

Mathematics

Newsletter of the Department of Mathematics at the University of Washington

A MESSAGE FROM THE CHAIR



The events of September 11th cast a shadow over the start of the academic year, a shadow in whose darkness we continue to live. I struggled in the next few days, as we all did, with puzzlement about the meaning of our daily activities. What helped me gain a sense of purpose was the idea that it is

in our mundane daily activities that we invest life with meaning. In Genesis, we hear that "God created the human in his image, in the image of God He created him." At least metaphorically, we find in these words the notion that each human has within him or her a spark of the divine, the spark upon which each of us calls to bring meaning into the world. We do so not necessarily through our grander achievements but through the concern and passion we bring to our daily activities. Such a notion of the divine underlies the writings of the philosopher-theologian Martin Buber. He writes of the moment when something appears to the soul and demands the soul's creative power. For that something to become a work, what is required is a deed done with one's whole being: if one commits, creative power is released and the work comes into being.

I became department chair this past July, succeeding Don Marshall, whose three years of selfless efforts on behalf of the department have made such a difference to all of us. As chair during these difficult weeks, I have had the good fortune and consolation of observing, in the work of our faculty, students, and staff, the process that Buber described. Perusing this newsletter, you will get to share this pleasure with me, as you learn about departmental developments of the past year. I draw your attention in particular to the article about our late colleague Bill Birnbaum, a virtuoso on each instrument of the trio of research, education, and service. He provided an extraordinary example of a life of creativity and meaning, a divine life. His death last December saddened us all. Yet in remembering him we find much joy.

I invite you to read this newsletter and to be a part of the life of our department. Share with us your thoughts about the role of mathematics in your career or your memories of time spent here and people in the department. If you are in the area, come visit. And if you wish to support the activities of the department, your contributions will be most gratefully received. Thanks so much for your continuing interest.

- Ron Irving

Z. W. BIRNBAUM, 1903-2000



The Department's long-time colleague and friend Zygmund William Birnbaum passed away at his home in Seattle on December 15, 2000, at the age of 97.

Bill Birnbaum was born in Lwów, Poland, educated in Poland and Austria, came to the United States in 1937, joined the faculty of the University of Washington in 1939, and retired with the title Professor Emeritus of Mathematics and Statistics in 1974. He remained active in mathematics for many years after his retirement.

Professor Birnbaum received a law degree in 1925 and a PhD in mathematics in 1929 from the University of Lwów. After completing his doctorate, he went to Göttingen, Germany, then the major center of mathematics. There he had contact with many of the leading mathematicians of the day. While in Göttingen, Bill qualified as an actuary, and in 1931 he obtained a position in a Viennese actuarial firm. After a year in Vienna, he was sent to the firm's Polish subsidiary in Lwów where he served as the chief actuary. The firm went out of business in 1936, and a little later Bill came to the United States as a reporter for a Polish newspaper.

With the help of the UW alumnus Harold Hotelling, then professor at Columbia University, Bill obtained a position in our department in 1939. The rest of his academic career was spent here, except, of course, for brief visits to other institutions, American and European.

Upon his arrival in our department, Professor Birnbaum immediately began an effort to improve our program in statistics. Because of his efforts, our department had one of the first comprehensive undergraduate programs in statistics in the country. He instituted new courses and founded a Laboratory of Statistical Research, which he directed until his retirement.

Professor Birnbaum was a distinguished statistician whose work was recognized with many honors. He received Guggenheim and Fullbright awards. The American Statistical Association honored him with its S.S. Wilks Medal for "his theoretical research, wide applications, leadership, inspiration, and teaching". He served a term as president of the Institute of Mathematical Statistics.

In addition to his scientific work, Bill made important contributions to the department. For more information, see **BIRNBAUM** on page 2

BIRNBAUM continues from page 1

butions to the University of Washington. He was instrumental in creating the present retirement system for the faculty, and he was active in the effort that led to the inclusion of the faculty in the Social Security system. He was also a plaintiff in a suit in the early 1960's concerning the loyalty oath; his was the only testimony in the case that was cited before the Supreme Court of the United States.

Bill married Hilde Merzbach in Seattle in 1940. Mrs. Birnbaum is well known in the Seattle community, especially for her work at Group Health, which she and Bill helped found.

A memorial service, which was attended by more than two hundred persons, was held in memory of Bill at the Faculty Club of the University of Washington on April 6, 2001.

NEW DIRECTOR FOR MATH STUDY CENTER

Patrick Perkins has been named the new director of the Department's highly successful MATH STUDY CENTER. Perkins assumed the position in the autumn of 2000 when the former director, Ken Plochinski, left to enter law school at the University of Michigan after having directed the Center since 1990.

The Math Study Center, which is located in the basement of the Communications Building across the street from the Mathematics Department, is a great place for students to work on math, whether or not they need help. It is not a tutoring center in the traditional sense. The Center provides a comfortable place and a supportive atmosphere where students can come together and study, in groups or individually. It has on staff a number of tutors (both graduate student TA's and advanced undergraduates) who will sit down with students and answer questions to help them understand difficult points. The Center does not provide long blocks of uninterrupted one-on-one tutoring. Many faculty members and TA's hold their office hours in the Center. Most students who use the Center work at large tables in the main room. There are also several smaller cubicles available. These are equipped with white boards and are often used by faculty for office hours. Textbooks, calculators and other study materials are available to be checked out for in-room use. Student response to the Math Study Center has been very positive. For example, the staff recently received a card and a big bag of homemade cookies from one grateful student!

Mathematics

This newsletter is published annually for alumni and friends of the Department of Mathematics at the University of Washington.

