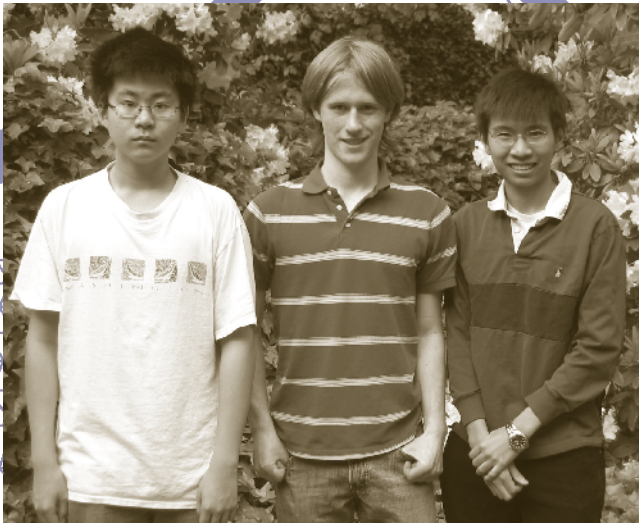


Mathematics NEWS



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DEPARTMENT OF MATHEMATICS NEWS

MESSAGE FROM THE CHAIR



The 2009–10 academic year, which started with the tragic loss of our colleague Paul Tseng, was transformed into a most exciting one by our students and faculty. Highlights you will read about in this newsletter include the Putnam Fellowship won by Will Johnson, the UW Sophomore and Junior Medals

awarded to Mark Bun and Will Johnson, the selection of the team of Mark Bun, Jerry Li, and Ian Zemke as one of the nine Outstanding Winners among the 2,254 teams that participated in the Mathematical Contest in Modeling, the Dean's Medal and a National Science Foundation (NSF) Graduate Fellowship won by Nate Bottman, an equally prestigious Department of Energy Graduate Fellowship awarded to Genia Vogman, NSF Postdoctoral Fellowships awarded to Jim Gill and our PhD graduate Catherine Williams, the election of Gunther Uhlmann as SIAM Fellow, the selection of Julia Pevtsova for a CAREER award, and the Sloan Research Fellowship won by Max Lieblich.

The numbers of undergraduate majors in our programs continue to rise. At the end of the academic year, there were 421 majors in the Mathematics undergraduate program and 265 majors in the joint ACMS (Applied and Computational Mathematical Sciences) program. Each of these numbers is a new record, and the total number of 686 betters the previous high by over 100.

During the year ending August 31, fifteen students completed the PhD, which is another record. More important than the annual record is the longer-term trend: since 2004 we have averaged eleven PhDs per year compared to a historical average of about 6.5. Since the typical PhD in mathematics takes five to six years to complete, this reflects the investments in our graduate program made over the past dozen years: financial support from a range of public and private sources, as well as the tremendous mentoring, instruction and research supervision provided by the Department's faculty. In particular, our graduate program benefited from two five-year VIGRE grants,

now followed by an RTG grant, both from the NSF, and from a number of new endowments established by the Department's friends and alumni.

Despite the tight job market, our PhD graduates continue to place into excellent positions. During the past three years alone, they have received postdoctoral appointments at Penn, Columbia, Princeton, Stanford, Northwestern, MIT, UC Davis, UBC and Warwick, and jobs at Chevron, Microsoft and Google.

As students, teaching assistants and researchers, our graduate students make critical contributions to every aspect of the Department's mission. The Department has worked very hard during the past dozen years to build a vigorous graduate program of nearly 90 students. I am very pleased to see that we have maintained the size, quality and morale of the program even as we go through the worst economic crisis of our lifetimes. The graduate students remain a top priority. They are an amazingly talented, dedicated and successful group, and we will continue to make every effort to keep it that way.

– SELIM TUNCEL

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Pictured (front cover):

Upper left: Julia Pevtsova and Max Lieblich – See pages 6 and 7.

Middle right: Nate Bottman and Will Johnson – See pages 8 and 4.

Lower left: 2010 MCM Outstanding Winner team (Jerry Li, Ian Zemke, Mark Bun) – See page 13.

PUTNAM FELLOW: WILL JOHNSON

UW Student Wins Mathematics Competition, Named Putnam Fellow

Last March math and computer science major Will Johnson placed among the top five in the William Lowell Putnam Mathematical Competition, becoming the first UW student to be named Putnam Fellow. This event touched off a flurry of response across the region, including articles in the *Seattle Times*, *University Week*, and *The Daily*, a *Seattle Times* editorial, and a Washington State Senate Resolution recognizing Will's achievement and the contributing support of his teachers and family.

Below is an article published in *University Week*, the faculty and staff newspaper for the University of Washington. We thank *University Week* and Hannah Hickey for permission to include the article.

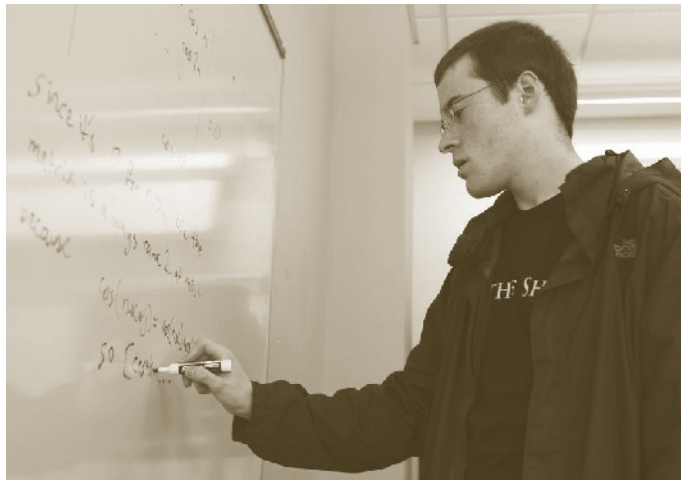
Last month stadiums reverberated as students on the UW's basketball team made it to the Sweet Sixteen round of the National Collegiate Athletic Association tournament. Meanwhile, over spring break another UW undergraduate quietly claimed the top prize in U.S. collegiate mathematics. William Johnson, who is majoring in mathematics and computer science, was named a Putnam Fellow, placing among the top five out of more than 4,000 students who competed this year.

