balmer** introduced a relatively new subject, "tensor triangular geometry," which is dedicated to the study of abstract structures, called tensor triangulated categories. These appear in various areas of mathematics, from algebraic geometry to noncommutative topology, via homotopy theory, motives, or modular representation theory of finite groups. In all those examples, although objects themselves can almost never be classified, it is remarkable that one can always classify so-called thick tensor-ideal subcategories, i.e., one can classify object modulo the elementary operations available in the structure. This classification is done via suitable subsets of an interesting topological space, called the spectrum of the tensor triangulated category under inspection. This space opens the door to algebro-geometric techniques, like so-called gluing, which have interesting applications beyond algebraic geometry. More generally, the abstract platform of tensor triangular geometry allows the transposition of results and methods between the various areas under its roof.

Number Theory – Invited Talk

Number theorist **Chandrashekhar "Shekhar" Khare** was invited to present his work that solved the famous Serre modularity conjecture. One of the reasons Serre's conjecture attracted so much attention in the 1980s and 1990s is that it implies Fermat's Last Theorem (about solving the equation $a^n + b^n = c^n$ for positive integers), proven by Wiles in 1994 after mathematicians worked on it for more that 350 years. Shekhar's 2007 proof is a theoretical keystone of historic consequence, arguably the first wholly unexpected great result in number theory of the 21st century. The theorem has multiple profound consequences, and notably enables a new and more direct proof of Fermat's Last Theorem.

ICM 2010

FROM THE INVENTION OF THE ZERO TO THE ASSEMBLY OF THE WORLD'S MOST EMINENT MATHEMATICIANS IT'S BEEN AN EXCITING JOURNEY.

The Indian mathematical community is happy to invite you to the **International Congress of Mathematicians, 2010**. From the invention of the decimal place value system and the fundamentals of calculus to the work of Ramanujan and Harish-Chandra this ICM is as much a celebration of our mathematical tradition as it is an occasion to interact with the finest minds in the field today.

Please join us in the historic city of Hyderabad, a beautiful blend of modernity and heritage, at the state-of-the-art Hyderabad International Convention Centre.

Dates: 19th - 27th August, 2010
Venue: Hyderabad International Convention Center, Hyderabad, India
To know more log on to www.icm2010.org.in

ICM 2010 HYDERABAD • INDIA

New Faculty

Mario Bonk joins the Department as professor in the analysis group. Mario is an expert on classical complex analysis and the applications of its ideas to geometry and geometric analysis. He is well known for his early work on Bloch's constant for meromorphic functions and for his several more recent theorems about conformal metrics, Gromov hyperbolic spaces, and quasisymmetric mappings of fractal sets. Mario was educated in Germany and received his PhD from Braunschweig University of Technology in 1988 under Karl-Joachim Wirths. Previously, he was professor at the University of Michigan. He gave an invited address at the 2006 Madrid International Congress of Mathematicians.

Grants

NSF awarded **Christian Haesemeyer** a **Focus Research Group** grant in algebraic geometry to investigate fundamental questions in the field using modern homotopical techniques.

Andrea Bertozzi, together with mathematical physicist **Lincoln Chayes**, mathematician **Martin Short**, UCLA anthropologist Jeff Brantingham, George Mohler (Santa Clara University), and criminologist George Tita (UC Irvine), was awarded an NSF **Focus Research Group** grant for collaborative research on mathematics of large-scale urban crime. The grant will enable them to develop new mathematical methods at the interface of the theory of nonlinear partial differential equations, statistical mechanics, graph theory, and statistics for predictability and control of urban crime. ■ In response to a call by NSF for "rapid response" proposals related to the Gulf of Mexico oil spill, Andrea was awarded a grant that builds on her recent studies on mathematical models for oil – sand mixtures on slopes.

Northrop Grumman Corporation awarded **Stanley Osher** a grant to support his research in emerging applications in applied mathematics, including imaging, materials science and compressive sensing.

Faculty News Highlights

Andrea Bertozzi and **Mark Green** joined 229 leaders in the sciences, social sciences, humanities, arts, business and public affairs who were elected to the **American Academy of Arts & Sciences** this year in recognition of preeminent contributions to their disciplines and to society at large. Andrea and Mark are two of eight UCLA professors to be named new fellows.

Terence Tao was co-recipient of the **King Faisal International Prize for Science** (mathematics). Terry was noted for "his highly original solutions of very difficult and important problems and for his technical brilliance in the use of the necessary mathematical machinery." ■ Terry was awarded the **Frederic Esser Nemmers Prize in Mathematics** "for mathematics of astonishing breadth, depth and originality." Sponsored by Northwestern University, two Nemmers prizes in mathematics and economics are awarded every other year to scholars who make major contributions to new knowledge or the development of significant new modes of analysis and are designed to recognize "work of lasting significance." ■ Terry was co-recipient of the 2010 **George Pólya Prize** sponsored by the Society for Industrial and Applied Mathematics. The award recognizes Terry's role in developing the theory of compressed sensing and matrix completion, which enables efficient reconstruction of sparse, high-dimensional data based on very few measurements; the work has led to remarkable solutions of practical engineering problems.

Sorin Popa was awarded a **Blaise Pascal Research Chair** to be conducted at Institut Henri Poincaré in Paris. The chairs enable internationally acclaimed foreign research scientists in all disciplines to work for a year in a prestigious research institution in France. ■ Sorin was awarded the **E. H. Moore Research Article Prize** for 2010 by the American Mathematical Society for his article, "On the Superrigidity of Malleable Actions with Spectral Gap." The article represents a major breakthrough in his work concerning von Neumann rigidity, orbit equivalence, and strong rigidity of ergodic measure preserving actions of countable groups. ■ In March, Sorin accepted the 2009 **Ostrowski Prize** at the University of Basel, Switzerland. The prize recognizes outstanding mathematical achievement.