Newsletter Staff:

Ronald S. Irving, Chair, chair@math.washington.edu
 Edgar Lee Stout, Editor, stout@math.washington.edu
 Mary Sheetz, Production, sheetz@math.washington.edu
<http://www.math.washington.edu>

PROMOTIONS



Boris Solomyak



James Zhang

During academic 2000-2001, the Department promoted Boris Solomyak and James Zhang from associate professor to professor. Professor Solomyak works in ergodic theory and symbolic dynamics. Professor Zhang works in noncommutative algebraic geometry.

CHANGES IN THE OFFICE



(l-r: Lisa Spencer, Mary Sheetz, Susan Burgher, Jessica Baird)

After many years of service to the University and to the Department, the Department's administrator, Donna Gardner, retired at the end of February.

After a thorough personnel search, Mary Sheetz, formerly the secretary to the chair of our department, was chosen as the new department administrator. Another change in the department's office is that Lisa Spencer, formerly receptionist, has become the department's fiscal specialist, replacing Carmela Halos, who has assumed a new position in another department. Jessica Baird has taken over as the secretary to the chair and our new receptionist is Susan Burgher.

NEW FACULTY

This year the Department welcomes four new faculty members:

- Yu Yuan (Assistant Professor - on leave this year), PhD University of Minnesota, 1998. Professor Yuan's mathematical work is in the subject of linear and fully nonlinear partial differential equations.
- Timothy Chartier (Acting Assistant Professor), PhD University of Colorado, 2001. Professor Chartier works on algebraic multigrid methods.
- Isabella Novik (Acting Assistant Professor), PhD Hebrew University, 1999. Professor Novik's subject is geometric combinatorics.
- Jennifer Taggart (Lecturer), PhD University of Boulder, 1997. Dr. Taggart's mathematical work has concerned hypergeometric series.

An opinion. "I think there's no way they should have to teach [math] now. We have computers. We no longer need to know why $3x=2y/4$."

—Talk-show host Rosie O'Donnell, as quoted in *Newsweek*, April 9, 2001.

IRVING RECEIVES DISTINGUISHED TEACHING AWARD



Professor Ronald Irving of the Mathematics Department has received the annual Distinguished Teaching Award, the University's highest award for teaching. The basis for the award was Irving's outstanding work in our courses that prepare secondary teachers of mathematics. Irving,

an algebraist, began to work in these courses for teachers about five years ago. In them he has striven to lead his students to a solid conceptual understanding of the material and has, at the same time, emphasized the importance of being able to communicate clearly the ideas of mathematics, both orally and in writing. To achieve his goals, he has had his students work together in groups in which they gain experience in mathematical communication, in part by their own efforts and in part by examining critically the work of their fellow students. There is a solid mathematical content to the courses; Irving has insisted on the importance of the mathematics as well as on the pedagogical issues that are important to future teachers. The course has been very well received and highly successful. A text based on Irving's course will be published in the near future by the publishing house Springer-Verlag. This is the second time in recent years that a member of the Mathematics Department has received this prestigious award; Professor David Collingwood received it in 1998.

MATHDAY

The twelfth annual Mathday will be held on the campus of the University of Washington on March 25, 2002. On that day 1200 high school students from around the state will attend lectures and panel discussions, participate in hands-on activities, and go on field trips to labs on the campus. This year the plenary speaker will be Chris Diorio from the Department of Computer Science and Engineering. Guest lecturers will be drawn from many departments around the campus including the departments of Mathematics, Applied Mathematics, Computer Science, Genetics, Geography, and Atmospheric Sciences. There will be field trips to Fisheries, the School of Music, the Computer Center, Aeronautics, and the HIT lab. There will also be hands-on mathematical activities involving puzzles and paper geometric models. Undergraduate students, graduate students, staff, and faculty contribute to the success of this exciting, educational day in which students learn about the uses of mathematics in academic research and in industrial research and development.

This year Mathday is supported in part by a generous donation from George Kaufmann, president of Riegel Capital Management.

FUTURE TEACHERS COMBINE COURSEWORK WITH PRACTICE IN A SEATTLE SCHOOL

In 1993 the College of Arts and Sciences chose math professor Neal Koblitz as a "Liberal Arts Professor" for one year, a designation that was accompanied by a modest course-development grant. He was prompted to ask himself the question: "If I could dream up a course outside of our current offerings that I would most want my department to be teaching, what would it be?" The result was Math 354/355.

This two-quarter sequence, which is taken by approximately 20 math majors who intend to teach in middle or high school, is now in its eighth year. It has several features which mark a radical departure from anything the Math Department had offered before. First, the 5-credit course includes a required "lab" consisting of a day each week teaching math enrichment topics to several classes of sixth or seventh graders at an inner-city school (either Washington or Meany Middle School). The topics presented to the children range from games that painlessly drill arithmetic skills to sophisticated, but simply presented, concepts in the theory of algorithms and cryptography.

Math 354/355 is multidisciplinary. Besides studying the enrichment topics in enough depth to be able to teach them well, the UW students also explore controversial issues in education. Guest speakers, assigned reading, videos, and class discussions have covered a variety of controversies: gender equity in the classroom, labeling of children and ability grouping, ethnic and racial stereotyping, accountability and assessment, the role of computers, and the traditionalist-*vs*-reformist "MathWars." Every week or two the UW students are required to turn in a short paper discussing some aspect of the class readings or the school visits. The essays are corrected and graded strictly, and the students are expected to hand in a revised version of each paper.

The culmination of the school visits is a day-long field trip to UW arranged by the Math Department and the Minority Science

and Engineering Program (MSEP).