While this competition allows no spectators, winning the Putnam is no less a feat than bringing home the NCAA title—especially when it's an upset.

"Just as Duke, Kansas, and Kentucky always seem to dominate in basketball, the Putnam Fellowships have been 'owned' by Harvard, MIT and Cal Tech. It's great to have a Husky join them," wrote President Mark Emmert. "Our math department is truly remarkable in working with our students, and a real point of pride for us."

The William Lowell Putnam Mathematical Competition is held each December by the Mathematical Association of America. The competition began in 1938, and is open to undergraduate students in the United States and Canada. The UW team had a strong finish the previous year, but this is the first time a UW student has been named a Putnam Fellow.

Johnson grew up in the Seattle area and attended Kenmore's



Will Johnson recalls one of the problems from the Putnam Exam that led to his being named a Putnam Fellow. Photo by Luke Springer

Inglemoor High School. Last year he placed sixth overall in the Putnam, just two points away from being among the winners. He was recently named the UW's Junior Medalist for earning the highest overall academic record for his class. This year he wins \$2,500 and the honor of being named a Fellow, a distinction that will follow him through his career.

"This is huge," said Selim Tuncel, chair of the mathematics department, noting that the list of previous winners includes many of the top names in the field. "Will's achievement is a combination of amazing talent and excellent mentoring on the part of my colleagues."

The UW team has been coached for the past two years by Ioana Dumitriu, a UW assistant professor of mathematics who in 1996 was the first woman to be named a Putnam Fellow, and Julia Pevtsova, also a UW assistant professor of mathematics, who was a silver medalist in the International Mathematical Olympiad.

"I am very, very proud of Will," Dumitriu said. "For me, it's a matter of huge pride to have a Putnam Fellow that I helped train."

The coaches emphasize that they cannot take credit for Johnson's performance.

"No amount of coaching could get him there unless he was willing to put in the work and unless he had this special talent to begin with," Dumitriu said. "It's kind of like athletes.

There's a tremendous amount of work that has to be put in, on top of a very good natural ability."

And, like athletes, a winning score requires focus and stamina on game day. The Putnam is a six-hour contest. Competitors are given one set of problems in the morning and another in the afternoon. They must submit fully written-out proofs to get full credit. Of a possible 120 points, the average competitor scores 1 or 2. (Johnson scored around 100.)

During fall quarter Dumitriu and Pevtsova co-taught Math 480a, The Art of Problem Solving, which prepares students to write the Putnam (students in the course are not required to enter the contest). Pevtsova and Dumitriu also hosted weekly evening Putnam practice sessions that were attended by about 12 regulars and as many as 30 students.

This year 19 UW students wrote the Putnam. Four others placed in the top 500: Yisong Song, a freshman in pre-sciences, Steven Rutherford, a freshman in computer engineering and Keyun Tong, a senior in computer science and Nate Bottman, a senior in Russian and mathematics, who both placed in the top 500 last year.

In addition to the coaching, Johnson credits his success to his religious beliefs, parents who encouraged an interest in mathematics from an early age, good math teachers, and two years of participation in the Mathematical Olympiad Summer Program in Nebraska.

None of Johnson's teachers was surprised to learn of his win.

"Will will be famous. I don't know what he will choose to do. It doesn't matter. He will add originality and depth to anything he tackles," wrote Jim Morrow, a UW professor of mathematics and one of the teachers Johnson singled out as an influence.

And while Johnson excels in theorems and proofs, he also shows interest in applied problems. About a year ago John-

son approached Richard Ladner, UW professor of computer science and engineering, to help with his mobile accessibility research because he wanted to work on a project that

could have a positive impact on people.

On his own initiative Johnson created a program that uses the vibration of an Android phone to transmit Braille through the touch screen. Johnson's tool, dubbed V-Braille, has been tested by members of the local deaf-blind community.

"I have shown his V-Braille to colleagues around the country who have told me that V-Braille is 'brilliant,' 'stunning,' and 'you should patent it,'" Ladner writes. He says he has seldom met a student "who has such prodigious talent, works hard, and is so creative."

The other four Putnam Fellows this year hailed from Harvard, Yale and MIT. Though Johnson probably could have had his pick of these, he chose to attend the UW.

"I liked the campus, and I like the state of Washington, where I grew up," said Johnson, whose tuition was paid through the Washington Scholars program.

Johnson has at least one more year of study at the UW. After graduating he is considering working in computer programming or pursuing a graduate degree in mathematics.

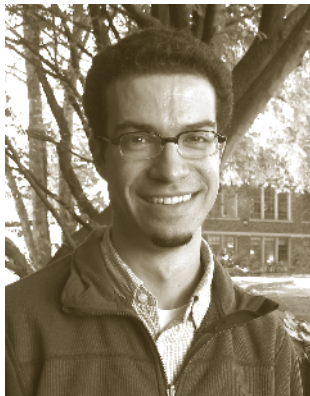
- HANNAH HICKEY, UNIVERSITY WEEK

FROM THE 2009 PUTNAM EXAM:

A game involves jumping to the right on the real number line. If a and b are real numbers and $b > a$, the cost of jumping from a to b is $b^3 - ab^2$. For what real numbers c can one travel from 0 to 1 in a finite number of jumps with total cost exactly c ?

SLOAN FELLOWSHIP

Sloan Research Fellowship Awarded to Max Lieblich



Max Lieblich has received a 2010 Sloan Research Fellowship. These fellowships are awarded by the Alfred P. Sloan Foundation with the goal of stimulating “fundamental research by early-career scientists and scholars of outstanding promise.”

Max Lieblich’s interest in mathematics was kindled when his grandfather, a chemist who was one of the masters of the actinide elements and an expert on photosynthesis, first told him about the square root of -1 . Originally intending to be a cellist, then a physicist, Lieblich realized that what really beguiled him was mathematics. Pursuing this interest, Lieblich attended Harvard, earned his PhD at MIT in 2004, spent a year at Brown and four years at Princeton, and joined the UW in 2009.

Twenty-five years after his first taste of complex numbers, Lieblich finds himself a practitioner of algebraic geometry, an area that is deeply intertwined with number theory, complex differential geometry, pure algebra, and topology. In its earliest incarnation, algebraic geometry was the study of the geometric structure of solutions to polynomial equations. For example, the solutions to $x^2 + y^2 = 1$ form a circle in the plane. There is a strong interplay between the shapes of the equations and the properties of the solution set. In the example of a circle, we know that a line in the plane will generally intersect the circle in two points. The quadratic nature of the defining equation and this geometric property of intersecting with a line are “equivalent” properties.