The Alfred P. Sloan Foundation awarded **Monica Visan** a 2010 **Sloan Research Fellowship** in mathematics for her research on nonlinear partial differential equations of dispersive type.
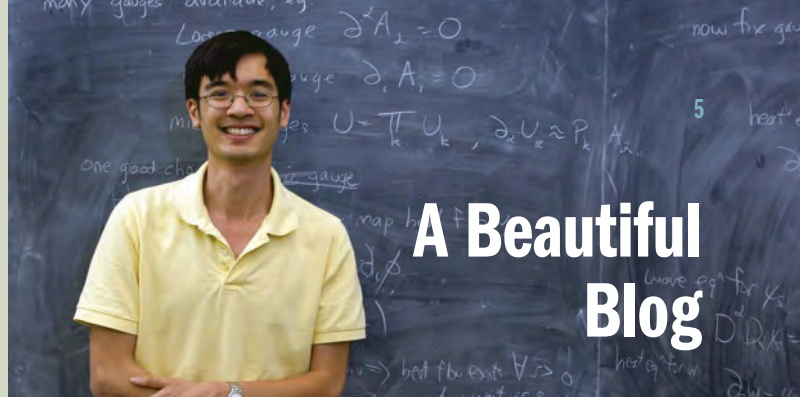
A Beautiful Blog

These equations model the evolution of waves in media where different frequencies travel with different speeds. This phenomenon arises in many physical contexts, most familiarly, in the breaking of light into its constituent colors in a prism. A prototypical example is the nonlinear Schrödinger equation, which is commonly used to model nonlinear optics and Bose-Einstein condensates, amongst other things.

The **Office of Naval Research** (ONR) awarded a prestigious Young Investigator Award to **Joseph Teran** for his proposal, "Manycore Accelerated Algorithms for Computational Solid and Fluid Mechanics." ONR's Young Investigator Program identifies and supports outstanding academic scientists and engineers who show exceptional promise for doing creative research. One of 17 recipients, Joey is the only mathematician to receive the 2010 award.

The membership of the **American Mathematical Society** (AMS) elected **Mark Green** to a five-year term on its board of trustees. **Christoph Thiele** was elected as a member-at-large of the council of the AMS for a three-year term.

Andrea Bertozzi was selected as one of 34 new fellows of the **Society for Industrial and Applied Mathematics** (SIAM) for her contributions to the application of mathematics in compressible flow, thin films, image processing and swarming. **Professor Emeritus Tony Chan** (President, Hong Kong University of Science and Technology) was also named as a fellow this year.

Christoph Thiele was the recipient of a 2009 **Humboldt Research Award.** The award is granted across scientific disciplines and honors the scientific work to date having significant impact on the scholar's discipline. Christoph works in harmonic analysis and is a leading expert on modulation invariant singular integral theory. He will use the award to support a research year at the University of Bonn in Germany.

Postdocs **Isaac Goldbring** and **Grigor Sargsyan** were awarded the 2009 **Sacks Prize** by the Association for Symbolic Logic for best dissertations in logic worldwide. Isaac's thesis, "Nonstandard Methods in Lie Theory," applies model theory to a fundamental problem from topological group theory. Grigor's thesis, "A Tale of Hybrid Mice" addresses a central conjecture of inner model theory, resolving it in settings that were previously completely beyond reach, and upending conventional wisdom on the strength of determinacy hypotheses.

The **American Association for the Advancement of Science** (AAAS) Council elected **Professor Emeritus Alfred Hales** to the rank of AAAS Fellow. Each year, the council elects members whose "efforts on behalf of the advancement of science or its applications are scientifically or socially distinguished." In mathematics, Al has been honored for his contributions in algebra and combinatorics, the Hales-Jewett Theorem, and characterization of infinite abelian groups by Ulm invariants. ■ Al has also been named as the new chair of IPAM's board of trustees.

In 2006, Professor Terry Tao did something different with his UCLA home page. He posted a mathematical problem in his "What's new" section, hoping someone might have an answer. Days later he received a complete solution from a reader. Says Terry, "I realized that people actually read this page." Encouraged by the feedback, Terry jumped into the—then fairly small—pool of mathematical bloggers to test the waters and see what might come out of high-level mathematical discourse in the blogosphere. From a few 100 hits on its first day to a daily average of 3,000 to 4,000 hits today, Terry's blog quickly evolved from his original aim to write about his own research to an early post on quantum mechanics and the popular videogame Tomb Raider. That's when the conversation really got going.

Terry has posted a range of content, including discussions of favorite open problems, the occasional guest post by a colleague, and informal discussions of mathematical phenomena—essentially principles or tricks of the trade that are well-suited to a blog. Says Terry, "There are bits and pieces of folklore in mathematics that are passed down from adviser to student but are too fuzzy and non-rigorous to be discussed in the formal literature." Terry's graduate students are now directed to read his blog to learn about these trade secrets. Terry has also learned a lot about mathematical topics outside his research: "We say in this business, the best way to learn something is to teach a course on it." Another way is to blog about it, inviting comments and connections to other parts of mathematics that broaden his understanding.

Terry also invites his readers to work on aspects of difficult problems. The first of these "polymath" projects—a play on the Greek word meaning a person of great and varied learning—sprung from the Hales-Jewett theorem in combinatorics which proved that in tic-tac-toe, for example, there are so many ways to win in higher dimensions that it's not possible to draw. The results, the first elementary proof of a related theorem, have been published in a paper under the pseudonym D.H.J. Polymath, reflecting key readers' contributions. His blog has also resulted in the publication of two books, each covering a year of his blog. The most recent is based on his notes on two graduate courses he taught on Henri Poincaré's mathematical legacies, which he posted weekly on his blog and incorporate readers' comments and insights. Says Terry, "There wasn't that much published literature out there. It was a very new piece of mathematics." Terry is thrilled how his blog shows what mathematics is really like: "When you read mathematical papers and textbooks, you only see the polished finished product and you don't really see what goes on behind the scenes—the thoughts and all the dead ends."

For a look behind the scenes, visit Terry's blog at www.terry-tao.wordpress.com. For more information about the books, visit http://terrytao.wordpress.com/books/.

faculty news

Research in the News: The Mathematics of Crime and Oil Spills

Andrea Bertozzi and her collaborators have grabbed major headlines in the world of criminology for their work in predictive policing. Applying sophisticated math to urban crime patterns, they seek to determine the types of crime "hotspots" in Los Angeles most likely to be affected by intensified police actions. Andrea's research in fluid dynamics recently resulted in an NSF grant related to the Gulf of Mexico BP oil spill. Andrea will conduct studies that address fundamental questions of the dynamics of oil and sand.

For more on mathematics and crime, visit http://newsroom.ucla.edu/portal/ucla/can-math-and-science-help-solve-153986.aspx.

For more on mathematics and the Gulf oil spill, visit http://today.ucla.edu/portal/ut/small-math-lab-joins-legions-of-164380.aspx.