This past Spring, 120 children from Meany came to campus, where their program included an hour in the Planetarium, a hands-on presentation by physics professor Oscar



Vilches, a tour of Husky Stadium, and a visit to MSEP's computer lab. The photo shows a UW student helping a seventh grader get started on a "scavenger hunt" (web search) that the MSEP students had designed for the middle schoolers.

MODELING CONTEST

Each year the Consortium for Mathematics and Its Applications (COMAP) organizes a contest in mathematical modeling. The contest consists of two modeling problems, one involving discrete mathematics, the other continuous mathematics. Teams of three undergraduates choose one of the problems and work on it over a long weekend, 12:01 AM Friday to 11:59 PM Monday. They download the problems from the web at the start and must work on their own, although they are allowed the use of reference materials, computers, etc. The teams work wherever they want, often around the clock. The UW's teams had access to the MSCC computer lab throughout the weekend. Monday evening the teams turn in their completed papers to their faculty advisers who send them in by UPS. The teams write a paper that describes the problem, their solution strategy, results, etc.

The UW had two teams of undergraduate ACMS or Math majors competing this year.

Both teams chose to work on problem B, which is, roughly formulated, the problem of the efficient evacuation of the population of the coast of South Carolina ahead of the landfall of a major hurricane. The motivation for the problem comes from the monumental traffic jam that occurred ahead of Hurricane Floyd in 1999. In response to this, the state of South Carolina has devised new ways of dealing with such situations. The contest problem is to analyze the new proposals and discuss alternatives to them.

The results of the 2001 contest are in. There were 281 teams from around the world that chose to work on Problem B. Of these, there were 6 Outstanding Winners, 43 Meritorious Winners, 65 Honorable Mentions and 167 Successful Participants.

The UW team composed of Ryan Card, Ernie Esser, and Jeff Giansiracusa received a Meritorious rating, and the team composed of Nicole Franklin, Zach Frazier, and Lonnie Princehouse received an Honorable Mention. Our congratulations to the members of these teams.

This year a total of 496 teams participated in the contest. Forty-seven per cent of them were from countries other than the US. Teams entered from Australia, Canada, England, Finland, Hong Kong, Ireland, Lithuania, P.R.China, Singapore, and South Africa.

For more details about the contest see the web site <http://www.comap.com/undergraduate/contests/mcm/> for the results and the web site <http://www.comap.com/undergraduate/contests/mcm/problems.htm> for the problems.

“Mathematics is the only infinite human activity. It is conceivable that humanity could eventually learn everything in physics or biology. But humanity certainly won't ever be able to find out everything in mathematics, because the subject is infinite. Numbers themselves are infinite.”

- Paul Erdős

APPLIED AND COMPUTATIONAL MATHEMATICAL SCIENCES PROGRAM



The ACMS Program at the University of Washington is an interdisciplinary undergraduate program in the mathematical sciences, which is jointly administered by the Departments of Applied Mathematics, Computer Science, Mathematics, and Statistics. Launched in the Autumn quarter of 1997, this innovative program was designed in direct

response to the ever increasing need for mathematical skills in a broad array of technical careers in business, industry, and research. The goal is to better train students in the computational, mathematical, and statistical skills required in the development and analysis of mathematical models for complex integrated systems. Beyond building a solid foundation in mathematics, students must choose from among eight areas of specialization for advanced training. These areas are Biological and Life Sciences, Discrete Mathematics and Algorithms, Engineering and Physical Sciences, Mathematical Economics, Operations Research, Scientific Computing and Numerical Algorithms, Social and Behavioral Sciences, and Statistics. In the four years since its inception it has grown to include over 160 active majors; it has 101 alumni.

Here are some of the highlights of the ACMS program during the 2000-2001 academic year:

- ACMS students received research funding from the UW's National Science Foundation grant for the Vertical Integration in Research and Education (VIGRE).
- ACMS students presented the results of their research at the Undergraduate Research Symposium.
- ACMS majors participated in the Engineering Co-op program.
- Two teams of students participated in the international modeling contest sponsored by the Consortium for Mathematics and its Applications. Both did very well. The contest is described in an adjacent article.
- This year the award for Outstanding ACMS Major was given to Ernie Esser and the award for Outstanding ACMS graduate was given to Jennifer Temple.
- Kristin Spaulding graduated in ACMS with Distinction for completing a Senior thesis on the modeling of optical fiber lasers.

- After five years of outstanding service as the Director of the ACMS Program, Randy LeVeque has stepped down from this post. Randy was the first Program Director for ACMS. The rapid growth and the interdisciplinary nature of the program posed and will continue to pose many challenges for the University, the mathematical sciences departments, and the program leadership. Randy was very successful in meeting these challenges on an almost daily basis. He, the program steering committee, and the program advisors Julie Martinson and Brooke Miller can be credited with bringing to the State of Washington a new, very sound,

see ACMS on page 5

ACMS continues from page 4

important, and visionary interdisciplinary program of undergraduate study in the mathematical sciences. We extend our thanks and appreciation for all of Randy's efforts over the past five years.

- Jim Burke from the Department of Mathematics has been appointed the new Program Director. Jim's area of expertise is optimization: theory, computation, and practice. He is an advocate of interdisciplinary research and holds adjunct appointments in the departments of Applied Mathematics and Bioengineering.

