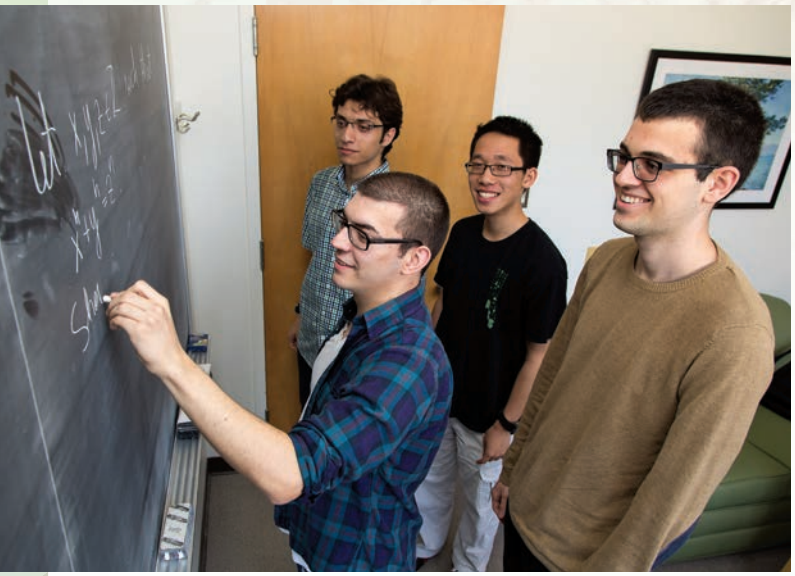
FALL 2013

THE Common Denominator

UCLA DEPARTMENT OF MATHEMATICS NEWSLETTER



Putnam contestants (left to right) Ufuk Kanat, Francisc Bozgan, Dillon Zhi, and Tudor Padurariu

UCLA Places Third in Putnam Competition!

Not many people will volunteer to take a six-hour math exam on a Saturday morning, especially when the median score is usually one or two points out of 120 possible – not unless you are of a certain mathematical make and mind, that is. The UCLA math department is fortunate to house several such individuals whose stellar performance in the annual William Lowell Putnam Mathematical Competition surpassed last year's impressive 12th place to finish third.

Every year, over 400 universities (4,000+ participants) in the U.S. and Canada prepare and compete in this prestigious competition. This time around, the UCLA Putnam Team finished third behind Harvard, a tie with the Department's previous record from the 1960s. "Talking to the students after the exam, I knew they did well, and I was expecting a great result," said Ciprian Manolescu, Putnam team coach and mentor. "But I didn't quite imagine we'd be number three."

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INSIDE

UCLA

Journey of a 1960s UCLA Putnam Scholar

by George Chapline

In 1957 I was a sophomore at Beverly Hills High School when Michael Melkanoff, who later became a professor of computer science, and David Saxon, a professor in the physics department, invited me to drop out of high school and attend UCLA. I had developed an interest in physics and mathematics at an early age and had read Morse and Feshbach's *Methods of Theoretical Physics* as well as books on quantum mechanics by von Neumann and Weyl. At this time, I also corresponded with Richard Feynman about quantum gravity.

I started UCLA at the beginning of 1958. I met Ernst Straus at that time, which was a thrill for me because Straus had worked as an assistant for Einstein. Even before coming to UCLA I had been

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George Chapline (left) and Richard Feynman in front of Bridge Hall at Cal Tech, 1963

Journey of a 1960s UCLA Putnam Scholar

continued from page 1

fascinated with Einstein's program of finding the classical equations which unify gravity and electromagnetism.

During my second year at UCLA, I started taking graduate math courses, and at the end of the year, I switched my major from physics to math. The main reason was my desire to take more math classes rather than spend a lot of time in physics labs, although, ironically, I have achieved much greater fame as an experimental physicist than a mathematical physicist.

It was Ernst Straus who invited me to participate in the Putnam competition. I took the exam twice, first as an individual and then as a member of the UCLA Putnam team. When I competed as an individual, I scored 11th in the nation, while the Putnam team I was on scored third in the nation. This stood as UCLA's best team score until last year.

My original impression of the Putnam competition was that it was largely a matter of luck – whether one could see the tricks for solving the problems. However, a few years later I had occasion to discuss the competition with Richard Feynman, who had won it while he was a student at MIT, and it became clear that Feynman's winning was not a matter of luck, but sheer genius.

After graduation from UCLA in 1961, I decided to pursue theoretical physics at Cal Tech (partly as a result of my very warm associations with Ernst Straus and David Saxon). Although Feynman was not my official advisor, I was a teaching assistant for his famous lectures on physics. After I received my PhD, Feynman arranged for me to become an assistant professor at the newly formed UC Santa Cruz.

Because I did not achieve anything notable in theoretical physics at either Cal Tech or UC Santa Cruz, I decided in 1968 to try my hand at experimental physics at Lawrence Livermore National Laboratory (LLNL). In this endeavor, I was spectacularly successful. I conceived the idea for and led the experimental team that demonstrated the first x-ray laser. This development contributed to the end of the Cold War. Indeed, Gorbachev had publically offered to stand down some of his nuclear armed missiles if LLNL stopped work on the x-ray laser. One of my last contacts with David Saxon was when he was president of MIT. He had seen my name in *TIME* magazine and called to talk about the x-ray laser.

My success with the x-ray laser allowed me to return to theoretical physics and mathematics. During academic leave at the Institute for Theoretical Physics in Santa Barbara, Nick Manton and I actually solved Einstein's unified field problem – generalized to include the weak and strong interaction gauge fields. Our solution is rather different from what Einstein

George Chapline (right) working on the x-ray laser experiment in 1979

imagined – our equations are simple only in 10 dimensions, and the Chern-Simons 3-form plays an important role. Remarkably, Einstein had the prescient idea that unification might involve an anti-symmetric gauge field, but the connection of this with the topological Chern-Simons form was our discovery. Sadly, Ernst Straus died the year we published our equations.

The unified field equations I developed with Nick Manton were a precursor to superstring theory, and this led to my most profound contribution to mathematics. After hearing John Schwartz talk about his work with Michael Green (who is now the Lucasian Professor at Cambridge) on superstring theory, I realized that the favored gauge symmetry for superstring theory is $E_8 \times E_8$. This contribution led me to start thinking about the Leech lattice in 24 dimensions, which can be constructed from three copies of the E_8 root lattice. This has an important connection with the theory of error correcting codes. Pursuing this line of thought, I found a connection between the various forms of superstring theory and the monster sporadic group. This work helps explain the connection between the monster group and modular invariance, which is a notable factoid supporting the Langlands program aimed at unifying algebra, geometry and arithmetic. The high point of my mathematics career was in 1985 when I gave a talk about this at the Institute for Advanced Study with some of the world's most famous mathematicians in attendance.

UCLA Places Third in Putnam Competition!

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Of the three-member UCLA Putnam team, two students ranked in the top 20 participants: sophomore **Tudor Padurariu** (11th with 66 points) and junior **Xiangyi Huang** (18th with 59 points). The third student, freshman **Dillon Zhi**, ranked among the top 150, with 39 points. An honorable mention was awarded to junior **Francisc Bozgan** who ranked 83rd with 44 points. Francisc was on the team last year. When asked what factors led to such an impressive team performance, Ciprian credited, "First and foremost, the enthusiasm of the students."

But this praiseworthy outcome did not come without hard work and commitment. Throughout the fall quarter, Ciprian taught three-hour preparatory courses every Monday night. One student shamelessly admitted that it was the only class in which he achieved 100 percent attendance because he enjoyed it so much. Others agreed that the sessions were crucial in readying them for the exam. One of the many ways Ciprian helped students, according to Tudor, was by teaching them new tricks to solve problems and manage their time properly when taking the exam. Dillon added, "You have to balance your time between finding the solutions – working them out in your head – and writing them down. Sometimes, in the process of writing your solution, you find out that what you thought worked in your head didn't actually work out on paper, and then you have to think about it again."

Though students had the choice to take the preparatory course for credit, Ciprian was pleased that many had spent hours preparing for the exam without receiving credit. "The Putnam exam is very difficult, and I don't recommend it for everyone. Every year, I'm surprised to discover new talented students among our undergraduates. Preparing for the Putnam is a good opportunity for our best students to get together. This way they share mathematical ideas and talk to each other about classes, plans for their future, and so forth." Preparatory sessions also allow students the chance to be exposed to mathematics they may never have seen before.