The After Math: UCLA Mathematics Professors Retire

Yiannis Moschovakis

The central themes of Professor Emeritus Yiannis Moschovakis' research are definability and computability. His PhD was in computability theory, and his influential first book, *Elementary Induction in Abstract Structures*, was on inductive definability. After joining the Department in 1964, Yiannis became a central figure in descriptive set theory, a subject combining both themes. His periodicity theorems and coding lemma are among the most crucial results in the revival of the subject that began in the 1960s, and his *Descriptive Set Theory* is its definitive text. More recently, Yiannis has worked in the foundations of the theory of algorithms, has applied definability and computability to philosophical logic and linguistics, and with Lou van den Dries, has obtained complexity lower bounds in arithmetic. Yiannis' many honors include Guggenheim and Sloan fellowships, honorary doctorates from the University of Athens and Sofia University, corresponding membership in the Academy of Athens, and an invited address at the International Congress of Mathematicians (1974). Yiannis is an outstanding teacher at both the undergraduate and graduate level, directing the doctoral dissertations of 20 students, including Howard Becker, Alexander Kechris, Phokion Kolaitis, Lawrence Moss and Glen Whitney. His *Notes on Set Theory* is an excellent undergraduate text.

As chair from 1984 to 1987, Yiannis had a permanent impact on the Department. He brought in the Program in Computing (PIC) and made it an important departmental component. His recruits, including distinguished senior faculty members Lennart Carleson, Heinz-Otto Kreiss and Paul Roberts, furthered the Department significantly. He also implemented an important normalization of departmental teaching loads and provided a strong voice for the Department on a number of issues. Over many years, Yiannis' high academic standards, his belief that anything is possible, and his positive attitude about all of mathematics have contributed immeasurably to the Department's current success.

Roberto Schonmann

Professor Emeritus Roberto Schonmann served the Department for 19 years, working primarily in the overlap between probability theory and mathematical physics. He was particularly interested in models of magnetic behavior. In recent years, the focus of his research interests has moved toward economics. His work was very influential, leading to his election as a fellow of the Institute of Mathematical Statistics in 1996, an ICM invitation in 1998, and a Guggenheim in 1999. He excelled in many areas, winning the departmental distinguished teaching award in 2002 and serving on the editorial boards of six journals (amazingly, five at one time). He served as graduate vice chair from 1997 – 1999. Roberto has expressed a desire to spend more time in Brazil and plans to commit substantial parts of each year to both the University of Sao Paulo and UCLA. We wish him well, as he moves in new directions, both geographically and scientifically.

math education

The Curtis Center

K – 12
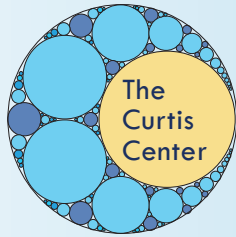
Curtis Center Helps Craft Content Standards for California K-12 Math Education

In June, Curtis Center Executive Director Heather Calahan joined the California Academic Content Standards Commission as an invited appointee. The 21-member commission developed academic content standards for K-12 mathematics, which were unanimously adopted by the California State Board of Education in August. By legislation, the standards included the Common Core standards, the result of a state-led effort to develop internationally benchmarked shared educational standards, which states may voluntarily adopt. Mathematics professors Bill McCallum (University of Arizona) and Hung-Hsi Wu (UC Berkeley) were among those who crafted the Common Core standards.

Los Angeles Math Circle (LAMC)

In its third year, LAMC has grown to nearly 100 K-12 students. The math enrichment program provides multi-level interaction between school children and UCLA students and faculty. Divided into four groups by age and level, students attend weekly problem-solving sessions in an interactive atmosphere. Math undergrads are trained to present extra-curricular mathematics and provide individual attention; graduate student leaders teach younger groups and prepare them for math competitions. Department faculty members keep the program fresh with presentations on a variety of pure and applied math topics.

UCLA Math Festival 2010: What Is Mathematics?

In February, the Curtis Center held its second annual mathematics festival attended by over 100 students. A keynote talk by Professor Francis Su of Harvey Mudd College was followed by problem-solving sessions and seminar talks led by professors, high school teachers, IPAM researchers and graduate students. A panel discussion on careers in mathematics concluded the day. The festival was held in collaboration with IPAM and the Center for Talented Youth at Johns Hopkins University.

Keynote speaker Harvey Mudd Professor Francis Su speaks on his favorite math fun facts

For more information, visit http://www.curtiscenter.math.ucla.edu.

Undergraduate Teacher Preparation

UCLA California Teach MATH

Through the new NSF Robert Noyce Teacher Scholarship program, upper division math students can now receive $10K to pursue careers in teaching. The senior undergraduate program continues to experience rising enrollment with 28 mathematics majors studying to become teachers.

Annual Mathematics and Teaching Conference

UCLA Math alumnus Uri Treisman delivered this year's keynote to over 200 secondary and university instructors. Uri is currently a University of Texas mathematics professor and director of the Charles A. Dana Center for Mathematics and Science Education. The conference included over 27 seminar talks and a reunion event for UCLA California Teach MATH grads.

Teacher Continuing Education

Mathematics Diagnostic Testing Project (MDTP)

Over 1,400 teachers used MDTP's services this year. Teachers report that the new online Daskala platform is a powerful tool for interpreting their MDTP test results and facilitating teacher collaboration. Site Director Mary Sirody is using the service in the second year of a pilot program to improve secondary math instruction in a local, underperforming school.

Math Content Program for Teachers (MCPT)

After nearly 20 years of service to the UCLA mathematics education community, Shelley Kriegler retired as director. New program director Helen Chan and program coordinator Lucy Matadovian began working on a new California Math Science Partnership Grant with Downey Unified School District to provide math courses for elementary school teachers. They also launched a three-course continuing education series that targets topics assessed on the California Subject Examinations for Teachers.

Executive Office of the California Mathematics Project (CMP)

CMP developed the K-8 Algebra Initiative to support preparation for and success in teaching. A key component of the initiative is to prevent misconceptions about algebra that are often taught in earlier grades and ingrained in middle school. These ideas are being presented at local and state teacher conferences.

Summer Mathematics Institute for Young Scholars

The center held its first annual math institute for secondary students. For four weeks, local students examined combinatorics, probability and mathematical physics. Assistant Adjunct Professor David Weisbart gave lectures, and graduate student Steven Kwok held problem-solving sessions. Students also participated in a number of seminars and outings, including a visit to IPAM's Research in Industrial Projects for Students, which showcases undergraduate student teams working on real-world research projects.

IPAM

Public Lecture Series at IPAM

On Mean Field Games

1994 Fields Medalist Pierre-Louis Lions presented his work on mean field games. These are mathematical models that describe the behavior of a very large number of "agents" who optimize their decisions, while taking into account and interacting with other agents.