In addition to maintaining the strong academic program that has been established, the most significant challenge facing the program leadership is to provide a sound financial foundation. Currently the program is sustained by annual gifts of \$2000 each from the Departments of Applied Mathematics, Mathematics, and Statistics. This annual budget of \$6000 goes to offset partially teaching release time for the Program Director. The program has no permanent funding and no funds for student advising, research activities, course development, or student awards, nor does it have funding for the more mundane costs such as program brochures, photocopying, postage, and website maintenance. For the moment, the Department of Mathematics has stepped forward to provide the necessary additional funding and services to keep the program afloat. However, maintaining permanent funds for the program is essential to its continued vitality and growth. Given the outstanding nature of this program and its growing importance to the University and the State, we are very optimistic that creative solutions to this problem will be found. The program is very appreciative of all contributions to its *Friends of ACMS Fund*. This fund contains the only discretionary money for the program. It is hoped that this fund will eventually be able to provide student awards and support for student research. In the past, this fund has been sustained by faculty contributions. However, it now has zero balance, so any contribution will have an immediate impact and will be warmly received. For further information, please contact Mary Sheetz in the Department of Mathematics ((206)543-1150. sheetz@math.washington.edu).

UNDERGRADUATE AWARDS

Each year in the spring the Department hosts an honors luncheon in honor of its outstanding undergraduates. At the honors luncheon in May, the following awards were announced:

Freshman honors, to the student with the best record in our freshman honors calculus sequence: Michael Byerly.

Sophomore honors, to the student with the best record in our sophomore honors calculus sequence: Sam Coskey.

The Gullickson Scholarship, which is awarded each year to a junior major, was given to Marc Blunk.

The Putnam Award goes each year to the student who makes the best score on the Putnam Examination. (This is an examination taken one autumn Saturday by students all across the country. The national winner receives a generous fellowship for graduate study at Harvard.) Timothy Hu received the award for having scored highest among the UW participants.

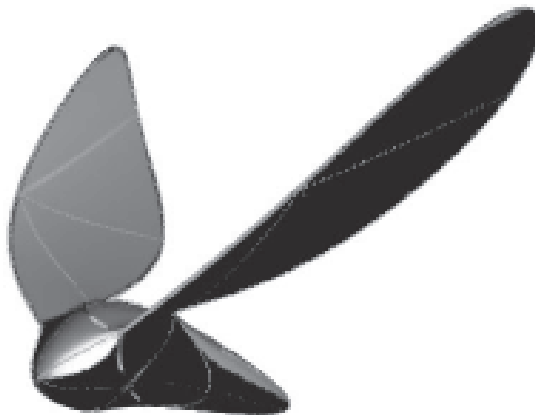
In addition to these awards to continuing students, our outstanding graduating seniors are honored for their distinguished work:

Among those receiving the BA, seniors Lisa Behmer and Chris Nelson both in the Teacher Preparation program, were at the top of their class.

Among those in the Comprehensive BS program, Julie Rowlett graduated first in her class.

The student with the best record in the Standard BS program was Ryan Card.

We congratulate these fine students for their distinguished achievements and wish them well in their further work.



THE PACIFIC INSTITUTE FOR THE MATHEMATICAL SCIENCES

The University of Washington has become a member of the Pacific Institute for the Mathematical Sciences (PIMS). The participating departments are Applied Mathematics, Mathematics, and Statistics. The Institute is dedicated to:

1. Promoting innovation and excellence in research in all areas encompassed by the mathematical sciences,
2. Initiating collaborations and strengthening ties between the mathematical scientists in the academic community and those in the industrial, business and government sectors,
3. Training highly qualified personnel for academic and industrial employment and creating new opportunities for developing scientists,
4. Developing new technologies to support research, communication and training in the mathematical sciences.

As a member of PIMS the University of Washington hosted The Industrial Problem Solving Workshop (IPSW) during the period of June 11-15, 2001. The IPSW brings together graduate students and faculty from many universities to work on mathematical problems presented by industrial experts. It is based on the model of the Oxford Study Group, which has been run successfully at Oxford University for many years. The IPSW was organized primarily by Marc Paulhus (Calgary), Randy LeVeque (UW), Chris Bose (U. Victoria), and Hauxiong Huang (York). The week of the IPSW at UW was preceded by a week-long Graduate Modeling Camp at the University of Victoria, where 58 graduate students were mentored on problem solving and prepared for the IPSW. These 58 students were joined by about 40 other people who participated in the IPSW.

One of the problems presented to the Industrial Problem Solving Workshop came from Algorithmics, a financial mathematics firm. Alex Kreinin of that firm presented a problem on measuring the credit risk of a given portfolio, based on the credit ratings of the obligors. Standard Monte-Carlo techniques do not work very well since the interesting events (default by the obligors) are very rare and hence require a large number of simulations. Algorithmics came to the workshop with a very well thought-out model and everyone was pleasantly surprised that the group discovered an analytical solution based on using the Lindberg-Feller Theorem (basically the Central Limit Theorem in this context) to approximate the credit risk of all counterparties in a single (credit driver) scenario. This resulted in approximating the risk across scenarios by a mixture of Gaussians, the latter being one of the current methods for treating distributions with long tails. The group then proceeded to test this fast, approximate solution against much more time-consuming full Monte Carlo simulations for one time step. They found reasonable agreement and expect much better results for longer time horizons since the CLT is better suited when the number of independent random variables increases. This was viewed as a significant development in the important area of credit risk, one that we look for-

ward to seeing developed further.

On September 19, 2001, the Governments of Canada and Alberta joined the U.S. National Science Foundation to launch the Banff International Research Station (BIRS) for mathematical discovery and innovation. It will be housed in the Banff Centre and start operations in 2003. BIRS has an Executive Committee, composed of the Directors of PIMS and MSRI and the Scientific Director of BIRS. As a member of PIMS and MSRI the University of Washington is excited about the station's potential to become an international center of mathematical research excellence.