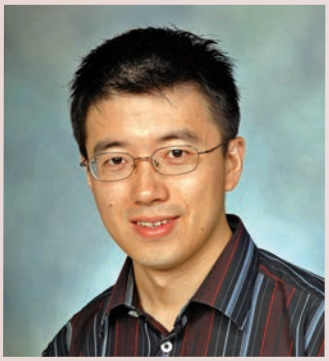
Ciprian is no stranger to these mathematical competitions. As a Harvard undergraduate, he scored among the top five students in three competitions. "I can't imagine someone being better at coaching students for the exam," remarked Francisc. Professor Dimitri Shlyakhtenko, chair of UCLA's mathematics department, praised Ciprian for motivating the team. "Ciprian is not only a fantastic researcher, but also a wonderful mentor. He inspires them to succeed, to grow, and to mature mathematically."

In the spring commencement address, Dimitri called the team's performance "an amazing feat," supporting the Department's reputation as one of the world's preeminent mathematics centers. Dimitri hopes the team's success will become one of several factors that encourage more students to study at UCLA. "Their performance is a reflection of the fact that the UCLA's mathematics undergraduate program is following the same steep upward trajectory as our faculty and our graduate program," he said. "It also reflects the attention and investment we are making in undergraduate education."

Read about Ciprian Manolescu's research on page 8.

faculty additions

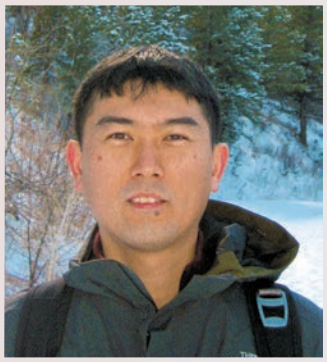
Wotao Yin



Wotao Yin joins the department as a professor in the applied mathematics group. His primary interests are in computational optimization and very large-scale computation, as well as their applications in image processing, machine learning, medical imaging and other inverse problems. He has introduced a dozen efficient numerical methods and published their software codes, which are widely used in the communities of compressive sensing, imaging, signal processing, computer vision, statistical learning and wireless networking.

Wotao received his BS from Nanjing University in 2001 and then moved to the United States where he attended Colombia University, earning his MS and PhD in operations research under the direction of Donald Goldfarb. Prior to joining UCLA, Wotao was an associate professor with the Department of Computational and Applied Mathematics at the University of Rice. He was awarded a National Science Foundation (NSF) CAREER Award in 2008 and an Alfred P. Sloan Research Fellowship in 2009.

Ko Honda



Ko Honda will join the Department in winter 2014 as a professor in the topology group. He is a leading expert in contact geometry, which has many connections with other parts of mathematics, such as symplectic geometry, algebraic geometry, low-dimensional topology, dynamical systems and mathematical physics. Early in his career, he resolved a handful of open questions about tight contact structures on 3-manifolds, together with collaborators Colin, Etnyre, Giroux, Kazez and Matić. Because of this body of work, he was an invited speaker at the International Congress of Mathematicians in 2006 and was awarded the 2009 Geometry Prize of the Mathematical Society of Japan. More recently (with Colin and Ghiggini), he established the equivalence of two Floer homology theories of importance in low-dimensional topology, namely Heegaard Floer homology and embedded contact homology.

Ko received his PhD from Princeton in 1997 under the direction of Phillip Griffiths. After postdoc appointments of varying lengths at Duke University, the University of Georgia, American Institute of Mathematics, and Institut des Hautes Études Scientifiques, he settled across town at the University of Southern California in 2001, where he is now professor of mathematics.

faculty news

Faculty News Highlights

Prizes, Awards, Fellowships, Honors & Service

As recipients of a prestigious $1 million grant from the **W.M. Keck Foundation**, **Andrea Bertozzi** and **Stan Osher** join an elite team of scientists. They are co-principal investigators for a UCLA project, Leveraging Sparsity, which stems from "the idea of using sparse data to make the collection and analysis of imaging and related data faster and more effective." Lead principal investigator Paul Weiss, director of UCLA's California NanoSystems Institute, and Mark Cohen, director of the UCLA Semel NeuroImaging Training Program, funded by the National Institutes of Health, will work collaboratively with Andrea and Stan to revolutionize the field of sparse data collection and reconstruction across real world applications in areas such as science, medicine and engineering. The ability to complete data sets from limited sources of information is made possible through the remarkable advances in pure and applied mathematics and will carry a significant impact on how data and images are collected and analyzed in the future.

Sorin Popa, along with four other UCLA faculty members, was elected into the newest class of the **American Academy of Arts and Sciences** in 2013. The honor recognizes members' accomplishments and calls upon them to serve the public by establishing projects and studies relevant to "the needs and problems of society." The newly elected members hail from an array of disciplines, including mathematics, science, art, business, public affairs and nonprofit sectors. Sorin, also a fellow of the American Mathematical Society, is an expert in the branches of mathematics known as functional analysis/operator algebras and ergodic theory, among others. From 2000 to 2005, he elaborated a revolutionary new method for classifying operator algebras associated with actions of groups on measure spaces, which led to the solution of many mathematical problems that were believed to be unsolvable for several decades.

Alexander Merkujev was named a fellow of the **John Simon Guggenheim Memorial Foundation** for his work on the complexity of homogeneous spaces. According to the Foundation, Guggenheim awards are "intended for men and women who have already demonstrated exceptional capacity for productive scholarship or exceptional creative ability in the arts." He joins 174 other selected fellows out of an applicant pool of 3,000. This is the 89th annual competition for the United States and Canada.

The Center for Excellence in Education (CEE) awarded the inaugural Joseph I. Lieberman Award for Outstanding Achievement in Mathematics to **Terence Tao**. The award was created in honor of Senator Lieberman who spent over 17 years supporting the center as a CEE trustee. Tao is an alumnus of the center's Research Science Institute (RSI) program – he was only 12 when he completed the six-week summer enrichment program in 1989.

The **2013 John von Neumann Lectureship** was awarded to **Stan Osher**. The lectureship is an honor bestowed every year "for outstanding and distinguished contributions to the field of applied mathematical sciences and for the effective communication of these ideas to the community." Stan presented his talk, "What Sparsity and l^1 Optimization Can Do for You," at the SIAM Annual Meeting.

UCLA Mathematics Department Receives Second Endowed Chair

Andrea Bertozzi, professor of mathematics and director of UCLA's applied mathematics program, was named the inaugural holder of the Betsy Wood Knapp Chair for Innovation and Creativity. Andrea's research has been applied across a variety of fields, such as image processing, swarming and robotics, crime modeling, and fluid dynamics. The award recognizes her collective achievements and ability to carry out unique and creative research while translating it into practical use and applauds her commitment to entrepreneurship in teaching and mentoring women in the field of mathematics. Remarked Joseph Rudnick, UCLA dean of physical sciences: "Professor Bertozzi is a world-class applied mathematician with years of distinguished performance as a teacher, scholar and leader in her field. She will continue to provide vital leadership and support for faculty and students."

The endowed chair was established through a gift to UCLA from Betsy Wood Knapp, an entrepreneur, philanthropist and founder/CEO of BigPicture Investors LLC. She has held numerous leadership positions at the university, including tenure as board chair of the UCLA Foundation from 2008 to 2010.

(from left) Dean Joseph Rudnik, Dimitri Shlyakhtenko, Betsy Wood Knapp, and Andrea Bertozzi

Edward Effros

The After Math
Edward G. Effros

by Masamichi Takesaki

Ed Effros has been a leading figure in operator algebras for many decades, and undoubtedly instrumental in making UCLA the world center of operator algebras that it is today; no other institution can match the strength of the outstanding research group of operator algebraists at UCLA. Ed has a unique style in conducting research: He has always chosen new research directions not previously worked, and in these new areas, has always been extremely creative. He is also known for his generosity in sharing ideas with junior colleagues and students, his excellent lecture style, and thoughtful preparation of his presentations.

Upon his arrival at UCLA in 1980 from the University of Pennsylvania, he made a decisive contribution to the theory of approximately finite dimensional C*-algebras with his junior collaborators, David E. Handelman and Chao Liang Shen, by determining completely what kind of commutative groups can appear as a dimension group of AFD C*-algebras. Another area attached to his name is the theory of operator spaces, often called quantized analysis, developed with his former student, Zhong-Jin Ruan. This new research area brought about the plenary talk of Gilles Pisier at ICM in 1998, and has had a decisive influence on the quantum information theory today, a subject that was highlighted in his two recent PNAS papers. Accordingly, he has been invited to numerous conferences on this research area – far more than he can possibly attend.

Ed's earlier work on the tensor product of C*-algebras played a critically important role in the Fields Medal work of Alain Connes in the 1970s. Another frequently cited earlier work is his 1965 paper on Borel transformation groups, whose long-lasting popularity is undoubtedly due to both the importance of the results and his lucid expository style. Ed is known as an excellent lecturer, as indicated by his frequent selection as the opening speaker of many conferences. He has also been very successful in mentoring graduate students. His warm personality, thoughtfulness, care and generous support for students have been instrumental in attracting many talented trainees. Finally, Ed has been a selfless and dedicated member of the Department, serving on many important committees. He assumed the role of vice chair of the graduate program soon after his arrival at UCLA – a time-consuming job which, nevertheless, did not slow down his research and training of students.