The Coming Revolutions in Fundamental Physics

Director of the Kavli Institute for Theoretical Physics and U.C. Professor of Physics (U.C. Santa Barbara) David Gross reviewed the present state of knowledge in elementary particle physics and current questions, and discussed the experimental revolutions that might occur at the Large Hadron Collider at CERN. He also reviewed the state of string theory.

Global Warming: Coming, Ready or Not!

Kevin Trenberth, leader of the Climate Analysis Section at the National Center for Atmospheric Research, highlighted the wealth of data that unequivocally demonstrates that global warming is happening and is caused by human activities. He presented results from climate models that show that the human influence on climate has exceeded the natural variability since 1970.

To view the lectures online, visit http://www.ipam. ucla.edu/videos.aspx.

IPAM Celebrates NSF Renewal with 10th Anniversary Conference

The NSF Division of Mathematical Sciences has renewed IPAM's main institutional grant for an additional five years with a substantially increased budget. Founded to create visionary, interdisciplinary collaboration between mathematicians and researchers from biology, medicine, engineering and other disciplines, IPAM celebrated its continued NSF support with a 10th anniversary workshop and two public lectures November 2 – 4, 2010.
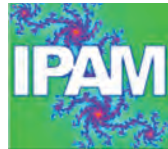
IPAM presents its second annual newsletter. Download a copy at http://www.ipam.ucla. edu/newsletter.aspx.

Research in Industrial Projects for Students (RIPS) Goes to Berlin

This summer IPAM and its German partners MATHEON and the Berlin Mathematical School debuted RIPS-Berlin. Undergraduate students from the U.S. and Europe participated in four industry-sponsored research projects, including proteomics fingerprinting, coarse graining complex biological networks, photogrammetric correction of microscopic images of photonic crystal fibers, and surface optimization using graphics cards.

Infinite Possibilities Conference Promotes Minority Women in Math

In partnership with Building Diversity in Science, IPAM sponsored the 2010 Infinite Possibilities Conference designed to promote, educate, encourage and support minority women interested in mathematics and statistics. IPAM Director Russ Caflisch was struck by the atmosphere: "There was a level of enthusiasm and emotion you don't usually see at math conferences." The two-day event attended by over 200 participants included featured speaker presentations, panel discussions, research talks, a poster session, math activities for high school students, mentoring activities, and an awards banquet. College scholarships were awarded to six students with a grant from Oracle Corporation. Other conference supporters included NSA, UCLA Office of Faculty Diversity and Development, Symantec Corporation, and Toyota.

Branching Out: Mathematicians and Biologists Team Up to Reconstruct the Tree of Life

As a mathematician working at the intersection of probability, statistics and theoretical computer science, UCLA Assistant Professor Sebastien Roch's research interests focus on biological applications. Today, the biological sciences have been transformed by technological advances that allow researchers to perform large-scale measurements of cellular states using DNA sequencing technology. During the human genome project, there was a big push to find new ways to sequence large amounts of DNA faster and cheaper. Says Sebastien, "Originally, the motivation was primarily medical. Biologists were trying to figure out which genes cause different diseases. What's been amazing is that the technology has led to some other applications that were not really anticipated." Many of these applications will be the focus of IPAM's upcoming 2011 program, "Mathematical and Computational Approaches in High-Throughput Genomics" that will bring together Sebastien and other mathematical and computational scientists with biologists and sequencing technology developers to advance the mathematical foundations of genomic studies. Some of these applications relate to Sebastien's specific interest in mathematical problems in evolutionary biology, a field that aims to reconstruct the tree of life of all species on Earth. As a key organizer of a workshop in evolutionary genomics, Sebastien is excited to advance the construction of the tree of life—the tree-like structure relating all life forms with myriad branches and millions of leaves that represent species—using mathematical models on large DNA data sets. Says Sebastien, "By measuring how similar DNA sequences are across species you can try to place them on the tree and find out the history of speciation. You have to use probabilistic techniques and discrete math theory to find efficient ways of extracting the information from the genome to build the tree."

For more information on the program, visit http://www.ipam.ucla.edu/programs/gen2011/.

graduate news

Heaviside Wealth Management Award for Outstanding Graduate Student Research

UCLA Math alum Alan Gillette, PhD '06, has established an annual Department award to be given to a graduate student who excels in the presentation of original research. Says Alan, "The award was created to reward students who excel in describing their specialized knowledge in such a way that it reaches outside of their own circle of specialists." The award is named in honor of Oliver Heaviside, a 19th century mathematician and physicist, who at the age of 23 tackled Maxwell's two-volume compendium, *A Treatise on Electricity and Magnetism.* Heaviside independently refined Maxwell's work, distilling 20 equations of 20 unknowns down to

Pascal Getreuer and Alan Gillette

four partial differential equations known as Maxwell's Equations. Explains Alan, "Without Heaviside's work to explain the core knowledge of Maxwell, the age of electricity would have had to wait some time as very few people could apply the original 20-equation framework to practical problems of engineering." This year's recipient is 2010 PhD Pascal Getreuer, who presented his work on "Image Processing with Optimization Techniques."

Fine Fellowships

The Clay Mathematics Institute appointed 2010 PhD **Tim Austin** to a five-year **Clay Research Fellowship**. Tim will conduct his research at Brown University and the New York University Courant Institute of Mathematical Sciences. His thesis, "Pleasant Extensions for Nonconventional Ergodic Averages" was carried out under the supervision of Terence Tao. Clay Research Fellows are selected for their research achievements and their potential to become leaders in research mathematics.

2010 PhDs **Pascal Getreuer**, **Thomas Goldstein** and **Helen (Guo-Ying) Lei** were named recipients of the **NSF Mathematical Sciences Postdoctoral Research Fellowship** (MSPRF). Pascal will use his fellowship at École normale supèrieure de Cachan, France; Tom will conduct his research at Stanford University; and Helen will go to Caltech.

Current PhDs **Nikhyl Aragam**, **Yingkum Li**, **Jed Yang** and **Joshua Zahl** were awarded **NSF Graduate Research Fellowships**. New fall PhD candidates **Damek Davis**, **Jaclyn Lang** and **Elizabeth Tuley** were also recipients.

The Department of Defense awarded current PhDs **Rami Mohieddine** and **Joshua Zahl** 2010 **National Defense Science and Engineering Graduate** (NDSEG) fellowships.

The Simons Foundation chose UCLA Math to host two prestigious **Simons Postdoctoral Fellows** in mathematics as part of its new program to provide 68 postdoctoral positions in the fields of mathematics, theoretical physics and theoretical computer science. The Department was selected by a committee of distinguished scientists for its dynamic research environment that meets the foundation's goal of providing the best possible postdoctoral training to a group of the strongest graduating PhDs. Probabilist **Oren Louidor** will be the Department's first Simon fellow.