VISITORS

Each year the Department welcomes many visitors; these visitors, who come for varying periods of time, teach for us and participate in our seminars. They make significant contributions to the life of the Department. That our visitors come from all over the world attests to the international nature of our subject and to the Department's attractiveness as a center of mathematical work. This year for the first time we have visitors from some of the community colleges in the state; they come under the aegis of our new Community College Educators Sabbatical Program, which is described more fully in the article on our new calculus courses.

This year's list of visitors is somewhat longer than usual:

Dmitri Burago, Professor of Mathematics at Pennsylvania State University. Visiting Professor during Winter Quarter. (Geometry, asymptotic volumes of tori.)

Serkiy Ivashkovich, Professor of Mathematics, Université des Sciences et Technologies de Lille, France. Visiting Professor during Autumn and Winter Quarters. (Complex analysis, several complex variables.)

Vladimir Sharafutdinov, Head Researcher at the Sobolev Institute of Mathematics and Professor of Mathematics, Novosibirsk State University, Novosibirsk, Russia. Visiting Professor Winter Quarter. (Differential geometry and topology.)

Gleb Diatlov, Senior Researcher, Sobolev Institute of Mathematics, Novosibirsk, Russia. Visiting Assistant Professor Spring. (Inverse problems for partial differential equations.)

Hyeonbae Kang, Visiting Assistant Professor Winter and Spring Quarters. (Several complex variables, inverse problems.)

Dmitry Kozlov, Assistant Professor, University of Bern, Switzerland. Visiting Assistant Professor Winter Quarter. (Combinatorics, algebra, and topology.)

Youngmee Kwon, Associate Professor of Mathematics at the Hansung University, Seoul, Korea. Visiting Scholar. (Probability theory.)

Robert Pollack is a National Science Foundation Postdoctoral Fellow. He received his PhD from Harvard in 2001. (Number theory.)

Ana Granados is a visiting scholar from the University of Madrid, Spain. (Analysis.)

see **VISITORS** on page 7

VISITORS continues from page 6

Alicia Canton is a visiting scholar from the University of Madrid, Spain. (Analysis.)

Elchanan Mossel and Christopher Umans, who are employed by Microsoft in Redmond, are jointly teaching a graduate course in coding theory in the Department. Dr. Mossel received his PhD in 2000 from Hebrew University of Jerusalem and Dr. Umans received his PhD from UC Berkeley in 2000. They are Lecturers.

The following three persons are Visiting Professors in the Department in connection with the Community College Educators Sabbatical Program, the new program that brings faculty from community colleges in the state to the department for visits during their sabbatical leaves. They are Ted Coskey (South Seattle Community College), Marina Frost (Clark Community College), and Dale Hoffman (Bellevue Community College).

GRADUATE STUDENTS RECOGNIZED IN THE SECOND ANNUAL GRADUATE AWARDS CEREMONY

The Mathematics Department lounge filled with students, staff, faculty and friends of the department on November 8, 2001 for the second annual Graduate Awards Ceremony held to recognize outstanding graduate students. In addition to recognizing students who received fellowships or awards during the past year, the Ceremony gave an opportunity to announce the recipients of this year's Excellence in Teaching and Academic Excellence awards.

Excellence in Teaching Awards: These awards recognize Teaching Assistants for outstanding teaching performance in undergraduate mathematics courses. Each award includes a \$1000 supplementary stipend. This year's awardees, chosen by the TA Advisory committee based on student and faculty feedback, were:

- Joan Lind, a fourth-year PhD student in complex analysis,
- Peter Littig, a fourth-year PhD student in algebraic topology.

Academic Excellence Awards: The Graduate Program Committee chose the recipients of Academic Excellence Awards on the basis of students' performance in the core graduate courses and PhD qualifying exams during 2000-2001. One award consisted of a VIGRE fellowship. Seven of the eight awards included a supplementary stipend of \$1000. They were funded by endowments created by three former faculty members, Carl B. Allendoerfer, Z. William Birnbaum and Edwin Hewitt. (Allendoerfer was department chair from 1951 to 1962. Birnbaum, who served the University as an active and emeritus faculty member from 1939 until his passing late last year, is widely recognized for his contributions to probability and statistics. Hewitt is well known for his work in real and harmonic analysis.) A list of the eight recipients, their current areas of interest and the awards they received follows.

- Matthew Blair, second year student, inverse problems and numerical analysis, Allendoerfer award.
- Yeongcheon Baek, second year student, optimization, Allendoerfer award.
- Sunil Chebolu, second year student, algebraic topology, Hewitt award.
- Kris Kissel, second year student, partial differential equations, Hewitt award.
- David Maxwell, second year student, analysis, Hewitt award.
- Karl Schwede, second year student, algebraic geometry, VIGRE fellowship.
- Pablo Shmerkin, first year student, fractal geometry, Birnbaum award.
- Michal Skokan, second year student, partial differential equations, Allendoerfer award.

VIGRE fellowships: These awards are funded by a joint grant to the UW Departments of Applied Mathematics, Mathematics and Statistics from the VIGRE (Vertical Integration Grants for Research and Education) program of the National Science Foundation. Each award provides fellowship support, without teaching duties, during two academic quarters and the summer. This year's VIGRE fellows in the Department of Mathematics are:

- Tristram Bogart, first year student from Oberlin College,
- Rebekah Hahn, fifth year student, studying algebraic topology with Steve Mitchell,
- Matthew Kahle, first year student from Colorado State University,
- Peter Littig, fourth year student, studying algebraic topology with Steve Mitchell,
- Keir Lockridge, third year student, studying algebraic topology with Ethan Devinatz,
- Daniel Meyer, fourth year student, studying complex analysis with Steffen Rohde,
- Karl Schwede, second year student, studying algebraic geometry,
- Michael Van Opstall, fourth year student, studying algebraic geometry with Sándor Kovács.