Lloyd Shapley, a Nobel Laureate

Lloyd Shapley, professor emeritus of mathematics and economics, was awarded The Sveriges Riksbank Prize in Economic Sciences, commonly referred to as the Nobel Prize in Economics. Professor Shapley is a renowned scholar of game theory, non-cooperative market models, cost allocation, and organization theory. He shares the award with Harvard University economist Alvin E. Roth "for the theory of stable allocations and the practice of market design."

Although Shapley and Roth worked independently, their combined research has given rise to the field of matching theory, helping to improve the performance of a variety of markets. Shapley's theoretical base for Roth's applications was founded in the paper "College Admission and the Stability of Marriage," co-authored with the late mathematician and economist David Gale. Together, they demonstrated a way to match two sets of agents in a way that is stable and the most efficient. Roth then took this fundamental theory and applied it to pairing different agents as efficiently as possible to improve the performance of markets, for example, matching prospective students with schools, or patients needing organ transplants with donors.

Lloyd joined UCLA in 1981, with a joint appointment in the economics and mathematics departments, although he spent the majority of his time in math. He has been professor emeritus since 2000.

Lloyd Shapley receives the Nobel Prize in Economics

faculty news

UCLA Fellows of the American Mathematical Society

30 UCLA mathematics professors, including 10 emeriti, were recently elected to the inaugural class of AMS fellows:

AMS Fellows (2013)
Aschenbrenner, Matthias J.
Balmer, Paul
Bertozzi, Andrea L.
Blattner, Robert J.
Bonk, Mario
Caflisch, Russel E.
Cantor, David
Edwards, Robert D.
Elman, Richard S.
Gamelin, Theodore
Garnett, John B.
Green, Mark L.
Hales, Alfred W.
Hida, Haruzo
Khare, Chandrashekhar
Liggett, Thomas M.
Merkurjev, Alexander
Neeman, Itay
Osher, Stanley
Popa, Sorin
Rothschild, Bruce L.
Rouquier, Raphaël
Schacher, Murray
Shapley, Lloyd Stowell
Shlyakhtenko, Dimitri
Sudakov, Benjamin
Takesaki, Masamichi
Tao, Terence
Thiele, Christoph
Varadarajan, Veeravalli S.

The After Math
Bruce L. Rothschild

Bruce Rothschild grew up within epsilon of UCLA. He graduated from University High School in midyear and, while waiting for Caltech's academic year to begin, he enrolled for a semester at UCLA. There, for trifling fees, he enjoyed a full academic schedule, including Ray Redheffer's honors calculus, which gave Bruce a very good start in mathematics. Bruce earned his PhD at Yale under Oystein Ore, and after two years as a Moore Instructor at MIT, joined the UCLA faculty in 1969. His research has focused on the field of combinatorial theory. He initially worked in Ramsey theory and collaborated on the Graham-Leeb-Rothschild theorem and the Ramsey theorem for finite vector spaces. Bruce has also worked in graph theory, asymptotic combinatorics, and finite geometries, among other areas. He has collaborated with a large number of co-authors, including Paul Erdos, with whom he published half a dozen papers.

Bruce Rothschild

When Bruce first joined the UCLA faculty, Ted Motzkin had just become the editor of *The Journal of Combinatorial Theory, Series A (JCT)*, the first major journal dedicated to combinatorial mathematics. Ted died unexpectedly in 1970, but Bruce and Basil Gordon continued to manage the *JCT* for the next 30 years. Since 2005, Bruce has worked with the Department's Curtis Center, serving as faculty director for several years. With Heather Dallas, he co-taught the senior course on mathematics and pedagogy for prospective secondary mathematics teachers. He also worked on teacher development projects, including several statewide projects.

As his substantial list of co-authors shows, Bruce has served as a facilitator. His office has always attracted departmental visitors. Through his own research, his long editorial work at the *JCT*, and his travels – his long and strenuous trips include a solo ride across the United States in 1975 – Bruce became friends with vast numbers of mathematicians around the world. This has given rise to the Rothschild Travel Conjecture, which is that Bruce can visit any college town in the world without ever having to stay in a hotel.

Jim Ralston

Research Conference in Honor of James Ralston's 70th birthday

Spectral Theory and Partial Differential Equations, presented in honor of James Ralston, provided an opportunity for researchers to present recent results on a wide range of topics drawn from linear and non-linear PDE, inverse problems and control theory. The conference comprised 21 talks and over 50 participants. Jim has been at UCLA since 1971, serving as department chair from 2003 to 2006.

David Cantor, Professor of Mathematics Emeritus

In memoriam, 1935 – 2012

by Kirby Baker and Al Hales

David Cantor died on November 19, 2012, at the age of 77. A noted researcher in number theory and combinatorics, David played a key role in the development of the Department's computing capabilities during his tenure at UCLA.

After graduating in physics from the California Institute of Technology in 1956, David received his PhD in mathematics from UCLA in 1960 under the combined direction of Basil Gordon and Ernst Straus. He held an instructorship at Princeton University from 1960 to 1962 and an assistant professorship at the University of Washington during the following two years before joining the UCLA faculty in 1964 as assistant professor of mathematics. Because of his growing accomplishments in computational algorithms, he also received a joint appointment in the computer science department.

David's distinction in number theory and combinatorics was recognized by a number of awards, including an honorary NSF postdoctoral fellowship in 1960 and a Sloan Foundation Fellowship in 1968. Shortly before his death, he was selected as an Inaugural Fellow of the American Mathematical Society. He was the author of over 50 papers, collaborating with many co-authors. His most cited works concern sophisticated computational aspects of algebra and number theory, e.g., computation in the Jacobian of a hyperelliptic curve of arbitrary genus, fast polynomial multiplication algorithms over arbitrary coefficient algebras (with Kaltofen), methods for factoring polynomials over finite fields (with Zassenhaus), and factorization of p-adic polynomials. These, along with his many other papers, show remarkable depth and scope. Over the years, David had a number of PhD students, and he was known for his kindness and helpfulness to students.

In the midst of his research and teaching activities, David worked to enable the Department's computing capabilities for mathematical experimentation, starting with one of the first microcomputers, which was mounted on a wooden desk. This effort was a precursor of the strong capabilities that the Department enjoys today and reflects the earlier prominent role of UCLA and the Department in developing and using modern computers.

David retired from the UCLA faculty in 1991 and thereafter was a researcher at the Center for Communications Research (CCR) in La Jolla, California. His classified work there led to several prestigious awards from the U.S. Department of Defense. He was a beloved and respected friend and colleague of many researchers at UCLA, CCR, and beyond.

UCLA Math Postdoc Receives Chancellor's Award for Postdoctoral Research

Craig Schroeder was one of eight recipients (out of 23 nominees) of the 2013 UCLA Chancellor's Award for Postdoctoral Research. In collaboration with UCLA Applied Mathematics Professor Joseph Teran, Craig was recognized for his significant contributions to the state of the art in numerical simulation of flexible solid bodies and incompressible fluids with applications to the computer graphics, computational engineering and physics communities. Craig published three papers during his first year and a half at UCLA; two of these are actively being used at Walt Disney Animation for the production of upcoming feature films. In addition to his research, Craig has successfully co-advised a number of PhD students.

Postdoc Craig Schroeder

focus on research

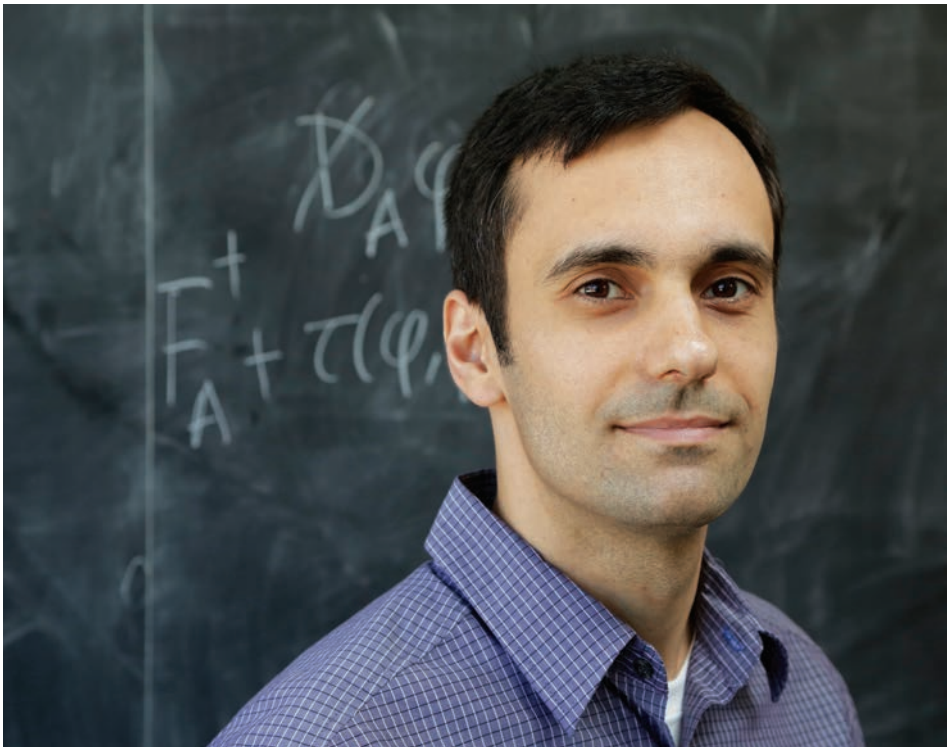
The Triangulation Conjecture

by Professor Ciprian Manolescu

Last spring, UCLA Mathematics Professor Ciprian Manolescu disproved the triangulation conjecture in dimensions greater than four. Following is his description of the conjecture and the historical background.