2011 PhD candidates **Miljan Brakocevic**, **Yen Do**, **Nicolette Meshkat**, **William Meyerson**, **Norbert Pozar** and **Paul Smith** were awarded **UCLA Dissertation Year Fellowships**.

Message from 2011 Graduate Vice Chair Itay Neeman

I want to thank current Graduate Vice Chair Dima Shlyakhtenko for his amazing work over the last couple of years. Behind the scenes he has led an information technology effort that has greatly improved the workings of the graduate office. And more visibly, he is leaving the program thriving and vibrant. Of 63 National Science Foundation graduate research fellowships in mathematics awarded this year, the Department claimed over 10 percent with seven fellowships. Internally, six PhD candidates were awarded university-wide dissertation year fellowships. The Department also graduated a record 33 PhDs in 2010. This fall, 28 students will enter the graduate program. Looking ahead, our greatest challenge continues to be funding. We compete with private universities that have greater resources and can more easily support graduate students on fellowships. Our success in this environment is a testament to the quality of our faculty. My colleagues' dedication and achievements in mathematics have made our graduate programs one of the best in the world, and it is thanks to their hard work that I am confident we can continue to thrive.

undergraduate news

Prizes & Publications

Departmental

Daus Prize: Applied math major **Travis Askham** graduated *summa cum laude* and will pursue a PhD in applied math at New York University. Math – econ major **Michael Egesdal** graduated *summa cum laude* and will pursue his PhD in economics at Harvard University. ■ **Sherwood Prizes: Ekaterina Merkurjev** is a departmental scholar in pure math who also earned departmental honors; Katie will pursue her PhD in mathematics at UCLA. Pure math major **Andrew Reynolds** graduated *summa cum laude* and will pursue his PhD in mathematics at the University of Oregon. ■ **Basil Gordon Prize: Junchao Zhang** was the top scorer on the William Lowell Putnam Mathematics Competition (37.2 points, 200th place).

College

Applied math grad **Iylene Marie Patino** was awarded a **Dean's Prize at UCLA's 2010 Science Poster Day**. Iylene's poster, "Determination of Flutter Speed for the Helios Unmanned Aerial Vehicle with Varying Parameters," used a mathematical model that takes into account the aerodynamic forces acting on a flexible wing with spatially separated engines. Iylene will pursue her PhD in aerospace engineering at UCLA.

Publications

Applied math students **Mike Egesdal** and **Jeremy Neuman** co-authored **"Statistical Modeling of Gang Violence in Los Angeles"** with Kym Louie and Chris Fathauer of Harvey Mudd College, which appeared in *SIAM J*. Undergraduate Research Online.

UCLA Math – Engineering – MBA Alumna Calls for Class of 2010 to Become Innovators

Building on her first degree from UCLA in mathematics, radar systems engineer, business leader and triple UCLA alumna Susan Baumgarten launched an extraordinary career in the aerospace and defense industry, culminating in her position as president of Raytheon International, Inc. In her commencement address, Susan challenged graduates to become key players, leaders, innovators and contributors in the "STEM" disciplines – science, technology, engineering and mathematics – and declared mathematics "a ticket to the future." Said Susan, "There are many sectors where you are needed: educating the scientists and mathematicians of the future; resolving our energy development needs; finding solutions for our environmental challenges; preventing disease rather than seeking incredibly expensive cures; and addressing our nation's and the world's infrastructure needs in transportation, communication, water supply, and more." A trained ballet dancer and arts supporter, Susan cited the sublime influence of math on her dance training, which required rigor, discipline and precision. Above all, she urged students to find "the critical balance of work, love and play and revel in the comfort that you have dimension far beyond the stereotype of a mathematician."

UCLA Putnam Mathematics Team Players

A total of 4,036 students from 546 colleges and universities in Canada and the United States participated in the December 2009 Putnam Mathematical Competition. The best performing UCLA Math student was **Junchao Zhang**, with 37.2 points, who ranked number 200 nationwide. Other UCLA students in the top 1,000 were **Tristan Miller** (20 points), **Hien Huynh** (20 points), **Ryan Gochee** (19 points), **Anton Bobkov** (19 points), and **Ryan Wilson** (18 points).

Merit Track in Mathematics

The Department has rolled out a new track to steer talented math freshmen into its Departmental Scholar program, which allows qualified undergraduate students to simultaneously complete their master's in mathematics. The UCLA Math Undergraduate Merit Track in Mathematics prepares students to take upper division mathematics courses by the end of their first year. Approximately 15 participants will be selected for fall 2010 on the basis of demonstrated excellence, achievement and promise in mathematics. Selection criteria will include scores on standardized tests, participation in mathematics competitions, and other evidence of mathematical creativity and problem solving ability. As part of this initiative, the Department has established its first-ever full merit scholarship for an exceptional freshman.

For a naming or endowment opportunity for this scholarship, please contact Kerri Yoder, Director of Development, at 310-794-9045.

Making the Most of Their UCLA Math Degrees

Showcasing how math serves as a foundation for a wide range of professional endeavors, UCLA Math alumni panelists shared their work experiences with undergrads at the Department's annual spring alumni career event. **Harry Kraushaar** (Sanders Industries, Chief Financial Officer) talked about his latest venture at a mid-sized manufacturing company. Recent graduate **Kara Schmutte** (Analysis Group, Analyst) shared her perspective as a research analyst at a leading Los Angeles economic, financial and strategy consulting firm. **Tom King** (Xerox Corporation, software development) led students through his long career from a cruise missile image processing programmer to managing business operations, process improvement, and working with UCLA computer scientists doing research in cryptography. As the only panelist with a job title of mathematician, **Lauren Caston** (RAND Corporation, Associate Mathematician) talked about his policy related work in nuclear proliferation, national security and catastrophic risk management. **Minh Ha Ngo** (Palisades Charter High School, Math Teacher/Academic Decathlon Coach) demonstrated how a 17-year career in math education progressed to leadership and governance opportunities. Citing his years as a math graduate student, **John T. Donald** (Yahoo!, Data Analyst/loss prevention & analytics) shared how his passion for "discovering" informed his career.

If you are interested in participating on our 2011 alumni panel, contact Lisa Mohan at lisam@math.ucla.edu.