Through several centuries of work, these kinds of algebra/geometry correspondences were broadened and deepened. We can now use the algebraic concepts of commutative rings and modules to distinguish an open space from a closed space, a doughnut from a sphere, or a cylinder from a cone. In fact, in spite of its humble origins studying circles, algebraic geometry can now capture such an enormous panoply of geometries that it has become perhaps the most flexible geometric tool in mathematics. Using the

techniques of algebraic geometry, one can even think about smooth manifolds in universes where 2 equals 0 ! (Amazingly enough, this is very useful, especially in number theory.)

Lieblich’s major research contributions focus on bringing together ideas from disparate areas to study old problems with new techniques. Using the highly abstract theory of stacks, he has attacked classical problems in pure algebra and classical algebraic geometry. His work on the period-index problem concerns fine structural properties of algebras that generalize Hamilton’s famous quaternions; he showed that this problem is in fact a problem in geometry, and he drew together topological, geometric, and arithmetic techniques to give the best results presently known. His work with Sándor Kovács on the Shafarevich boundedness conjecture for families of smooth canonically polarized manifolds yielded a complete solution to this famously thorny problem. He has done foundational work on the moduli of objects in the derived category, an exotic flavor of geometry first arising from mathematical physics. Building on his work, researchers have recently made great strides in understanding these bizarre spaces and their numerical and limiting properties.

Lieblich’s work has been the subject of several seminars in the United States and France. He has been invited to lecture on his results throughout the US, Europe, and Asia. He has also been invited to give expository lecture series in Germany, Italy, and India, and will be a Visiting Fellow at the Newton Institute in Cambridge, England during part of 2011.

In addition to research, Lieblich cares deeply about education and effective mathematical communication. He mentors

two graduate students in the Department, teaches talented high school students at the Summer Institute for Mathematics at the University of Washington (SIMUW), participates in the UW Math Day, and teaches both undergraduate and graduate courses. He has organized and co-organized seminars at Brown, Princeton, and UW, co-organized a graduate student summer workshop on deformation theory at MSRI, and is co-organizing a workshop in January 2011 at the American Institute of Mathematics focused on the geometric aspects of certain problems in pure algebra.

The people and tools at the University of Washington make it possible for Lieblich to try new things and engage his students at many levels in ways that are relevant and interesting to them, both in person and through technology. Through traditional lecturing, free-form participatory classes, and small group discussions, he works hard to show his different audiences the profound beauty of all things mathematical.

Julia Pevtsova Receives NSF CAREER Grant

Julia Pevtsova has been awarded a CAREER grant by the National Science Foundation. These prestigious five-year grants are for junior faculty “who exemplify the role of teacher-scholars through outstanding research, excellent education, and the integration of teaching and research within the context of the mission of their organizations.”



Born and raised in Russia, Julia Pevtsova received her PhD from Northwestern University in 2002. After a year at the Institute for Advanced Study and two years at the University of Oregon, she came to the UW as an acting assistant professor in 2005 and became an assistant professor in 2008.

Pevtsova’s research centers on modular representation theory, a branch of algebra that deals with groups of symmetries in vector spaces. She and her collaborators are responsible for some of the most substantial advances in this theory in recent years. In particular, her work has led to new connections between representation theory and algebraic geometry, another flourishing field, as well as other areas such as algebraic topology.

In addition to her research, Pevtsova has been heavily involved in educational efforts going well beyond her regular teaching load for the benefit of students at all levels

from kindergarten to graduate school. She has collaborated with Associate Professor Ioana Dumitriu in coaching students for the Putnam competition (see the article on page 4), and in that connection they have developed a new undergraduate course entitled “The Art of Problem Solving.”

Pevtsova is the driving force behind a remarkable group of programs to enrich the mathematical education of students in local elementary and middle schools and encourage their interest in mathematics. She began in 2005 by instituting the Math Challenge program for students at Montlake Elementary School, which has now expanded to Washington Middle School. In an effort to extend the reach of such activities to students in other local schools, she has developed two programs on the UW campus for middle school students: the Monthly Math Hour, a series of lectures, and the Math Circle, an informal course that meets on Sunday afternoons. These programs, staffed by a group of volunteers that includes Pevtsova as well as some of our graduate and undergraduate students, have proved very popular.

FEATURED GRADUATE: NATE BOTTMAN

Nate Bottman Graduates a Dean's Medalist and NSF Graduate Fellow

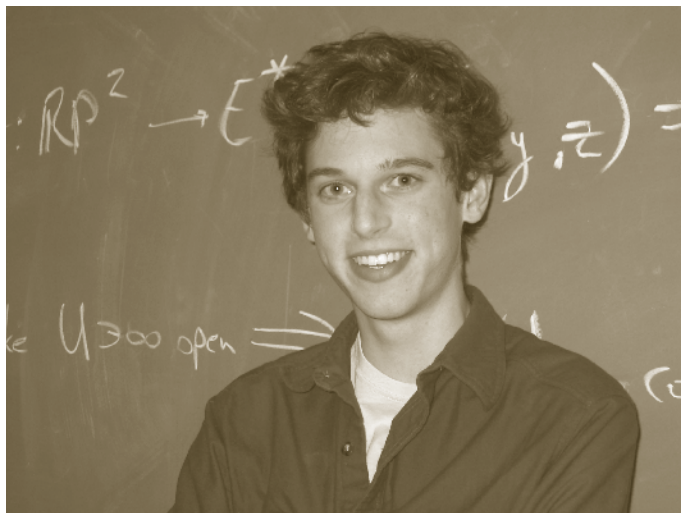
Every year the National Science Foundation awards Graduate Research Fellowships to outstanding students pursuing graduate degrees in the US. One such student is Nate Bottman, who last spring graduated from the UW with both a Bachelor of Science in Mathematics and a Bachelor of Arts in Russian. Not only were both degrees Magna Cum Laude, but Nate also capped his UW career by earning a 2010 Dean's Medal from the College of Arts & Sciences and a 2010 Outstanding Graduate Mathematics Major award from the Department.