GK-12 Fellowship: This fellowship is funded by a grant from the National Science Foundation. It enables the recipient to augment her studies with K-12 educational work. This fellowship is held by

- Theresa Anderson, a second year student.

Graduate Opportunity Fellowships: These fellowships are funded by the Graduate Opportunity Program of the University of Washington, for the purpose of bringing outstanding women candidates into the PhD program. Each award provides Research Assistant support for two or three quarters. This year's recipients are:

- Tracey Marsh, first year student from the University of California, Berkeley,

see **GRADUATE AWARDS** on page 8

GRADUATE AWARDS continues from page 7

- Grisha Stewart, first year student from Bryn Mawr College.

ARCS Fellowships: Each of these \$15,000 awards is funded over three years, at the level of \$5000 per year, by the Achievement Rewards for College Scientists Foundation. This year's recipient is:

- Matthew Kahle, first year student from Colorado State University.
- Davis Doherty and Jason Swanson are continuing in the second and third year, respectively, of their ARCS awards.

Microsoft Scholar Awards: These \$20,000 awards, in the form of yearly supplementary stipends of \$5000 for four years, are funded by a gift from Microsoft Corporation. This year's awardees are:

- Ilgar Eroglu, first year student from Bilkent University in Ankara, Turkey,
- Pablo Shmerkin, first year student from the University of Buenos Aires, Argentina.

Ilgar and Pablo join Robert Hladky, Kris Kissel, David Maxwell and Hui Xu as Microsoft Scholars.

Graduate School Merit Awards: These recruitment awards, averaging \$5000, are made available by the Graduate School to help with the recruitment of outstanding applicants. The awardees are all first year students:

- Tristram Bogart, from Oberlin College,
- Christopher Hanusa, from Harvey Mudd College,
- Tracey Marsh, from the UC, Berkeley,
- Phillip Nguyen, from Tulane University,
- Jeremy Walthers, from Michigan State University,
- Shengyu Zhang, from the University of Science and Technology, China.

The number of students in our graduate program has grown in recent years to over 80. These students are central to every aspect of the department's work. They share the teaching of undergraduate courses, they are students in our graduate courses and, as they advance, they become participants in our research program. Our success in each of these activities depends on our ability to recruit, encourage and develop some of the best talent. Awards and fellowships provide invaluable encouragement. They are also essential to our efforts to make up for the deficiency of our TA salaries. During the graduate admissions process last spring, our 11-month TA salary was \$13,300, while many peer mathematics departments, such as those at Michigan, UCLA, UCSD and UC Berkeley, had 11-month salaries between \$17,000 and \$18,000. The department recently endorsed a plan by the Graduate Program Committee to offer to the majority of incoming PhD students awards that will boost their stipends to \$17,000 while they make satisfactory progress towards the PhD. The awards and fellowships listed above give this plan a great start; we are grateful to the institutions and individuals that support our department by making such resources available to graduate students.

KOVÁCS RECEIVES NSF AWARD

Assistant Professor Sándor Kovács has received a Faculty Early Career Development award from the National Science Foundation. This five-year award is the most prestigious award for new faculty members from the National Science Foundation. The award will support Professor Kovács's research in algebraic geometry.

According to the NSF, these awards go to teacher-scholars who are likely to become the leaders in their disciplines in the future.

TORO NAMED FELLOW AT RADCLIFFE

Associate Professor Tatiana Toro has been named a Fellow of the Radcliffe Institute at Harvard University. She will spend the 2001-2002 academic year in Cambridge, Massachusetts, as a visiting faculty member at Harvard.

UHLMANN WINS GUGGENHEIM

Professor Gunther Uhlmann of the Mathematics Department has been awarded a Guggenheim Fellowship, which will support his work on inverse boundary problems. Uhlmann received his PhD from M.I.T. in 1976 and came to the University of Washington in 1987. The Guggenheim Fellowships, which are among

the most prestigious academic awards, are awarded annually to distinguished scholars across the country. Their purpose is "to promote the advancement and diffusion of knowledge, and the understanding of beauty, by aiding ... scholars, scientists, and artists of either sex in the prosecution of their labors." A total of three mathematicians in the country received Guggenheims this year. In addition to Uhlmann, one other UW professor received a Guggenheim Fellowship this year, Professor Patricia Ebrey of the History Department.



“NEW” CALCULUS AT THE UW

The core content of freshman calculus is over two hundred years old, but methods of teaching the subject are always evolving. After several years of intensive study within the department and with the help of generous funding from the Office of Undergraduate Education, the first two quarters of freshman level calculus will be taught in a new format for the next three years. The major changes include:

- Lecture classes of 81 students, a reduction from the previous size of 160 students.
- TA section classes of 27 students, a reduction from the previous size of 40 students.
- Introduction of one 80 minute TA section per week combined with one usual 50 minute TA section; in the past, both TA sections were 50 minutes in length.
- We will use a standard textbook that thoroughly covers the basic mechanics of calculus, then supplement the text with departmentally produced materials. Some of the material will augment the textbook homework, while other materials (worksheets) are designed specifically for the 80 minute TA sections.
- Students will take their two hour-long midterm exams during the 80 minute TA sections, an effort aimed at eliminating time pressure problems. In the same spirit we write a 2 hour final

exam, but offer students 3 hours in which to take the exam.