In topology, a basic building block for spaces is the n-simplex. A 0-simplex is a point, a 1-simplex is a closed interval, a 2-simplex is a triangle, and a 3-simplex is a tetrahedron. In general, an n-simplex is the convex hull of n+1 vertices in n-dimensional space. One constructs more complicated spaces by gluing together several simplices along their faces, and a space constructed in this fashion is called a simplicial complex. For example, the surface of a cube can be built out of twelve triangles, two for each face. Topologically, the cube is indistinguishable from a sphere (and also from a tetrahedron, or from an octahedron), since all these surfaces can be deformed into each other without tearing them apart, we say that they are homeomorphic.

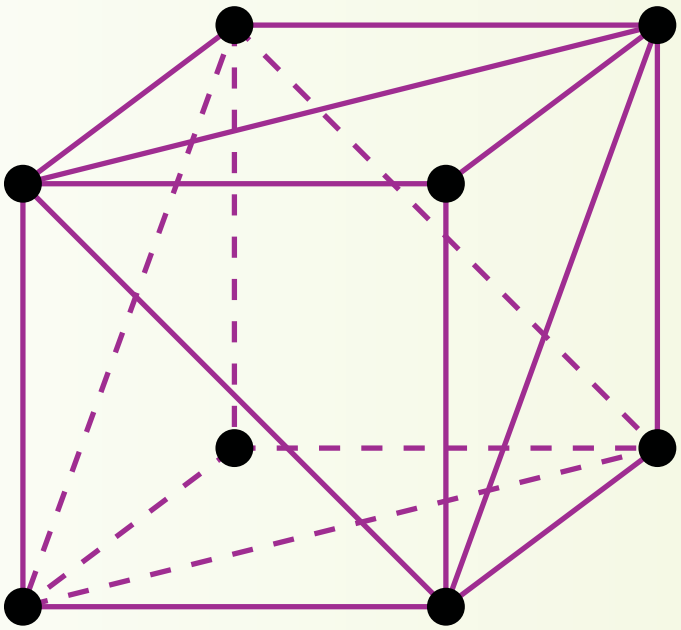
Apart from simplicial complexes, manifolds form another fundamental class of spaces studied in topology. An n-dimensional manifold is a space that looks locally like the n-dimensional Euclidean space. Manifolds are ubiquitous in many parts of mathematics; for instance, they can appear as spaces of solutions to systems of polynomial equations or to systems of differential equations. However, knowing that a space is a manifold does not tell us much about its global structure. To study the properties of a manifold, it is helpful to triangulate it, that is, to construct a homeomorphism to a simplicial complex. For example, the surface of a sphere is a two-dimensional manifold, and it admits a triangulation with twelve triangles, in the form of the cube. (Of course, it also admits many other triangulations.) A triangulation yields a combinatorial description for the manifold. Furthermore, if we have two manifolds and we try to tell them apart, the first thing to do is to check if their topological invariants (such as their homology groups) are the same. If we are able to triangulate the manifolds, it is straightforward to compute their homology groups in terms of the two triangulations.



Ciprian Manolescu

The triangulation conjecture – first formulated by Kneser in 1924 – claimed that every manifold was triangulable. The conjecture turned out to be false in general, although it is true for manifolds of dimension up to three, and also for all differentiable manifolds (those that are “smoothly” like Euclidean space, so that one can do calculus on them). In Kneser’s time, it was already known that every two-dimensional surface is triangulable, due to the work of Rado. The case of differentiable manifolds was settled in the 1940s by Cairns and Whitehead. In 1952, Moise showed that any three-dimensional manifold is differentiable and thus triangulable.

Much of the later progress towards settling the conjecture was done by people associated with UCLA, at various points in time. In 1968, Rob Kirby, then a professor at UCLA,



Triangulated cube

discovered the so-called torus trick, a technique that enabled him to find (in joint work with Laurence Siebenmann) the first example of a manifold that does not admit a piecewise linear structure. A piecewise linear structure, also called a combinatorial triangulation, is the kind of triangulation in which the manifold structure is evident technically, a triangulation in which the link of every vertex is a sphere. Most of the triangulations of a manifold that one can think of are of this type. The simplest way to construct a non-combinatorial triangulation is to first triangulate a non-trivial homology sphere (a manifold with the same homology groups as the sphere, but not a sphere), and then to take its double suspension. One then needs to appeal to the Double Suspension Theorem, proved in the 1970s by Bob Edwards (also at UCLA) and J. W. Cannon to see that the resulting space is a manifold (in fact, a sphere).

A piecewise linear structure, also called a combinatorial triangulation, is the kind of triangulation in which the manifold structure is evident technically, a triangulation in which the link of every vertex is a sphere. Most of the triangulations of a manifold that one can think of are of this type.

The work of Kirby and Siebenmann showed that there exist manifolds without piecewise linear structures in any dimension greater than four. Dimension four is very special in topology, and new techniques were needed in that case. In the early 1980s, Michael Freedman revolutionized four-dimensional topology, and in particular, gave an example of a four-manifold (the E_8 manifold) that has no differentiable or piecewise linear structures.

The first counterexamples to the triangulation conjecture were also found in dimension four: In the mid 1980s, Andrew Casson introduced a new invariant of homology 3-spheres. This can be used to show that, for example, Freedman's E_8 manifold is not triangulable.

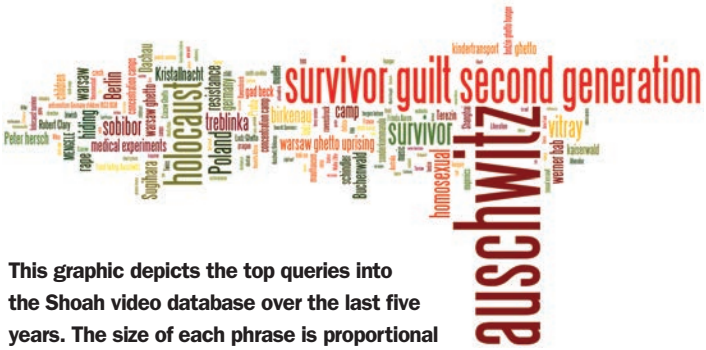
This left open the question of triangulability for manifolds in dimensions greater than four. In the 1970s, this problem had been shown to be equivalent to a different problem, about 3-manifolds and homology cobordism. The equivalence was discovered by Ron Stern (a UCLA PhD) together with his collaborator David Galewski, and independently by Takao Matumoto. In technical terms, they showed that all manifolds of dimension > 4 are triangulable if and only if the 3-dimensional homology cobordism group admits an element of order two and Rokhlin invariant one. Furthermore, Galewski and Stern gave an explicit example of a 5-dimensional manifold that is not triangulable, if the answer to the question above were negative. By taking products with tori, one would also obtain counter examples in all higher dimensions.

Indeed, the answer to the question about homology cobordism turned out to be negative. The proof involves techniques from gauge theory, namely, a new version of Floer homology called Pin(2)-equivariant Seiberg-Witten Floer homology. Gauge theory is the study of certain elliptic partial differential equations that first appeared in physics – they govern the weak and strong interactions between particles. In the 1980s, Donaldson pioneered the use of gauge theory in low-dimensional topology. Out of gauge theory came Floer homology, an invariant associated to 3-manifolds that is particularly useful in studying cobordisms. (A cobordism between two 3-manifolds Y and Y' is a 4-manifold with initial boundary Y and final boundary Y'.) Floer homology is what Atiyah called a topological quantum field theory (TQFT). The main property of a TQFT is that a cobordism from Y to Y' induces a map between the respective invariants (in this case, their Floer homologies). This should be contrasted with what happens in ordinary homology, where we need an actual map (not a cobordism!) between Y and Y' to get a map between their homologies. The various kinds of Floer homologies (instanton, Seiberg-Witten, Heegaard Floer) are the main tool for studying cobordisms between 3-manifolds, and the answer to the Galewski-Stern-Matumoto problem is only one of their many applications.