John Donald

Lauren Caston and Minh Ha Ngo

Harry Kraushaar, Kara Schmutte and Tom King

Logic Center Holds Second Summer School for Undergrads

The UCLA Logic Center hosted its second summer school, a three-week intensive program covering computability and complexity, determinacy and set theory, and o-minimal structures. Eighteen aspiring mathematicians immersed themselves in courses exposing them to current research techniques and problem solving sessions. Three incoming fall 2010 graduate students were participants in the center's 2009 inaugural summer school.

undergraduate news

Undergraduates Tackle Real World Problems in Applied Math Research Program

"Swarming by Nature and by Design" is the title of Professor and Director of Applied Mathematics Andrea Bertozzi's lecture that she gave as SIAM's 2009 Sonia Kovalevsky Lecturer. The topic speaks to one of Andrea's research interests and also describes the flock of over 30 undergraduate mathematics students, 13 faculty and research advisers, and five assistant PhD mentors who work with her in the Department's summer applied mathematics research for undergraduates (REU) program. Funded by NSF, the REU is flying high in its fifth year with nine projects, which all come from faculty research. Andrea sees a synergistic benefit for students and faculty: "Just because younger students haven't had a graduate course in numerical analysis or differential equations doesn't mean that they can't contribute something really meaningful."

Five years ago, Andrea saw the opportunity to expand the Department's existing REU program, which at its peak funded six applied math students. Andrea proposed to triple that number to 18. The last two years has seen the program grow to over 30 students, with additional support provided by faculty mentor grants.

The UCLA program partners with Harvey Mudd College (HMC), which brings six to 12 students to the program each summer; and a handful of other local schools participate: UC Irvine, Cal State University, Long Beach and Pepperdine University. The project teams are vertically integrated with small groups of students working together and learning from each other, while talented senior postdocs and faculty from UCLA, HMC and other partnering universities oversee each of the projects. PhD students and other postdocs frequently function as assistant mentors. The program has had enthusiastic buy-in from UCLA math faculty as well as other campus faculty, outside researchers, government agencies—and in some cases, industry partners—which makes the program truly interdisciplinary.

Past REU projects included Disaster Los Angeles, which resulted in the student team devising sophisticated mathematical approaches to responding to a fictional terrorist attack; biomedical image processing projects related to analyzing properties of the placenta, which may reveal important information on how certain diseases progress; and crime modeling.

This summer, the program continued to be a hotbed of research: In the Department's Applied Mathematics Laboratory, one student group worked on the third generation robotics car for performing cooperative control experiments with real sensors while another team across the lab conducted slurry flow experiments that have applications in natural disasters, including most recently, the BP oil spill. Other summer 2010 projects: modeling gang rivalries to better understand and predict retaliatory behavior; analyzing correlation effects of volatility in the stock market; conducting aquatic robot test bed experiments; boundary tracking in Atomic Force Microscopy; detection and visualization of airborne toxins; and mathematical modeling of bone growth.

Over eight intense weeks, students gradually become experts on their projects. Says Andrea, "One of the things we expect the students to learn from this program is scholarship. We introduce them to reading journal articles and research papers. We have them try to understand what the state of the art is for the problem that they're working on. By the end of the eight weeks, these students have taken ownership of their projects." In addition to a final presentation of their work and a written report, the student teams write journal publications, referee conference proceedings, and in some cases, produce computer software for government agencies and industry sponsors.

Going forward, Andrea envisions a regional expansion of the REU program across California: "We've been able to bring a lot of really great young talent from UCLA into these research projects and get these students involved at a much younger age than they would typically get involved in research. We'd like to involve as many students as possible."
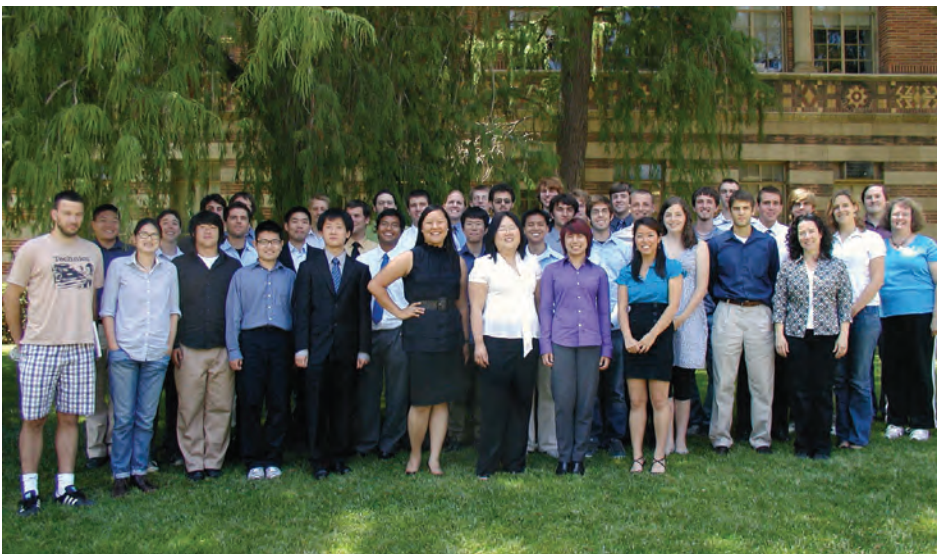
For more information on the program and research projects, visit http://www.math.ucla.edu/~bertozzi/RTG/.

events

Math in the Public Eye

Download This Join global math enthusiasts who have downloaded over 1,300 free video podcasts of select UCLA Math public lectures and symposium. Check out Field Medalist Terry Tao's public lecture on prime numbers; our UC Fields Medalists' symposium; our Logic Center symposium; and National Academy of Science member Tom Liggett's public lecture on stochastic models. Now available through UCLA on iTunes U at www.math.ucla.edu/itunes.

Panelists Bill Chen, Leonard Kleinrock, Chris Ferguson, Tom Ferguson and Don Ylvisaker

Probabilist Tom Liggett spoke on "Stochastic Models for Large Interacting Systems in the Sciences" for the UCLA Science Faculty Research Colloquium series. A free video podcast of Tom's lecture is available through UCLA on iTunes U at www.math.ucla.edu/itunes.

Betting on Chris "Jesus" Ferguson ('86, PhD '99): Math, Computer Science and Poker

UCLA Math and the UCLA Henry Samueli School of Engineering and Applied Science co-hosted a panel event featuring internationally renowned poker player and UCLA alumnus Chris Ferguson in conversation with key players from his life: his father, Professor Emeritus of Mathematics Tom Ferguson; his mentor and PhD adviser, Professor of Computer Science Leonard Kleinrock; his California Lottery employer and Professor Emeritus of Mathematics and Statistics Don Ylvisaker; his graduate adviser, Professor of Computer Science Richard Korf; and Chris' professional poker player colleague, William Chen. Chris shared his highly mathematical approach to poker with a packed house of alumni, supporters and friends. Since he began playing in the World Series of Poker, Chris has won more bracelets, made more final tables, and had more money finishes than any other player.