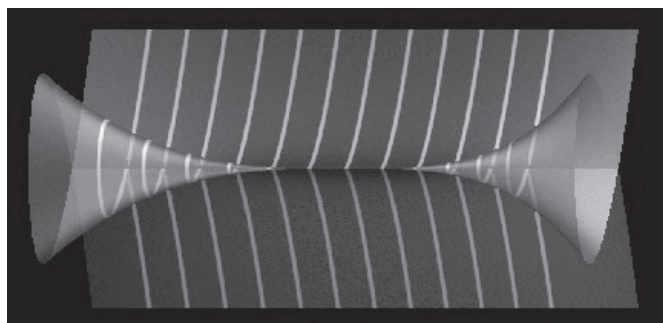
- Course materials will be conveniently archived using the world wide web, an asset for both students and instructors. The web address for Math 124 and Math 125 is <http://www.math.washington.edu/~m12X> where X=4 or 5.

There is also an outreach component to our changes. A small number of community college faculty (three during the 2001-02 academic year) will visit our department during their sabbaticals and be involved in teaching calculus. This will give the department an opportunity to learn about mathematics instruction at local community colleges. At the same time, these teachers will have an opportunity to renew their mathematical interests by becoming involved in various seminars and courses within the department. At the end of a three-year period, we will pursue permanent funding for this “new” calculus through the College of Arts and Sciences. To help us with this effort, we have already begun to work with the Center for Instructional Development and Research (CIDR), which will assist us in assessing the success of our new approach. In the end, our goal is to deliver an outstanding calculus course that prepares our students for further study in the sciences, in engineering, or elsewhere within the university. Of course, along the way, we hope to expose our students to the beauty and power of mathematics.

REU PROGRAM AT THE UNIVERSITY OF WASHINGTON

The National Science Foundation supports Research Experiences for Undergraduates in various disciplines at selected universities in the United States. The University of Washington Mathematics Department has had an REU site since 1988. This program is directed by Ed Curtis and Jim Morrow. The students in the program are undergraduates selected in a competitive process from universities throughout the United States. Each year eight to ten students are selected and are given a stipend from the NSF grant that supports an eight week stay during the summer in which they participate in research projects under the direction of professors Curtis and Morrow. The projects are in the general area of inverse problems for electrical networks. After

a week of lectures and reading, students start to work on projects. In summer 2001, students came from UW, MIT, West Virginia, Emporia State College, Smith College, and Cornell University. The students in this program are exceedingly strong. There are usually one or two University of Washington undergraduates in the program. However the applicants from the University of Washington were so outstanding we had three UW students in the program in 2001. One of the UW students from the year 2000 program is now serving as a TA in the Mathematics Department, even though he is still an undergraduate. Two of the year 2000 REU students were part of a very successful Mathematical Modeling Team that won a “Meritorious Winner” award in the modeling contest sponsored by the Consortium for Mathematics and Its Applications. (For more information about this contest, see Modeling Contest on page 4.)



MILLIMAN LECTURES



Charles Fefferman



Peter Sarnak

Each year the Mathematics Department invites a distinguished mathematician to visit the department for a week and deliver a series of lectures called the Milliman Lectures. This Lectureship is funded by the Milliman Fund, an endowed fund established in 1983 by a gift from Grace Milliman Pollock and her husband, S. Wilson Pollock, in honor of Mrs. Pollock's brother, W. A. Milliman, who received his Mathematics degree from the University of Washington in 1926 and who was a founder of the actuarial firm of Milliman and Robertson.

The 2000-2001 Milliman Lecturer was Charles Fefferman of Princeton University, who visited the department during the week of May 14-18. He gave a series of three lectures on "Unsolved problems of fluid mechanics." Known as an out-

standing speaker, Charles Fefferman drew a large audience from a variety of disciplines. He gave a masterful exposition of the research related to existence and smoothness of solutions for the Navier-Stokes equations — one of the seven "Millennium prize problems" named by the Clay Mathematics Institute. Quoting from the official problem description — authored by Charles Fefferman himself:

"Waves follow our boat as we meander across the lake, and turbulent air currents follow our flight in a modern jet. Mathematicians and physicists believe that an explanation for and the prediction of both the breeze and the turbulence can be found through an understanding of solutions to the Navier-Stokes equations..."

Charles Fefferman has received many awards and honors for his work, among them a Fields Medal in 1978, usually regarded as the mathematical equivalent of a Nobel Prize.

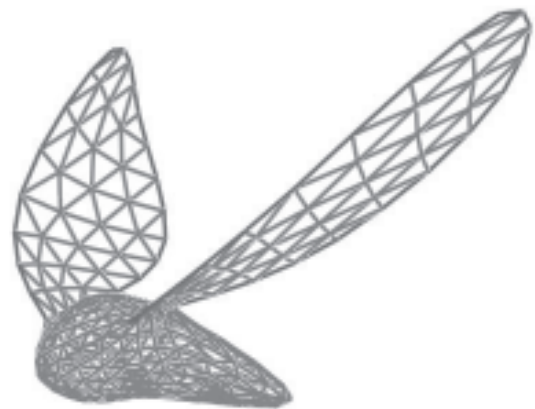
The 2001-2002 Milliman Lecturer was Peter Sarnak of the Institute for Advanced Study and New York University. He visited the department during the week of October 15-19 and delivered three lectures on "Families of L-functions and applications." The individual lectures were entitled

1. Introduction and overview
2. Hilbert's eleventh problem
3. High energy eigenstates on an arithmetic surface.

L-functions, starting from Riemann's zeta function, play a central role in number theory. In his lectures, Peter Sarnak demonstrated some unexpected and exciting connections between number theory, geometric analysis, and mathematical physics. Professor Sarnak is known for his pioneering work related to the Riemann Hypothesis, perhaps, the most famous unsolved problem in Mathematics. Among his many honors is the Polya Prize of the Society of Industrial and Applied Mathematics, awarded in 1998.