IPAM

Institute for Pure & Applied Mathematics

2013 RIPS Projects Feature Twitter and Shoah



This graphic depicts the top queries into the Shoah video database over the last five years. The size of each phrase is proportional to how often that phrase has been queried.

Research in Industrial Project for Students (RIPS) is an ongoing summer program bringing together high-achieving undergraduate students and industry sponsors to collaborate on real world research. This year two of the projects involved social media for crime prevention and information retrieval for Steven Spielberg's Shoah program.

Although the Los Angeles Police Department (LAPD) has leveraged the rising popularity of social media to target criminal activity as it is happening, another strategy is being evaluated. Can social media serve as an interface to target gang related crime before it happens? The RIPS LAPD project took on the task of comparing crime data from the LAPD Hollenbeck Division with Twitter data from the same time period and geographic area to see how such an interface might occur. Students applied topic modeling techniques, such as non-negative matrix factorization, to filter the Twitter data for crime-based content and partition the area into regions based on known gang territories and natural boundaries, such as the freeway. The students then used time series analysis methods and determined that a significant temporal relationship exists between Twitter and crime activity. The ultimate goal of this research is to develop a web-based investigative tool that will help the LAPD anticipate criminal activity. Such a tool would monitor Twitter usage to identify tweets that are potentially crime-related, identify the specific area of activity, and ultimately enable the LAPD to anticipate the location and time of future criminal activity in that area so they can target their resources.

The USC Shoah Foundation was established by director Steven Spielberg in 1994 to collect video testimonies from survivors and witnesses of the Holocaust and other genocides. To date, it has collected over 52,000 testimonies, creating a compelling voice for educational and political efforts to prevent future genocide. To facilitate access and retrieval of the testimonies, the videos have been indexed. But to realize the full potential of the foundation's archives, it is vital to build a more effective information retrieval system for users. The goal of the Shoah RIPS project was to improve search quality by leveraging user activity data from the current online index. Users have performed more than 110,000 quick searches and viewed almost a million video segments over the past five years. The RIPS team constructed and implemented two ranking algorithms, a vector space information retrieval model and a PageRank algorithm, and applied them to the user data. The results were promising as they appear to outperform the foundation's existing system.

In 2014, IPAM will launch a new RIPS industrial program in Berlin, geared to graduate students, adding a third location to the current locations in Los Angeles and Hong Kong.


IPAM
Annual Newsletter of the Institute for Pure and Applied Mathematics
a National Science Foundation Math Institute
at the University of California, Los Angeles
Fall 2013
IPAM Discussions Lead to Exciting New Direction for Materials Science Research
Emily Carter to Give Simons Lecture at IPAM
Inside

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Spring 2013 IPAM Program:

Interactions Between Analysis and Geometry

By detailing recent developments on the interface between analysis and geometry, program organizers hoped to enhance communication between mathematicians in these two areas. To achieve this goal, the program offered four week-long workshops over three months in addition to a research seminar, a participating seminar for junior members, and a UCLA graduate course on Stochastic Löwner Equations taught by Steffen Rohde from the University of Washington. The workshops were titled: Analysis on Metric Spaces, Dynamics of Groups and Rational Maps, Non-Smooth Geometry, and Quasiconformal Geometry and Elliptic Partial Differential Equations. Special activities included Ursula Hamenstädt's UCLA Distinguished Lecture Series on the role of hyperbolicity in geometry and dynamics and the Green Family Lectures presented by Fields Medalist Wendelin Werner: "Drawing Pictures at Random," "Random Mountains," and "About Conformal Loop Ensembles."

The 45 program participants, comprising many postdoctoral fellows, were augmented by about 40 additional attendees at each workshop. The program's organizing committee was chaired by UCLA's Mario Bonk and included John Garnett from UCLA, Ursula Hamenstädt from Bonn, Pekka Koskela from Jyväskylä, and Eero Saksman from Helsinki.

math education

The Curtis Center

Summer Institutes participants

Curtis Center Teacher Conferences

At this year's annual Mathematics and Teaching Conference a peak attendance of 350 teachers heard from keynote speaker and Fields Medalist David Mumford. He encouraged the teachers to balance applied and pure mathematics in their classrooms. This year's Summer Institutes garnered more than 200 participants. The training helped teachers gear up to teach mathematics that is new to their grade level or subject area due to California's adoption of the Common Core State Standards in Mathematics. The teachers will return for four "Saturdays at UCLA" throughout the academic year. Curriculum for the training sessions is developed by teams of mathematics educators and mathematicians.

The Curtis Center completed a three-year grant to provide mathematical training to teachers in the Downey Unified School District with the program evaluation showing statistically significant increases in teacher math knowledge in all three years.

Keynote speaker and Fields Medalist David Mumford

Los Angeles Math Circle – Seven Years Later

Now in its seventh year, the first cohort of Los Angeles Math Circle alumni is entering graduate school in mathematics (including programs at the University of Chicago, Cambridge, and University of California campuses). Several Math Circle instructors have furthered their careers in mathematics, developing curricula at the Main School of Science and Mathematics, Magnolia Magnet Public Schools, and the Art of Problem Solving.

The Los Angeles Math Circle fosters interest in advanced mathematics and problem solving among K-12 students. For more information please visit www.math.ucla.edu/~radko/circles.

Susie Håkansson Retires

After 14 years as executive director of the California Mathematics Project (CMP), Susie Håkansson retired in December 2012. Her efficient and proactive administration of the CMP helped to establish the UCLA Department of Mathematics as a center for mathematics teacher leadership in California.

In the early 1980s, UCLA Mathematics Project (UCLAMP) was one of several sites established on California university campuses to oversee professional development projects for school mathematics teachers. The sites quickly became important venues for teachers who wanted to improve instruction. Susie was appointed as site director for UCLAMP in January 1985 after a career as a high school mathematics teacher. She received her PhD in educational psychology four years later.

The 1990s were a turbulent time for public school mathematics, but Susie and the CMP survived. In 1999, the University of California agreed to place the CMP headquarters in the UCLA math department, choosing Susie as executive director. Susie proved to be an effective leader and capable administrator. She brought balance to the CMP and pulled it together, making it an inclusive and effective organization. She was beloved by the community she served. Within the Department, Susie provided invaluable assistance through her participation in various aspects of the teacher preparation program. She helped to design a major for the teaching of mathematics, assisted in the drafting of the proposal for recertification of the math department program for teacher preparation, and contributed to the establishment of the Curtis Center.

The Great Recession of 2008 threatened the existence of the CMP as a result of state budget cuts. Susie was able to rescue the organization by securing a grant for a five-year study of teacher retention. This study was brought to a close in 2012 with a convention of national scope and the publication of a monograph on mathematics teacher retention. It is notable that the research gives strong support to the importance of the mathematical networking of teachers as carried out by the CMP. In 2009, Susie was awarded the Robert Sorgrenfrey Distinguished Teaching Award by UCLA's math department.

Susie moves to a new career as consultant and lecturer and is currently president-elect of TODOS: Mathematics for All, a national affiliate of the National Council of Teachers of Mathematics (NCTM). She is a recipient of the Walter Denham Memorial Award from the California Mathematics Council for tenaciously championing mathematics education in the face of many obstacles – political, philosophical and budgetary. In 2012, the California Mathematics Council (CMC) South announced the establishment of the new Susie Håkansson Award for Fostering Emerging Leadership of Math Educators of Color. Throughout her career, Susie has accepted the challenge of ensuring that every student in California has a qualified teacher and every teacher has the opportunity to grow and be successful.

events

2012-2013 Distinguished Lecture Series

Jean-Pierre Wintenberger of the University of Strasbourg presented a series of lectures on Serre's modularity conjecture and ramifications in Iwasawa theory. He was co-recipient of the 2011 Cole prize in number theory, along with UCLA professor Chandrashekhar Khare, for the proof of Serre's modularity conjecture.

László Lovász, recipient of the Wolf Prize, the Knuth Prize and the Hyoto Prize for his work in combinatorics, gave a series of lectures on the motivation for graph limit theory. Topics included Szemeredi's regularity lemma and its variants to graph limits, limits of dense graphs and limits of sparse graphs. He is currently a professor at Eötvös Loránd University in Budapest, Hungary.

Ursula Hamenstädt, a professor at the University of Bonn, Germany, lectured on the hyperbolicity in geometry, dynamics and groups. Her lecture series was part of the Spring 2013 IPAM Program, Interactions Between Analysis and Geometry.