"Outstanding" is a word that has applied to Nate repeatedly in his past four years at UW.

Originally entering the UW via the Academy for Young Scholars, Nate, a Seattle native, began his undergraduate career at the age of 15. Even in his early courses, Nate was eager to understand the advanced mathematical concepts and proofs he encountered that most students do not confront until they are upperclassmen. His skill and talent soon earned him the UW Freshman Medal, awarded to the sophomore having the highest scholastic standing after the first year of coursework at the University.

It was but one of four major awards Nate received that year: He was among the three members of the UW team that earned Outstanding Winner in the international Mathematical Contest in Modeling by applying a mathematical approach to the problem of political districting. The American Mathematical Society chose Nate as one of three American students to receive a Math in Moscow Scholarship, which provided Nate with a fifteen-week-long research experience at the Independent University of Moscow in the autumn of 2007. Finally, in an award ceremony in September at the Library of Congress, Nate became a recipient of an illustrious Davidson Fellows Scholarship.

The Davidson Fellows Scholarship, begun in 2001 by the Nevada-based Davidson Institute, is awarded to "extraordinary young people under the age of 18 who have completed a significant piece of work." Nate received \$25,000 toward his schooling for his project titled "Analytically Determining



Nate Bottman, a Magna Cum Laude graduate, leaves UW after earning two undergraduate degrees and a plethora of awards such as the Arts & Sciences Dean's Medal and an NSF Graduate Fellowship, among others.

the Spectra of Solutions of the NLS," in which he determined the spectra of solutions for the Nonlinear Schrödinger Equation (NLS) that describes wave propagation in fluids and plasmas.

After his time studying in Moscow, Nate returned to Seattle, continuing to excel. By April 2008 he had earned the Barry M. Goldwater Scholarship, awarded to undergraduates intending to pursue careers in science, mathematics, and engineering. As universities

may only nominate four undergraduates each year, the Goldwater Scholarship is one of the most prestigious in the United States. The Department also honored Nate with the Gullicksen Award for the year, selected on the basis of excellence in the field of mathematics.

Throughout his undergraduate career, Nate was highly active in the life of the Department.

"I think that all the different opportunities for interaction and mentorship within the UW Math Department are outstanding," writes Nate. "I am thinking particularly of Jim Morrow's summer [Research Experience for Undergraduates] program...and the Putnam preparation seminar that Ioana

"I think that all the different opportunities for interaction and mentorship within the UW Math Department are outstanding."

—Nate Bottman

Dumitriu and Julia Pevtsova have been running for the last several years.”

The Putnam preparation seminar Nate mentions is linked to the annual William Lowell Putnam Mathematical Competition. Nate participated in the competition every year during his time as an undergraduate, on multiple occasions placing individually in the top 500 of about 4,000, and in one year was a member of a team that scored 15th out of 405.

Beyond working alongside his fellow undergraduates, Nate also helped to teach them. During the 2008-09 academic year Nate was one of two undergraduate teaching assistants. In particular, Nate served as TA for the Math 334/5/6 Honors Advanced Calculus sequence. Says Nate, “I realized soon enough that the location of the undergraduate TA office is no accident: anyone entering or leaving the building passes by, and students and professors would stop by on a daily basis to talk about interesting math problems, effectively integrating the undergraduate TAs into the social life of the Department.”

Nate has now begun his graduate career at M.I.T., where he is pursuing a PhD in Mathematics with the help of his NSF Graduate Fellowship. This quarter finds him exploring such concepts as algebraic geometry, Riemann surfaces, and geometric analysis. While Nate is enjoying his time at M.I.T., he does have one regret: “I’m forced to take the subway every afternoon for a decent espresso.”

In awarding him the fellowship, the NSF has indicated their belief in Nate’s potential: “Fellows are anticipated to become knowledge experts who can contribute significantly to research, teaching, and innovations in science and engineering.”

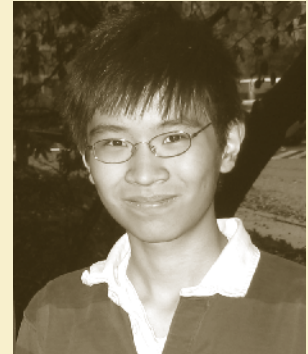
Nate’s goal, as it has been for many years, is to fulfill this potential through becoming a mathematics professor. We in the Department have every confidence that he will do so with spectacular success.

– MIKE MUNZ

UW Medalists in Mathematics

Last year was an eventful one for Mathematics majors and UW medals. Not only did Nate Bottman receive the 2010 College of Arts & Sciences Dean’s Medal for the natural sciences, but two other Mathematics majors were honored with medals of their own:

The UW Sophomore Medal, going to the junior having the highest scholastic standing for the first two years of coursework, was awarded to **Mark Bun**. Mark is a double major in Mathematics and Computer Science, and a member of our Outstanding Winner team in the 2010 Mathematical Contest in Modeling (see article, page 13). Mark currently serves as TA for the Math 134/5/6 Honors Calculus sequence.



The UW Junior Medal, going to the senior having the highest scholastic standing for the first three years of coursework, was awarded to **Will Johnson**. Will is a double major in Mathematics and Computer Science, and a Putnam Fellow (see article, page 4). Will currently serves as TA for the Math 334/5/6 Honors Advanced Calculus Sequence.



GRADUATE PROGRAM

VIGRE Retrospective

“VIGRE had a tremendously positive impact on my mathematical career”, says Robert Miller, a UW PhD now on a postdoc at the University of Warwick. “Organizing the VIGRE-supported Combinatorics pre-seminar enabled me to meet and interact with many experts in my research area” says graduate student Andrew Crites. “VIGRE projects with faculty convinced me that I wanted to become a research mathematician” says Nate Bottman, a former UW undergraduate student now studying mathematics at MIT.

What is this VIGRE? In 1999 the Division of Mathematical Sciences at the National Science Foundation started an ambitious program of large grants to mathematical sciences departments to change their culture. Part of this change was to better connect the various educational levels, from undergraduates through graduate students, postdocs, and faculty. They named this initiative Vertical Integration Grants for Research and Education, or VIGRE.

Our Department combined forces with the Applied Mathematics and Statistics Departments to make a joint proposal for the first round of VIGRE funding, giving us some horizontal as well as vertical integration! We were awarded one of the first five-year VIGRE grants, which was worth several million dollars. Subsequently we were one of only two universities to receive a second five-year VIGRE grant, this time worth four million dollars (the other one was the University of Wisconsin).