Third Annual UCLA Alumni Day

At the Department's open house, UCLA applied math professors Luminita Vese and Joseph Teran and graduate student Aleka McAdams present cutting edge research on brain imaging, as well as applied math and scientific computing in the visual effects industry.

Video of the panel discussion can be viewed at http://www.ustream.tv/recorded/7189848

events

2009 – 2010 Distinguished Lecture Series

Pierre-Louis Lions of the Collège de France spoke on the emerging subject of mean field games, which model systems of many agents who optimize their actions based on their expectations of how the other agents will behave; traffic flow is a good example of such a system. These expectations cause a complicated interaction between past and future that is not present in more traditional models, such as those given by evolutionary partial differential equations.

Barry Mazur of Harvard University spoke on Hilbert's tenth problem on the solvability of Diophantine equations. While this problem is known to be unsolvable over the integers (by a famous result of Matiyasevich), the question is still unresolved for other important rings (such as the rationals), and Mazur spoke on the history of this problem, together with his findings (with Karl Rubin) that there were unexpected connections between this problem and on standard conjectures on elliptic curves.

Leonid Polterovich of Tel Aviv University spoke on the phenomenon of symplectic rigidity, an important concept in symplectic geometry. He spoke of how this phenomenon can be viewed in terms of the quantitative functional-analytic properties of the Poisson bracket, shedding new light on the geometry of symplectic structures.

Ken Ono of University of Wisconsin – Madison spoke on the fascinating story of Ramanujan's mock theta functions, which were discovered in Ramanujan's famous "lost notebook." These functions exhibit many unusual properties, but the systematic understanding of these functions has only been clarified recently by the work of Ono and Bringmann.

2010 Special Awards Ceremony

Robert Sorgenfrey Distinguished Teaching Awards

Horn-Moez Prize for Excellence in First-Year Graduate Studies

TOP LEFT: Postdoctoral awardee David Weisbart; Jared Weinstein is also an awardee ■ **TOP RIGHT: Graduate student Patrick Allen receives his award; other graduate awardees are Darren Creutz, Matthew Lane and Laura Smith** ■ **BOTTOM: Faculty awardee Paige Greene; Professor Luminita Vese is also an awardee**

ABOVE: Alexey Stomakhin with his award; Kevin Ventullo is also a recipient

Dissertation year fellowships were awarded to Yen Do, Miljan Brakocevic, Nicolette Meshkat, William Meyerson, Norbert Pozar and Paul Smith. Jonas Azzam received the **Beckenbach Award**; Pascal Getreuer was awarded the **Heaviside Wealth Management Award for Outstanding Graduate Student Research Presentation.**

Research Conferences

February 6 – 7: Professor V.S. Varadarajan co-organized the international conference, **"Supersymmetry in Mathematics & Physics,"** which presented recent advances and future trends in supersymmetry.

June 14 – 20: The Department's top-ranked number theory group hosted the instructional workshop **"Modular/Geometric Iwasawa Theory and p-adic L-functions"** on the study of L-functions and Galois representations, which are at the heart of modern research in number theory and arithmetic geometry.

Our Donors

July 1, 2009 – June 30, 2010

five digits

The Larry Morris Weiner Trust

four digits

Anonymous
Sharla Boehm and Dr. Barry Boehm
Natalie W. Crawford
Stephen and Terry Godfrey
Daniel A. Gordon
Dr. John Gregory and Virginia Gregory
Heaviside Wealth Management/Alan Gillete, President
Dr. Robert Lynn and Janet Braziel
Simi S. Juneja
Laura and Evan Manning
Dr. Nicholas J. Marechal
Don T. Phan

three digits

Leslie L. Abbott
Gabriela Adler
John A. Ambler
Buck Consultants
AIG SunAmerica, Inc.
Dr. Emmanuel K. Akoto-Amanfu
Dr. Leonard Asimow and Marilyn Asimow
Edie and David Babbe
Valeria Barinova
Keith A. Barker
Gina F. Bartnik
Dr. Julius S. Bendat
Inga Bogomolny
James J. Bohannon
J. Michael Bossert
Wayne and Alaine Brandt
R. Samuel Brightbill
Michael Brzycki
Mark Calahan
Cameron Campbell and Ting Wang

The Capital Group Companies, Inc.
Sharon and Derek Carlson
Jumy Chan
Sabrina Chan
Kathy Chao
Gordon and Susan Chen
Xu Q. Chen
Ko-Hsin Chi
Hsienting Chiu and Daisy Wang
Dr. Ronald Clark and Francis Clark
Jennifer Y. Cho
Michael E. Copeland
Debi and Gerry Drayer
Manuel Duarte
Drs. Alexander Dubelman and Soteria Karahalios
Luda Dubrovina
Kevin Durkin and Erin Flannery
Renate Edmundson
Geoffrey W. Farnham
Bernard H. Fliegelman
Eugene M. Friedman
Walker Robins Flores
Nicholas and Nancy Fortis
Dr. Theodore W. Gamelin
Teri L. Geske
Glenn M. Glazer
Dr. Basil Gordon
Victoria P. Gray
Annie N. Gross
Marilyn L. Guastamacchio
Cheryl D. Harrelson
John Harshman and Kathy Zeidenstein
Corinne P. Hawk
Debbie T. Hopp
Liman Hu and Kaihua Cai
Andrew Jeffers
Prashant Joshi
Gregory C. Juarez
Ioana B. Justus
Randolph and Agnes Kallas

Karen Kalwarski
Wendy Kang and John Tseng
Dr. L. Robin Keller
Ed Kijel
Dr. So Y. Kim
Thomas A. King
Harry C. Kraushaar
Lawrence and Ella Kulinsky
Joyce C. Law
Katherine P. Layton
Joseph C. Lee
Griffith S. Lee
Richard S. H. Lee
Linda and Mark Levin
Donna J. Lim
Kevin Liu and Jenny Lo
Yun Z. Liu
Guixia Long
Nicole C. Luque
Vernon P. Magnuson
Mohsen Malek
Robert L. Marcus
Kim and Gregory Marr
Jason P. Meagher
Susan and Siavash Meshkat
Danny G. Miller
Yvonne M. Mojica
Dr. Patrick W. Murphy
James M. Murphy
NCCI, Inc.
Vasseleva S. Nedeltchev
Jeff and Stephanie Nuruki
Kelvin D. Okimoto
Gina Ou-Yang
Pacific Life Insurance Company
Hamant Jashbhai Patel
Dr. Pablo Perez-Fernandez and Traci Hortinela
Aditya K. Putcha
Alex Ramos and Olga Huaman
Lynn E. Ross
Marilyn R. Ross
Joe and Helene Rudberg