Inaugural Event for the Bruin Actuarial Society

Last fall, the Bruin Actuarial Society (BAS) hosted its first alumni – student networking event, including a special visit from Brad Smith, the president of the Society of Actuaries, an educational, research and professional organization for actuaries across North America. The event launched a new outreach effort to foster networking between current UCLA actuarial students and alumni who are working in the field.

During the visit, Brad met with members of the Department's Actuarial Advisory Council, a group of administrators, faculty, students, local employers and benefactors that meet quarterly to improve the effectiveness of the program and identify outside resources that would further benefit students. He also gave a talk to undergraduate students and alumni, detailing his journey in the actuarial profession, and offered advice for their own careers. Brad served on various councils and boards prior to his election to the position of Chairman of Milliman in 2000, which he still holds. He is a fellow of the Society of Actuaries, a member of the American Academy of Actuaries, and a fellow of the Life Management Institute.

Brad Smith, president of the Society for Actuaries, speaking to UCLA students and alumni

Informal Logic Meeting

Hosted by the UCLA Logic Center, A Very Informal Gathering of Logicians (VIG) was attended by some 60 researchers and graduate students. It was the 17th biannual event, dating back to 1975. The aim of the series is to cover logic broadly, including its interactions with the philosophy of mathematics and computer science. Events are generally held on Super Bowl weekends and include formal lectures (seven this time), informal problem sessions, and discussion. A highlight of the meeting was the inaugural Hjorth Lecture given by Slawomir Solecki of the University of Illinois at Urbana-Champaign. The Hjorth Lecture was recently established by the Logic Center to honor the memory and contributions of the late UCLA Professor Greg Hjorth. The Lecture will be a regular part of all future VIGs.

Physical Science Lecture Series: Life After the Degree

The UCLA Division of Physical Sciences hosted two **Life After the Degree Lecture Series** events, highlighting alumni who have applied their science backgrounds to achieve success in the world of finance and biotechnology. Panelists shared their personal educational and career experience while offering advice on how to best use scientific analytical and quantitative skills to thrive in competitive markets.

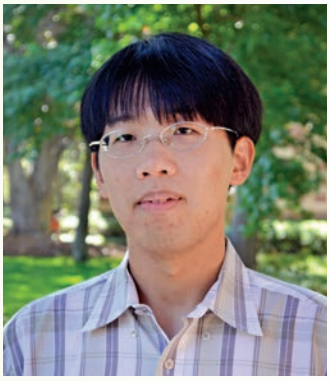
Science & Finance event: Two of the six panelists earned UCLA degrees in mathematics: Davida Milo (BS 1990), senior vice president and technology manager at PIMCO, and Steve Godfrey (BS 1989), executive vice president and head of foreign exchange eCommerce for Wells Fargo.

Careers in Biotech event: Two of the five panelists earned UCLA degrees in mathematics: Matt Cravets (BS 1992), senior director of the Biostatistics Department at Ardea Biosciences, a wholly owned subsidiary of AstraZeneca, PLC, and Mike Tang (BS 2005), a research and development chemist for Allergan Inc.

**Life After the Degree Lecture Series is aimed at educating students on career options beyond the scope of traditional scientific research. If you are interested in attending or participating in a future lecture series, please contact Erica Marentes at:* emarentes@support.ucla.edu.

graduate news

2013 Graduate Students Take Flight



Anush Tserunyan *to University of Illinois at Urbana-Champaign*

Growing up in Armenia, Anush's interests varied from astronomy and physics to music. A short Isaac Asimov story called "Profession," drew her to the computer science department at Yerevan State University where she completed her undergraduate and master's degrees. "In undergrad, I realized pretty quickly that I liked the math courses most of all, but the rigidity of our university system didn't allow switching majors without losing funding. So, I continued in computer science, but kept reading some math on my own and got interested in analysis, as well as in logic and set theory."

Anush liked every math subject she studied at UCLA, which made it hard to choose a research area. However, she knew that it had to be in logic or set theory. "Eventually, I started a course in descriptive set theory with Alexander Kechris (a Caltech professor) and was very interested in it as this subject lies at the intersection of analysis and set theory. It has the flavor of both and has broad application throughout ergodic theory, topological dynamics and operator algebras." She is extremely grateful to the UCLA logic group for its support and for making it possible to work with an external advisor.

Apart from her studies in math, Anush played music. She was part of a band with a friend – he played guitar and she, piano. Together they ended up recording an album to make sure they remembered their songs. Anush also took up fencing and plans to continue practicing the sport during her postdoc at the University of Illinois at Urbana-Champaign where she will be part of the logic group.

Jed Yang *to University of Minnesota*

Jed always wanted to be a mathematician. Like most kids at age 3, he would ask "Why?" every few minutes. To satisfy his son's curiosity, Jed's father began teaching him how to solve simple systems of linear equations. Jed enjoyed these quizzes so much that his dad continued to teach him mathematics at an accelerated rate. His family ended up installing a white board in their dining room in Taiwan, and mathematics became a common course during dinner.

After finishing middle school in Taiwan, Jed came to the United States, at his own request, for three years of high school in order to learn English and to transition into an American university. While attending college in Pasadena, he developed a strong interest in combinatorics and spent two summers doing research. The first summer led to a paper, but the second was a failure. Oddly enough, it was the latter that convinced him to continue pursuing his dream. "I realized that I had what it took to push through the tough days that would inevitably come for those who do research."

At UCLA, Jed was intrigued by Igor Pak's research interests and immediately decided to work with him. Pak ultimately helped Jed narrow his research focus. "He gave me a few open problems after I asked him to be my advisor. I liked the one on tilings and solved it over the weekend." Their relationship was cemented when his advisor suggested that they write a paper together the following week. Jed has enjoyed studying computational complexity and decidability of tileability over the last three years under Pak's guidance. In his spare time, Jed also organized the weekly graduate student seminar. He is excited to be moving on to a postdoc at the University of Minnesota.

Joshua Zahl *to MIT*

As a child growing up in Ottawa, Canada, Josh wanted to be an aerospace engineer and then a physicist. He soon discovered that the part of physics he found most interesting was the underlying mathematics. "Unfortunately, I did not have a particularly strong background, and upon entering college in California, I was placed in the remedial math class. Nonetheless, I decided to continue with math, and I was a pure math major at Caltech from 2004 to 2008. By the time I graduated, I was sure I wanted to do harmonic analysis." UCLA has an exceptionally strong harmonic analysis group.

In the summer of 2008, before he began courses at UCLA, he came across a paper by Izabella Laba, Nets Katz, and (his future advisor) Terence Tao on the Kakeya problem. "I couldn't understand the paper very well, but I was sure it was a cool problem." Josh spent the majority of his research time over the past five years studying this problem. By coincidence, the new and exciting sub-discipline of incidence geometry emerged while he was at UCLA, and his study of the Kakeya problem perfectly positioned him to be part of this new field.

Josh also took up rock climbing, which is very popular amongst the UCLA math graduate students. In addition to climbing at UCLA's rock wall, he took trips to nearby climbing spots, including Bishop, Joshua Tree and Tahquitz.

Josh's postdoc position at MIT is funded in part by the NSF's mathematical sciences postdoctoral research fellowship program. He is excited to work with the mathematicians there and pleased to be closer to his family in Ottawa.

graduate news

Special Awards Ceremony

Honoring our graduate students

Every year the Department honors outstanding graduate students and faculty with awards and prizes. This year's top students and honored faculty are:

Recognizing our faculty, graduate students, and post-docs for their teaching service is of extreme importance to the mathematics student experience. If you are interested in supporting or naming a Distinguished Teaching Award, please contact Kerri Yoder, Director of Development at 310-794-9045 or kyoder@support.ucla.edu.

Bob Brown and Liam Watson received the Distinguished Teaching Award for Faculty.

Paul Balmer, Graduate Vice Chair, presents the Horn-Moez Prize for Excellence in First-Year Graduate Studies to Mathew Stoffregen (shown) and Jianfeng Lin (not shown).

Beckenbach and Dissertation Year Fellowship awards went to Xiaojing Chen, Guy David, Benjamin Hayes, Yi Yang, Bin Zhao, and pictured here, Beren Sanders.

Robert Sorgenfrey Distinguished Teaching Award winners (from left) Shagnik Das, Jason Murphy, Samuel Miner, and William Rosenbaum

UCLA Alumnus Alan Gillette (right) and business partner David Franco (left) presented the Heaviside Award to graduate student Joshua Zahl (center).

The fall 2013 incoming class of 32 graduate mathematics students was selected from over 500 applicants worldwide. These students hail from the U.S., China, Korea, Greece, Australia, Vietnam and Mexico.

undergraduate news

Student Awards

Putnam Awards

Every year, the Department hosts a special ceremony that honors undergraduate students who showcase outstanding performance and potential in the field of mathematics. This year we are pleased to announce the newly established **Richard F. Arens Putnam Scholars Undergraduate Award**. The inaugural award was presented to sophomore Tudor Padurariu for his meritorious performance on the Putnam exam this academic year. The award was established by math alumnus Don Phan, who named it after an influential professor during his undergraduate career in the 1970s. Tudor is also the recipient of the **Basil Gordon Prize** for scoring the highest on the Putnam exam out of all the participating UCLA students. This marks the second year Tudor has received this honor.