The lion’s share of VIGRE funding went to graduate students, enabling students at critical stages in their career to fully focus on their research objectives, free from teaching or other responsibilities. One measure of how successful this has been is the steady increase in the number of PhDs awarded (see graph, page 16).

But VIGRE has supported students in many other ways as

well. It meant our students were able to travel to conferences and workshops, to discuss their work and meet with experts. Robert Miller, quoted above, got VIGRE funding to participate in many conferences, including ones at UCLA, San Diego, Banff, Boston, and Barcelona, and feels these experiences were transformational for his career. In addition, VIGRE supplied funding for the graduate student summer schools held at the UW, where our students joined others from around the country. The most recent of these

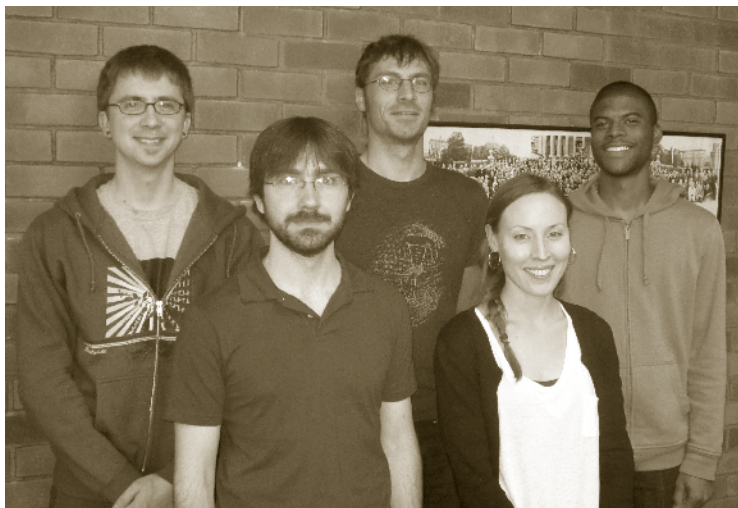
was a summer school in probability last summer.

Another big impact was involving many more undergraduates in research projects, with stipends paid with VIGRE funds. We could fund roughly two dozen projects per year, ranging from number theory to the modeling of brain tumors. Nate Bottman’s undergraduate project involved establishing a new property of an old concept, the arithmetic-

geometric mean, and this propelled him in the direction of research mathematics.

VIGRE gave us seed money for testing out innovative new ideas. A great example is the Combinatorics pre-seminar. Outside speakers preface their regular research seminar with an informal pre-seminar aimed at undergraduates, but with everyone invited, which describes the background, basic examples, and motivations for the later talk. A graduate student, such as Andrew Crites mentioned above, is in charge of running this pre-seminar. Former organizers include Brant Jones, who went on to a VIGRE postdoc at UC Davis, and Kurt Luoto, now a postdoc at the University of British Columbia and whose collaboration with a UBC faculty member began through the pre-seminar.

Another great example has been Math Across Campus, which brings outstanding speakers in the mathematical sciences to campus once a quarter for a general talk with a



Last year’s VIGRE fellows (from left): Andrew Crites, Christopher Jordan-Squire, Luke Wolcott, Kiana Ross, and Cris Negron.

Graduate Student Awards for 2010–2011

Academic Excellence Awards:

Stephen Lewis · Andrey Sarantsev · Yang Yang

Teaching Excellence Awards:

Andrew Crites · Lindsay Erickson

ARCS Foundation Fellows:

Tobias Johnson · Christopher McMurdie · Peter Caday

Birnbaum Fellow:

Weiyang Ning

GO-MAP Research Assistantship:

Sonali Tamhankar

Hewitt Fellow:

Kiana Ross

McFarlan Fellow:

Sweta Suryanarayan

McKibben and Merner Fellows:

Joel Barnes · David Sprehn · James Stark · Andrey Sarantsev

Microsoft Scholars:

Tim Carrell · Mauricio Duarte · Stephen McKeown · James Pfeiffer · Xingting Wang · Guangbin Zhuang · Pal Zsomboki

RTG Fellows:

Matthew Badger · Joel Barnes · Gregory Drugan · Mark Hubenthal · Stephen Lewis · Lee Patroliia · Justin Tittelfitz

Tanzi-Eggerton Fellow:

Ting Zhou

Top Scholar Awards:

Yajun An · Alan Bartlett · Jing Hong · Hikaru Kiyo · Stephen Lewis · Kaloyan Marinov · Trevor McCarten · Hanchao Wang · Yang Song · Yang Yang

Tseng Fellow:

Zsolt Patakfalvi

typical audience of several hundred. This idea was so successful that it has now attracted alternative funding from the Department, the College, and elsewhere.

VIGRE has helped us support outreach activities to our community. The Montlake Math Challenge boosted the interest and math skills of two generations of elementary school students at a local elementary school. With VIGRE support, some of our undergraduate and graduate students shared their enthusiasm and knowledge about mathematics with younger kids. This program was particularly popular among the female students. The mother of one such girl said that it was amazing that her daughter would excitedly discuss math problems during dinner! After a successful launch thanks to VIGRE funding, the program at Montlake Elemen-

tary is thriving, now getting its support from other departmental sources and NSF grants.

Our VIGRE grant is now over, and indeed the NSF has modified its approach by ending VIGRE and concentrating on more focused programs such as Research Training Groups. We are fortunate to have been recently awarded a large RTG grant, and this will help continue the legacy of VIGRE and its enormous positive impact on our department.

– DOUG LIND

UNDERGRADUATE HONORS

Departmental Undergraduate Awards

The following undergraduate awards were presented to students during a ceremony last May. In addition to their award stipend, each student was given a book reflecting their mathematical interests, indicated in italics.