Lorraine Schmidt
Charles L. Schwennesen Jr.
Steven and Alison Selover
Tina Shaw
Dr. Michael Shearer and Jeanne Shearer
Ann L. Snowhook
Ha Khai Song
Myeong J. Song
Dr. Gregory C. Steele
Stern Family Foundation
Angela Stich and Dr. James Stich
Dr. David M. Strong
Fegzhu Sun
Rao and Fariha Tadepalli
John H. Tang
Dr. Terence Tao
Janis H. Terada
David Terr
Dr. Christoph Thiele and Andrea Thiele
Transamerica Occidental Life Insurance Company
Marion and Steve Usselman
Mark and Nagisa Usui
Francisco M. Valeriano
Phyllis Vandeventer
Eugene Volokh and Leslie Pereira
Mark A. Wagoner
Feng Wang
Meng Wei
Dr. Gregory White and Lisa Pokorny
Dr. Irvin R. Whiteman
Dr. Paula Jo Whiteman
Patricia and James Wilson
Anna Wong Barth
Hung-Ju S. Wu
Yaner Xu and Rong Ye
Paul W. Yee Jr.
Meng-Yen Yin
Ruey S. Yu

Matching Gifts

AARP
Alliant Techsystems Community Investment Foundation
Amgen Foundation Inc.
Bank of America Foundation
The Boeing Company
The DIRECTV Group Program Giving
Electronic Arts Inc.
Farmers Insurance Group, Inc.
Freddie Mac Foundation Matching Gift Program

Integrity Applications Corporation
Merrill Lynch and Company Foundation Inc.
Nestlé USA, Inc.
Northrop Grumman Foundation
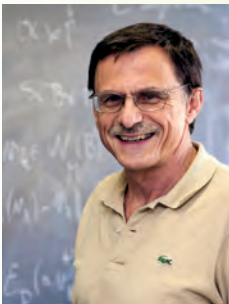Raytheon Systems Company
Transamerica Foundation
Wells Fargo & Company
Xerox Foundation

We are pleased to thank and acknowledge our many supporters.

Gifts of three digits and above made after June 30, 2010, will appear in our fall 2011 newsletter.

Alumni News

BruinWorks Online Alumni Professional Networking Site Coming Soon

This winter, the UCLA Alumni Association will launch BruinWorks, an online professional networking site exclusively for UCLA alumni. It offers a dynamic array of online tools that will revolutionize the way math alumni interact with each other, the Department and the university. BruinWorks features a career network for peer-to-peer mentoring, a comprehensive alumni directory, résumé and job listings, and a global events calendar. Once BruinWorks goes live, you will be invited to sign on and take advantage of this fantastic resource. For a sneak peak, visit http://www.BruinWorks.com.

Math Faculty Sit Down for Dinners for 12 Strangers

For forty years, this UCLA tradition has brought math alumni, faculty and students from all generations together to enjoy good food and good conversation. This year, UCLA Math professors **Kirby Baker**, **Robert Brown**, **Tom Liggett**, **Alan Laub**, **Bruce Rothschild**, and **Yehuda Shalom** and their spouses joined local alumni, who opened their homes to UCLA students for dinner. Dinner for 12 Strangers, 2011, will be held on Saturday, February 26; Saturday, March 5; and Sunday, March 6. If you are interested in hosting a dinner, visit https://www.uclalumni.net/CalendarEvents/d12/overview.cfm.

Please consider supporting UCLA Math online at www.math.ucla.edu, or use the enclosed envelope.

UCLA

UCLA Department of Mathematics

520 Portola Plaza
6363 Math Sciences
Box 951555
Los Angeles, CA 90095-1555

Dear Friends, Colleagues, Students and Alumni:

I am delighted to welcome you to our annual fall edition of *The Common Denominator.* My first year as department chair has been distinguished by multiple accolades for our programs and faculty. Most prominently, *U.S. News & World Report* released its 2010 Best Graduate Schools rankings, elevating UCLA Math to its highest historical ranking of number eight overall in the nation. We invite you take a look behind the numbers in our feature article.

Our strong standing in the mathematical research community has always been a team game, marked by the Department's unique synergy between our pure and applied mathematicians and an enthusiasm to play at the highest possible level. Such efforts were rewarded by the election of applied mathematician Andrea Bertozzi and IPAM founder Mark Green to the American Academy of Arts & Sciences. Terry Tao's unique talent has once again been recognized by multiple awards, acknowledging the remarkable depth and originality of his work. Young faculty are also making waves with a prestigious Sloan Research Fellowship awarded to analyst Monica Visan, and a Young Investigator Award from the Office of Naval Research granted to computational scientist Joey Teran, the only mathematician to receive the award this year. Receiving the Ostrowski Prize in Switzerland this past winter for my work in operator algebras was a particularly gratifying career milestone for me. Our faculty team continues to attract top talent with the addition of a new member, Mario Bonk, to our analysis group.

Our graduate students also had a great year with the National Science Foundation awarding over ten percent of its fellowships in mathematics to further their research. In our undergraduate program, we have launched the UCLA Math Undergraduate Merit Scholarship to steer exceptional students to our scholars program, giving them the opportunity to blossom in a highly stimulating and competitive environment.

The Institute for Pure and Applied Mathematics, UCLA's NSF-funded math institute, was granted a five-year renewal with a substantially increased budget under the directorship of UCLA Math professor Russ Caflisch. And finally, on the K-12 education front, the Curtis Center for Mathematics and Teaching was instrumental in helping develop and adopt national core standards for mathematics in California's secondary schools with the appointment of the center's executive director, Heather Calahan, to the California Academic Content Standards Commission.

As you know, innovation is powered by mathematics. With your support for a number of our creative programs, we will continue to uphold our excellence as a research and educational institution.

Thank you for all the ways you give back.

Sincerely,

Sorin Popa

UCLA Department of Mathematics

520 Portola Plaza
6363 Math Sciences
Box 951555
Los Angeles, CA 90095-1555
310-825-4701

http://www.math.ucla.edu/