Honorable mention went to **Francisc Bozgan** and **Xiangyi Huang** who ranked 83rd and 18th, respectively, among 4,000 + Putnam participants.

Alumnus Don Phan (Class of 77') presents the inaugural Richard F. Arens Putnam Scholars Undergraduate Award to Tudor Padurariu.

Putnam team coach and mentor Ciprian Manolescu presents honorable mentions to juniors Francisc Bozgan (shown) and Xiangyi Huang (not shown) for their excellent performance on the exam.

If you are interested in supporting the Putnam team, student awards given to graduating seniors at commencement, or providing named undergraduate merit scholarships, please contact Kerri Yoder, Director of Development at 310-794-9045 or kyoder@support.ucla.edu.

Awards for Outstanding Achievement

During commencement the following students were honored for their outstanding academic achievements:

Daus Prizes

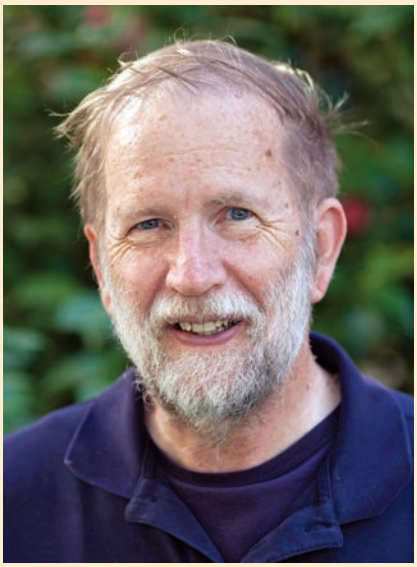
Nicholas John Frontiere
Jeffrey Stephen Hicks
Daniel James Massatt
Daniel Montealegre
Elizabeth Ann Peterson
Yitzchak Elchanan Solomon

Sherwood Prizes

Cheng Mao
Nicholas Brian Strehlke

Outstanding Actuarial Science Student Award

Qingdi Lu



Message From New Undergraduate Vice Chair David Gieseker

Let me first of all thank my predecessor, Bob Brown, for his remarkable work as undergraduate vice chair over the last two years. Under Bob's leadership, the program is thriving. The number of students, both majors and non-majors, has grown steadily over the last 20 years. We are pleased to announce that the Department is starting a new important major – Financial Actuarial Mathematics – this fall. We are also very proud of the great performance of our Putnam team, a testament to the high caliber of the students in our program.

The Department's goals are to maintain and strengthen the major and to provide the most relevant education for all of our students. Given declining resources, one challenge is simply to maintain excellence in our core courses. Another is to develop new courses to prepare our majors for the mathematics that is becoming increasingly used in diverse areas, such as machine learning, social networks and computational biology. Another challenge is to revise the mathematical preparation of life science students to prepare them for new and exciting uses of mathematics in biology. Given the excellence of our faculty, students and staff, we will endeavor to meet these and other challenges.

undergraduate news

BS Degree in Financial Actuarial Mathematics

Did you know about BAS?

Former Bruin Actuarial Society (BAS) President Qingdi Lu didn't know she would end up graduating with the skill set and passion to work in the actuary field when she entered the UCLA math program. Joining BAS helped her choose this educational path and prepared her for a career at Aon Hewitt immediately upon graduating. "BAS has assisted me tremendously in learning about the actuarial profession, and eventually becoming an actuary myself. I didn't know anything about the field before I joined BAS. The club events gave me good insight to this profession, various industries within it, and how to become an actuary, step by step. I also met many other actuarial students who became my good friends; we studied for exams and prepared for interviews together."

If you are interested in learning more about the actuary profession or want to meet other aspiring actuaries, join BAS today. The society provides many resources for students, such as an annual career/networking fair during the fall, actuarial case competitions, and workshops on Excel and interviewing. For more information, visit www.math.ucla.edu/~actuary/.

Qingdi Lu received the Outstanding Actuarial Science Student award.

34 Years in the Making

Well rounded knowledge of econometric techniques and modeling – pricing of financial assets models, actuarial models, and statistical models – are highly valued skills in today's competitive world. This fall, the Department launched the major that will train students to master these skills and more – the **Financial Actuarial Mathematics degree**.

As natural disasters continue to wreak havoc on lives and property and government tackles the conundrum of health care and pensions, there is a need for well-qualified mathematicians to assist in shaping the future of our national policies. This new degree will provide the necessary training and skill set to produce quality candidates for positions within actuarial firms, the government and research organizations.

Over the past several years, an increasing number of students have participated in the "actuarial plan," a program option for mathematics/applied science majors, established in 1979 by Ira L. Boyle, (UCLA '72) and Professor Emeritus Ronald Meich. During the 1990s, the actuarial plan was dormant due to the lack of qualified instructors, but all that changed in 2000 when Assistant Adjunct Professor Loong Kong, Fellow of the Society of Actuaries, was appointed as director. Under Loong's tenure, the program has steadily gained interest and grown substantially. It has strong support from the Department as well as the Actuarial Advisory Council, a group consisting of administrators, faculty, students, local employers and benefactors dedicated to improving the discipline. UCLA's program is now reputed as one of the best established programs on the West Coast. The new Financial Actuarial Mathematics Major replaces the actuarial plan and prepares students for careers in this high-demand field.

For more information regarding the new financial actuarial mathematics degree, please contact the Department's student affairs office at (310) 206-1286 or ugrad@math.ucla.edu.

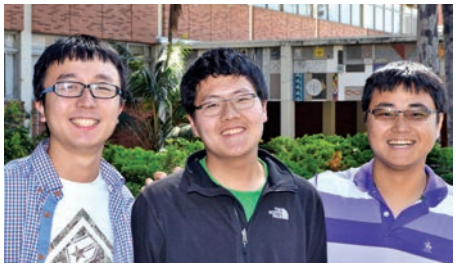
UCLA's financial actuarial program is reputed as one of the best established programs on the West Coast.

Mathematical Contest in Modeling

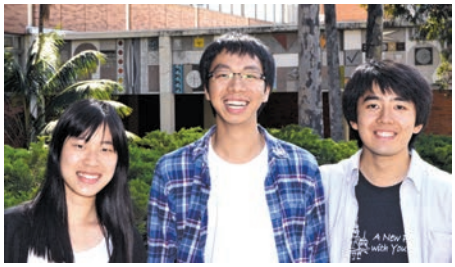
Twelve UCLA teams participated in the 2013 COMAP Mathematical Contest in Modeling (MCM). Out of 5,636 teams from 14 different countries, two UCLA teams were awarded Meritorious Winner, a designation that is reserved for the top 17 percent of the papers submitted. The MCM is an annual international contest in which teams of three undergraduate students use mathematical modeling to solve a real world problem. Teams have just four days to choose one of two posed problems, clarify and make necessary assumptions about the problem, develop and analyze a mathematical model, and finally, compose their findings in a clear and coherent paper. A panel of judges then scores the solution papers, and prizes are awarded.

This year, the contest problem options were (a) the optimal pan shape designs for baking brownies and (b) the mathematics of fresh water policy in various countries. The winning teams consisted of the following UCLA undergraduates: Jing Dai, Hao Lin and Yumin Zhang for their solution paper on problem (a) and Huachen Yu, Weijian Lin and Yingjun Shen for their solution paper on problem (b). UCLA mentors for the competition were Braxton Osting, Jinsun Sohn, Luminita Vese, Kefeng Liu, Jesus Rosado, Yves van Gennip and Brian Van Koten.

Undergraduate students interested in learning more about the MCM contest can visit: www.math.ucla.edu/~lvese/MCM_ICM/.