Outstanding Graduating Major:

Elisha Allred (Bachelor of Arts, teacher prep) – *Euler's Gem: The Polyhedron Formula and the Birth of Topology*
by David S. Richeson

Adrian Barnard (ACMS) – *The Weather of the Pacific Northwest* by Cliff Mass

Nate Bottman (Bachelor of Science, comprehensive) – *Plato's Ghost: The Modernist Transformation of Mathematics*
by Jeremy Gray

Trevor McCarten (Bachelor of Science, comprehensive) – *The Man Who Knew Infinity: A Life of the Genius Ramanujan*
by Robert Kanigel

Michael Spillane (Bachelor of Science, standard) – *Is God a Mathematician?* by Mario Livio

Genia Vogman (Bachelor of Arts, standard) – *Pythagoras' Revenge: A Mathematical Mystery* by Arturo Sangalli

Outstanding Student in Honors Calculus:

Jerry Li (2nd year) – *The Enjoyment of Math* by Hans Rademacher and Otto Toeplitz

Yisong Song (1st year) – *What is Mathematics?* by Richard Courant and Herbert Robbins, revised by Ian Stewart

Gullicksen Award:

Tam Do – “*e*”: *The Story of a Number* by Eli Manor

Ian Zemke – *Six Themes on Variation* by Robert Hardt (editor)

In addition, Will Johnson and Milda Zizyte were awarded a Department of Mathematics Summer Undergraduate Research Fellowship and a Paul Tseng Fellowship, respectively, to support their participation in the 2010 Research Experience for Undergraduates program at UW, led by Jim Morrow.

Undergraduate Scholarships in Mathematics

Matthew Heid has been selected as the 2010 recipient of the Mathematics Undergraduate Endowed Scholarship, which is renewable for up to four years with satisfactory progress. Matthew is an incoming freshman with plans to be a Math teaching major along with a second major in Music. His goal is to teach high school mathematics. Matthew was also a participant in last year's Summer Institute for Mathematics at UW (SIMUW).

Matthew joins previous scholarship recipients Mimi Fung and Tam Thanh, who are continuing their studies at UW.

Leo Spizirri has been selected to receive the 2010-2011 Thomas Bleakney Endowed Scholarship in Mathematics. Leo is an outstanding student who is beginning his junior year at UW after arriving in Winter 2010 as a transfer student. He is working toward a Bachelor of Science degree in Mathematics. The scholarship is made possible by an endowment established by Thomas P. Blakeney.

UW Team Tracks Serial Killers to Win Mathematical Contest in Modeling

In April, a team of three UW undergraduates became the eighth team in nine years to be declared Outstanding Winner in the Mathematical Contest in Modeling. Below is an article published in *University Week*, the faculty and staff newspaper for the University of Washington. We thank *University Week* and Hannah Hickey for permission to include the article.

A team of UW undergraduates has been declared an Outstanding Winner in the 2010 Mathematical Contest in Modeling, putting them in the top nine out of 2,254 teams.

This is the eighth team from the UW to win this distinction in nine years.

“When they do it year after year, you start to expect it,” said Selim Tuncel, chair of the Dept. of Mathematics. “But this is an amazing achievement.”

The winning team consisted of Mark Bun, a double major in Mathematics and Computer Science; Jerry Li, who is in the Early Entrance Program; and Ian Zemke, in Mathematics. They won for their answer to the second of three problems—a scenario that could have been a plot from the television show *Numb3rs*.

The students’ winning paper converts distances to driving times and adds a dose of criminal psychology to try and pinpoint a serial criminal’s home base. They applied their tool to historical cases of the “Yorkshire Ripper” and the “Atlanta Child Murder” and found that in both cases their method would have been able to predict the general location of the killer’s residence.

The UW team faced especially intense competition this year, Tuncel noted. In 2007, the UW claimed two of the 14 top spots from a field of 949 teams. This year the competition drew more than 2,200 teams, of which 84 percent were from outside the United States.

Two other UW teams were named Meritorious Winners, placing among the top 20 percent of all entrants this year.

As in previous years, the team was coached by Jim Morrow, professor in the Department of Mathematics.

— HANNAH HICKEY, UNIVERSITY WEEK

Department of Energy Graduate Fellowship Awarded to Genia Vogman



Genia Vogman, who last year received a Bachelor of Arts in Mathematics (along with a Bachelor of Science in Aeronautical and Astronautical Engineering with minors in Applied Math and Russian), has been awarded a U.S. Department of Energy Graduate Fellowship. The new fellowship program is designed to strengthen the nation’s scientific workforce by providing support to young students during the formative years of their research.

Genia is now using the fellowship to pursue a PhD in the Applied Science and Technology Program at the University of California, Berkeley. Her research involves the use of spectroscopy to measure plasma properties such as temperature and density.

FACULTY NEWS

Jim Gill Receives NSF Postdoctoral Fellowship



Jim Gill has been awarded an NSF Postdoctoral Fellowship. Gill, who joined the Department as an Acting Assistant Professor upon completing his PhD at Washington University in St. Louis in 2009, plans to use the fellowship to continue his work in complex analysis here at the Department for another three years.

Neal Koblitz Awarded Honorary Doctorate



Neal Koblitz, who has been a vigorous supporter of mathematics in Vietnam over many years, was awarded an honorary doctorate by the Vietnam Academy of Science and Technology.

Gunther Uhlmann Elected SIAM Fellow



Gunther Uhlmann was elected fellow of the Society for Industrial and Applied Mathematics in honor of his contributions to the analysis of inverse problems and partial differential equations.

New Mathematics Faculty Fellows

The Mathematics Faculty Fellowships are intended for research faculty below the rank of professor, or professors who are less than fifteen years past the PhD, and recognize the importance and impact of research support for these colleagues.



This year the Department has selected **Max Lieblich** and **Julia Pevtsova** to be the latest recipients of this two-year award (see articles on pages 6 and 7).



Isabella Novik, who was selected last year, continues as a Faculty Fellow this year.

Faculty Promotions

Five faculty were promoted this autumn:

Ioana Dumitriu was promoted from Assistant Professor to Associate Professor.

Andrew Loveless was promoted from Lecturer to Senior Lecturer.

John Palmieri was promoted from Associate Professor to Professor.

William Stein was promoted from Associate Professor to Professor.

Yu Yuan was promoted from Associate Professor to Professor.

SUMMER EVENTS

Summer Sizzles with Math

The UW campus was a hotbed of organized mathematical activity in the summer of 2010. As in all recent years, we hosted our regular group of annual programs, including the Research Experience for Undergraduates, run by Professor James Morrow, and the Summer Institute for Mathematics at the UW for high school students, to which several faculty and graduate students contribute. While in a typical summer there is often one other faculty or graduate student conference, this summer was exceptional.