In addition to the Milliman Lectures, Peter Sarnak spoke at the "Brown Bag on teaching and learning" seminar, where he described the undergraduate mathematics research laboratory that he had put together at Princeton.

The 2002-2003 Milliman Lecturer will be János Kollár of Princeton University.



OUR DONORS

The following is the list of our friends who have contributed to the Department between July 1, 1999, and June 30, 2000. 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 our Chair, Professor Ron Irving (206-543-1151); chair@math.washington.edu).

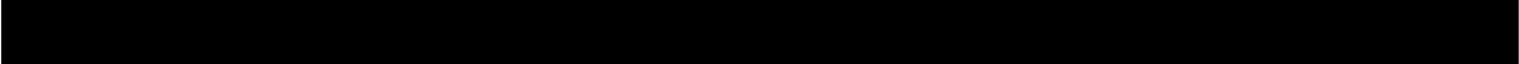
Amy Emiko Yoshihara and Roy Abe	Allen and Jane Johnson	Bror Saxberg and Denise Brudevold
Elsie and Loren Argabright	Lisa Kalnoski	Alice and Arthur Siegal
Judith Arms and Stan Sorscher	Joseph and Jean Karpen	Monroe Sirken
Carol and Charles Austin	George and Cheryl Kauffman	Antoinette Slavich
Alfred Beebe and Shauneen Giudice	Gary and Katherine Kiyonaga	Mark and Caroline Stewart
Bonnie Birch	Robert Kurshan	David and Janie Stewart
Neal Bogue	Victor LaForest	Edgar Lee and Janet Stout
Phillip Bombino	James and Marjorie Leggett	John and Jean Sullivan
Belinda and Michael Borden	Cathy Mader	Leonard Swanson
Meg and J. Michael Bossert	Marnita and Jerry Magner	Robyn Timberlake
Michael Brown and Kathryn Renouard	Stephen Mar	Paul Tseng
David and Pairat Bushnell	Norman and Suzanne Metcalfe	John and Marsha Tuohy
Laura Chihara	Ernest and Erika Michael	Lorraine Volpone
H. James Clifford	Isaac and Lensey Namioka	Matthew Warne and Tracy Johansson
Beverly and James Culpepper	William Norton	Jennifer Weisbart
Betty and James Dolan	Howard and Frances Nostrand	Stephen White
Timmie and Jack Faghin	Gerald and Mary Oberg	Joseph and Robin Wilcox
Carl and Janice Fisher	Kenneth Oien	Nancy Williams
Gerald Folland	M. Scott Osborne	John and Lynn Wilson
Joseph and Joyce Frost	Warren and Barbara Peterson	Wojbor Woyczynski
Dorothy and Joseph Gangler	Trinh Phan	
Dorothy and Leon Gilford	Will Pirhonen	<i>Corporate Donors:</i>
Ahava Goldwater	Frank and Judith Pollard	American Electric Power Co.
Lisa Granat	Glenn and Aileen Pruiksma	Boeing
Owen Green	John and Natasha Pruss	GE Fund
Wilma and Ira Green	Ronald and Gladys Pyke	Hewlett-Packard
Gary and Gail Grimes	Vaho Rebasoo and Maura O'Neill	Lucent Technologies
Henri Hartman	Linda Roberts	Microsoft
Mark Hartman	Burnett and Dorothy Sams	PACCAR
Jeffrey Hendershot	David and Barbara Sando	
Joseph and Sally Jaeger	Donald and Linda Sando	

Each year the Department receives gifts from its alumni and friends, gifts, usually in the form of financial contributions, of immense value to us. These gifts permit us to carry on activities that are of importance to our students and to our scholarly work. For instance, they provide money for scholarships, fellowships, and prizes for our students, undergraduate and graduate both. They support visits to our Department by distinguished mathematicians from other institutions, both American and foreign. They give the Department a much-needed element of flexibility to meet special needs as they arise. For these contributions we are truly thankful. We hope to continue enjoying the support of our many alumni and friends. If you are thinking of making a gift to the Department or, perhaps, remembering the Department in your will, we invite you to discuss the matter with Professor Ron Irving, the chair of the Department (206-543-1151 or chair@math.washington.edu) or with Dondi Cupp of the Development Office in the College of Arts and Sciences (206-685-6736, dcupp@u.washington.edu.)

Attention Husky Fans!

Did You Know That You Can Now Earn Tye points by Contributing to the Mathematics Department?

Tye program members supporting the University at the President's Club level (\$2,000 and above) and who currently qualify for priority seating in Husky Stadium (Tye seats) and the Bank of America Arena at Hec-Edmundson Pavilion (Key 100 and Fast Break seats) can receive one (1) Tye point for every \$100 given to academic programs within the University. For details regarding Tye points go to the Husky homepage www.gohuskies.com —navigate the site by clicking on Departments, then The Tye Program, and finally Priority Seating Opportunities.



UNIVERSITY OF WASHINGTON
DEPARTMENT OF MATHEMATICS
Box 354350
Seattle, Washington 98195-4350

Nonprofit Organization
U. S. Postage PAID
Seattle, WA
Permit No. 62