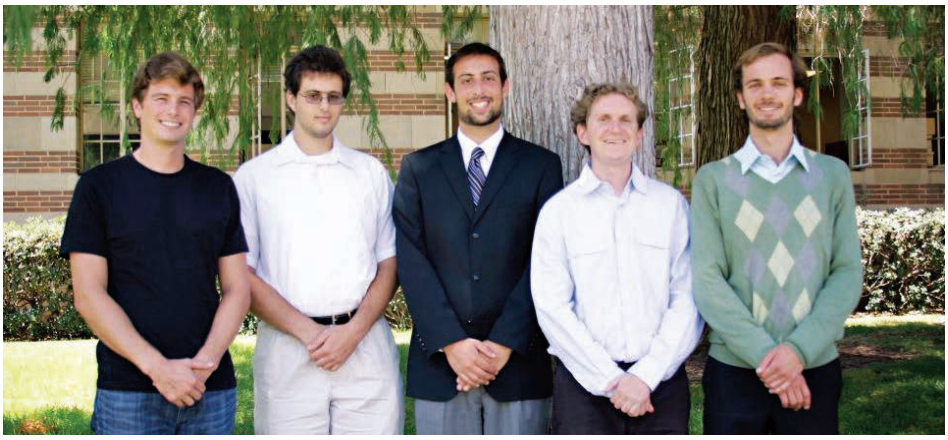
Weijian Lin, Yingjun Shen, and Huachen Yu



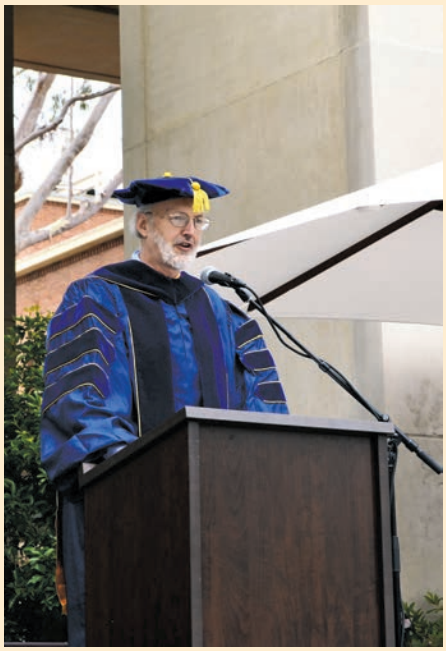
Jing Dai, Hao Lin, and Yumin Zhang

REU Wins 2013 Joint Mathematics Poster Award

UCLA Research Experience for Undergraduate (REU) students Peter Elliott, Daniel Barrow, Ian Draye and Garren Gaut, together with their faculty advisor, Braxton Osting, received the Outstanding Presentation Award of the Undergraduate Student Poster Session at the 2013 Joint Mathematics Meetings this year. Their poster was titled "Ranking Rankings: a Comparison of the Predictive Power of Sports Ranking Methods."



REU team (from left to right): Braxton Osting, Ian Drayer, Daniel Barrow, Peter Elliott, and Garren Gaut

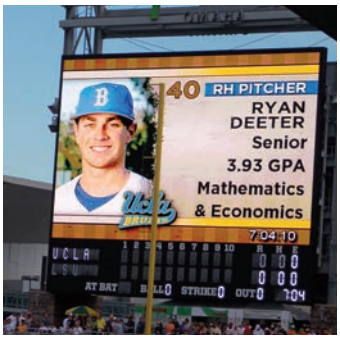


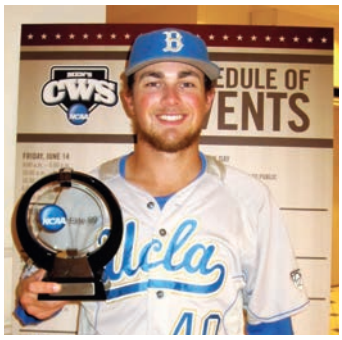
Commencement Speaker Peter Jones

Alumnus and Yale Professor Gives Commencement Address

Students and families were treated to an address from alumnus Peter Jones in this year's commencement ceremony. Peter Jones is the James E. English Professor of Mathematics and Applied Mathematics at Yale University and director of Yale's applied mathematics program. He received his PhD from UCLA in 1978 under the direction of John Garnett before moving to the University of Chicago, where he was on the faculty until 1985. His message to the audience: the future of math lies with students and young scholars. He advised the graduates to take advantage of everything they learned while at UCLA and to always appreciate that they were able to earn their degrees from one of the crown gems of UCLA – the mathematics department.

alumni news





The NCAA Elite 89 Award Goes to a Math Student

This spring, UCLA Bruins celebrated their first NCAA national championship in baseball and 109th NCAA title, overall. It also marked the first time a UCLA student athlete received the Elite 89 Award, a prestigious honor bestowed on the individual with the highest cumulative grade-point average participating in the finals for each of the NCAA championships. Ryan Deeter, pitcher and mathematics/economics major, is the proud recipient of this award. He was also named UCLA's Male Scholar Athlete of the Year.

Read why Ryan Deeter chose to balance math and athletics:

Growing up, math was an interest of mine because of its seemingly mysterious results and the satisfaction I received knowing I had objectively solved a problem. Mathematics has continued to intrigue me because of its wide scope of tangible applications in today's world. The process of proving something and not simply accepting it as a mechanical device has given me a great sense of understanding and accomplishment.

The UCLA mathematics department is challenging, to say the least. I can recall many times when I would initially fail to understand a concept or complete a problem, but with the determination and resilience that I learned in sports, I was able to stay with whatever academic feat I was pursuing. I have learned that, just as with sports, academic success can only be achieved with a consistent work ethic day in and day out, keeping yourself even keeled, not getting too high, not getting too low, and never being satisfied.

The Math Shirt

Alumnus Adam Goodge (BS '94, math/applied science and physics) and his sons, Kyle and Shae, promoting the new UCLA math T-shirts.

Slice of Pi – What's your flavor?

In collaboration with UCLA Career Center's annual Career Week, the Department hosted its alumni panel, showcasing various alumni careers and experiences since graduation from the Department. Panelists included Lauren Caston (chief mathematician and co-founder of Praedicat Inc.), John Higgens (paralegal and full charge bookkeeper at Valensi Rose PLC), Elisabeth McVerry (math teacher and department chair at Lawndale High School), Tessa Riley (business manager for ValueClick Media), and Binbin Xing (actuarial analyst at Personal Lines Pricing Group, Farmers Insurance Group).

Participating on a panel is a great way to give back to the Department and help today's UCLA students. If you are interested in participating on our 2014 alumni panel, contact Anna Ramos at anna@math.ucla.edu.

Have exciting news to share with the Department? Want to know about upcoming opportunities and ways to give back to UCLA math? Email anna@math.ucla.edu.

Our Donors

July 1, 2012 – June 30, 2013*

We are pleased to thank and acknowledge our many supporters.

Gifts of three digits and above made after June 30, 2013, will appear in our fall 2014 newsletter

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UCLA Math Alum Supports Putnam Scholars with a $25,000 Gift

Alumnus Don Phan (Class of 77') gave a significant gift to the Department in honor of the late Dr. Richard F. Arens, a faculty member who inspired him and many others with his unparalleled enthusiasm for mathematics and teaching. Dr. Arens was a member of the Department for 42 years, specializing in the rarefied strata of functional analysis, function algebras, field theory and quantization. The award will support the rising efforts of meritorious undergraduate students who are studying to compete in the annual William Lowell Putnam Competition. Following the historic results from last year's competition, Don hopes the gift will continue to provide much needed support to students who excel at mathematics. As Dr. Arens was a Putnam laureate himself it is fitting that this award was named in his honor.

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Dear Friends, Colleagues, Students and Alumni:

I am very happy to be sharing with you the latest issue of our departmental newsletter. This has been an exciting and successful year for our entire department. Let me single out just a few highlights.

Last fall, UCLA Professor Emeritus Lloyd Shapley was awarded the Nobel Prize in Economics. Professor Shapley held a joint appointment in the departments of mathematics and economics, but spent most of his time in math.

Professor Andrea Bertozzi was awarded the Betsy Wood Knapp Endowed Chair in Mathematics. This is the second endowed chair bestowed on a member of our Department (Terence Tao holds the James and Carol Collins Chair).

Professor Sorin Popa was elected to the American Academy of Arts and Sciences. Professor Alexander Merkurjev was chosen as a recipient of the Guggenheim Fellowship. Professor Stan Osher was selected by SIAM to give the prestigious von Neumann lecture. And Professor Terence Tao received the Joseph Lieberman Award for Outstanding Achievement in Mathematics.

Professors Ed Effros and Bruce Rothschild retired this past summer. This year, we will be joined by Professors Ko Honda (topology) and Wotao Yin (applied mathematics), both recently appointed to the UCLA faculty.

Last but not least, our undergraduate team has placed third out of 402 university teams in the Putnam Exam, an elite college mathematics competition with participation across the United States and Canada. This is a tie with our best-ever performance in this competition (back in the 1960s). This is a truly stellar performance, and it reflects the emphasis that our Department is placing on its programs, at all levels.

Let me conclude by thanking Bob Brown, our outgoing undergraduate vice-chair, for his two years of service, successfully steering the Department's undergraduate offerings through a tough budgetary period. I am also very grateful to David Gieseker, who agreed to step in as Bob's replacement.

Finally, I want to express our deep gratitude and appreciation to many of you, whose kind support has been instrumental to our success.

Sincerely,

Dimitri Shlyakhtenko

UCLA Department of Mathematics
Fall 2013 Newsletter

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