First, there was an additional student-oriented program, the Summer School in Probability sponsored by the Pacific Institute of Mathematical Sciences, of which the UW is a participating institution. This was the fifth in a series of such summer schools, but the first one to be held here. Over a hundred students from all over the world came to attend two “main courses” (series of 15 lectures) and three “short courses” (series of 5 lectures) by distinguished experts on topics of current research interest in probability theory, as well as a variety of shorter talks by the participants. The members of our probability group (Professors Burdzy, Chen, Hoffman, and Pal) constituted four-fifths of the organizing committee, and Chen was one of the short-course lecturers.

In addition to these programs for students, we hosted two international conferences honoring mathematicians with UW connections. The first one was entitled “The Mathematics of Klee and Grünbaum: 100 Years in Seattle.” The “100 years” refers to the combined lengths of the UW careers

of Professors Victor Klee, who died in 2007, and Branko Grünbaum, still active at the age of 81. Although one might expect such a conference to have a retrospective feel, it also encompassed new developments and looked to the future: one of the lectures presented the resolution of a longstanding conjecture, and Grünbaum contributed an edited and updated list of open problems that Klee had compiled some years earlier, which should provide directions for further research.

Finally, in the second week of August there was a conference in honor of the 65th birthday of Professor Kenneth Goodearl of UC Santa Barbara, who received his PhD from the UW in 1971 and has maintained a connection with our department for many years as an affiliate professor. Entitled “New Trends in Noncommutative Algebra,” it comprised a broad range of lectures on that subject and its connections with other parts of mathematics and mathematical physics.

It all goes to show that although one might think of summer as the off-season on academic campuses, it is often the most exciting time for mathematics!

– JERRY FOLLAND

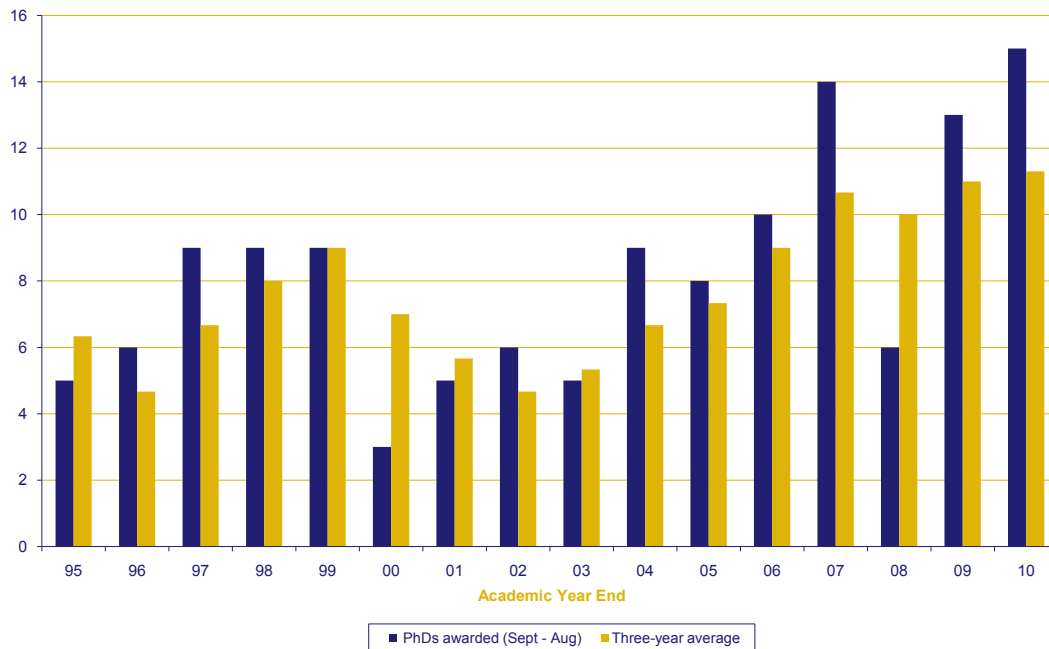
Participants of the “New Trends in Noncommutative Algebra” (top) and “The Mathematics of Klee and Grünbaum” (bottom) conferences.



MATHEMATICS DEGREES

Mathematics PhDs Awarded (1995 – 2010)

The bar graph to the right indicates the recent growth in the number of PhDs awarded by the Department. As the typical PhD takes five to six years to complete, the recent robust numbers reflect the concentrated investment in the graduate program begun in 1998.



Graduate Alumna Receives NSF Postdoctoral Fellowship

Catherine Williams, who earned her PhD from the Department in Spring 2008 under the supervision of Dan Pollack, has been awarded an NSF Postdoctoral Fellowship. These fellowships are among the most prestigious awards available for young mathematicians. Her area of research lies at the intersection of general relativity and geometric analysis.

Catherine's PhD thesis, "Asymptotic behavior of marginally trapped tubes in spherically symmetric black hole spacetimes" explored the mathematical relationship between a quasi-local description of a dynamical black hole and the classical notion of the event horizon in Einstein's theory of general relativity. Since completing her doctorate, Catherine has spent two years at Stanford University as a Hans Samelson & RTG Postdoctoral Fellow. She has been a participant in workshops at the Newton Institute in Cambridge, UK, the Institut Mittag-Leffler in Djursholm, Sweden, the Mathematisches Forschungsinstitut, Oberwolfach, Germany, and the BIRS center in Banff, Canada. As a UW graduate student, Catherine received the Jocelyn Bell Burnell/GGR Prize, awarded for the best student talk at the 23rd Pacific Coast Gravity Meeting, primarily a physics meeting. This award represents the extent to which Williams is able to communicate mathematical research to a varied and interdisciplinary audience in a very effective manner.



Catherine is now using her NSF Postdoctoral fellowship at Columbia University where she is working with Professor Mu-Tao Wang.

Recent Degree Recipients

The following students completed their doctorates in Mathematics during the academic year 2009-10:

Aleksandr Aravkin. His advisor was Jim Burke, and his thesis title was “Robust methods in Kalman filtering/smoothing and Bunch adjustment.” Aleksandr is now a Postdoctoral Fellow at the University of British Columbia.

Robert Bradshaw. His advisor was William Stein, and his thesis title was “Provably correct computation of motivic L-functions.” Robert is now a Software Engineer for Google.

Jonathan Cross. His advisor was Jim Burke, and his thesis title was “Spectral abscissa optimization using polynomial stability conditions.” Jonathan is now in Relevance and Ranking for Bing Commerce at Microsoft.

Ariana Dundon. Her advisor was Sándor Kovács, and her thesis title was “Families of log canonically polarized varieties.” Ariana is now an Assistant Professor at Montgomery College.

Julie Eaton. Her advisor was Jim Burke, and her thesis title was “Variational properties of spectral functions.” Julie is now a Visiting Assistant Professor at the University of Puget Sound.

Daniel Finkel. His advisor was Sándor Kovács, and his thesis title was “On the number of Fourier-Mukai partners of a K3 surface.”

Michael Goff. His advisor was Isabella Novik, and his thesis title was “Bounds on quantities related to simplicial complexes.”

Sean Holman. His advisor was Gunther Uhlmann, and his thesis title was “Generic uniqueness in polarization tomography.” Sean is now a Visiting Assistant Professor at Purdue University.

Antonio Kirson. His advisor was Sándor Kovács, and his thesis title was “Wild automorphisms and Abelian varieties.” Antonio is now a Presidential Management Fellow with the Office of Risk Management and Analysis within the Department of Homeland Security.

Steven Klee. His advisor was Isabella Novik, and his thesis title was “Lower bound theorems for simplicial and cubical complexes.” Steven is now a VIGRE Postdoctoral Fellow at UC Davis.

Jacob Lewis. His advisor was Charles Doran, and his thesis title was “Elliptic surfaces: normal forms deformations and applications.” Jacob is now an NSF International Research Fellow at the University of Vienna.

Qiuying Lin. Her advisor was Jim Burke, and her thesis title was “Sparsity and nonconvex optimization.” Qiuying is now working for T-Mobile.

Robert Miller. His advisor was William Stein, and his thesis title was “Empirical evidence for the Birch and Swinnerton-Dyer conjecture.” Robert is now a Postdoctoral Fellow at Warwick University.

James Vargo. His advisor was Gunther Uhlmann, and his thesis title was “Lens rigidity for Riemannian manifolds with a magnetic field.” James is now a Visiting Assistant Professor at Texas A&M.

Liang Xu. Her advisor was Jim Burke, and her thesis title was “Merging trust-region and limited memory technologies for large-scale optimization.” Liang is now working on economic forecasting for Microsoft.

Below is a list of those who finished their work at the UW with a Master’s degree in Mathematics, with each student’s advisor listed in parenthesis:

Tom Boothby (Stein)

Yelizaveta Gorstko (Solomyak)

Megan McCormick (Thomas)

Bachelor’s Degrees

174 Bachelor’s degrees were awarded during the 2009–2010 academic year: 117 in Mathematics and 57 in ACMS.

PAUL TSENG

In Memoriam: Paul Tseng

A memorial service for Professor Paul Tseng was held in the Walker-Ames Room on Saturday, May 8, 2010. Paul has been missing since August 13, 2009, when he disappeared on a solo kayaking trip on the Jinsha River near Lijiang, in Yunnan province of China, where he had been invited to give a talk at an international conference on numerical optimization and linear algebra. When he did not arrive at the conference site, his friends and colleagues initiated a search. It was eventually determined that Paul arrived at the Lijiang airport and took a taxi directly to a remote village on the Jinsha River, where he launched his kayak in rapid waters. An avid outdoorsman and very seasoned kayaker, Paul had planned to kayak for three days on the Jinsha through a beautiful but mostly uninhabited mountainous region. His kayak and backpack were found on August 30 a few kilometers downstream from where he entered. It is believed that Paul was a victim of an unfortunate accident. He is survived by his mother and his sister Nora.

Paul joined the Mathematics Department in 1990. His voluminous and widely recognized research (over 120 journal papers) ranged over several fields including continuous optimization, discrete optimization, parallel and distributed computation, network and graph algorithms, and applications of large scale optimization techniques in signal processing and machine learning. He was one of the foremost researchers in numerical optimization of his generation, at a time of great progress in his field. In addition, Paul is also known for the software packages RELAX and ERELAXG coauthored with his PhD advisor Dimitri Bertsekas. This software is widely used in industry and academia for research purposes.

Paul's loss has been a great blow to the University and the Mathematics Department at a personal and academic level. He was admired for his creative work and productivity and well liked for his cheerful and friendly manner. He enjoyed close collaborations with numerous colleagues within the University and around the world. He served the University community as a conscientious and engaging instructor as well as a consultant on several research projects around

campus, and he served the research community for many years as a hard-working editor for several top optimization journals.

Within the past year there have been two international research conferences dedicated to Paul's life and work. One was held at the University of Washington on May 9, 2010, with over 70 attendees from Europe, Canada, the US, and China. This was closely followed by a second conference at Fudan University in Shanghai, China, on May 21. The speakers at this conference included many of the world leaders in numerical optimization.

Paul was well known for his adventurous and unconventional travels, often using bicycle and kayak. In the years 1986–2008, he took long bicycle trips on several continents and kayaking trips on many major rivers. He kayaked for long distances (such as from Laos to the Mekong delta in Vietnam and from Prague to the Danube delta in Romania), often mixing with local people on the way and sharing their lifestyles. He brought back many pictures and stories, which can be

found at his website (www.math.washington.edu/~tseng/personal.html). His ambition was to kayak in all the major rivers of the world.

Paul had several other nonprofessional interests. He was well known for his expert tennis game. He also had a strong interest in music, particularly in playing the piano, and in drawing, painting, pottery making and woodcarving. He spent a few summers drawing portraits in Stanley Park in Vancouver, and he had a summer job making wood carvings of West Coast animals. He was a minimalist in life, with a deeply held commitment to environmentalism and noble causes (he frequently "walked for hunger"), and he tended his garden and beautiful roses with great care.

We are saddened by Paul's sudden loss, but he clearly lived a full, rich, and productive life where he was loved and admired by many. He left this world a month shy of his 50th birthday.

– JIM BURKE



OUR DONORS

The following is a list of our friends who have contributed to the Department between September 1, 2008, and October 15, 2010. Should you notice an error or omission in this list, please draw it to our attention by a telephone call or e-mail message to Mike Munz (206-543-1151 or munz@math.washington.edu).

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