Math

Department of Mathematics

## Letter from the Chair

Dear colleagues and friends of the department:

Our big news this spring is that the department has received a VIGRE grant from the National Science Foundation. This grant is for \$3.6 million and will run for five years. The VIGRE program at UIUC will provide fellowships for graduate students, support for new postdoctoral positions, and funds for research experiences for undergraduate students. The VIGRE program will also encourage a variety of new interactions across all faculty and student levels. Meetings with graduate students and faculty members will be held this spring term to discuss these opportunities.

I am also very glad to announce that a number of excellent mathematicians will be joining the department as new faculty and postdoctoral fellows this coming fall. Iwan Duursma, Ilya Kapovich and Andreas Stein are the new assistant professors. Luis Alvarez-Consul, Peter Brinkmann and Marco Schlichting are the new J.L. Doob Research Assistant Professors who will start here in Fall 2000, and Bernhard Lamel and Panayotis Kevrekidis will begin in Fall 2001. Three VIGRE postdoctoral fellows will be joining the department with support from the new VIGRE grant. They are Sean Sather-Wagstaff, Jozef Skokan, and Karen Shuman. Another postdoctoral fellow, Yangsuk Ko, will join us with support from both the Center for Process Simulation and Design and the Department of Mathematics.

This spring term, three of our long term faculty, Ararat Babakhanian, John Gray and Donald Sherbert, are retiring. Mathematics librarian Nancy Anderson and office manager Pat Coombs are also retiring after long and dedicated service to the department. We thank them all for what they have done for us, and wish them well in their new activities.

This year the department has again been the scene of much mathematical activity, with many classes, talks in seminars by visitors and our own faculty members, colloquia, workshops, and small conferences. Particularly notable is that the number theorists have been organizing a series of important events this year. Their Special Year in Number Theory is culminating in Times

Spring 2000

the Millennial Conference, a major international conference to be held on campus on May 21–26.

The close of my first year as department chair is rapidly approaching. Thinking back, it has been a pleasure to be chair for this year because of the involvement of our many talented faculty members and staff. Mostly, this year has been a good one. Yet the challenges for the next year are many and diverse. Two of them stand out. One challenge will be to get the VIGRE program running effectively so that it maximizes this opportunity for the department. The other challenge will be to continue with our efforts to bring new faculty members and graduate students to UIUC to join in our enterprise and to help build an even more diverse and successful department. Neither of these challenges will be met without effort. But I am optimistic that together we are capable of handling these tasks with great results.

Yours truly,

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Joseph Rosenblatt

University of Illinois at Urbana-Champaign

### **Altgeld restoration**

The Mathematics Department, together with the UIUC campus, will restore and rehabilitate the third floor of the Library in Altgeld Hall. Completed in 1897, Altgeld, which is listed on the National Register of Historic Places, is one of the few Romanesque buildings in the Midwest and was named for Governor John Peter Altgeld, a passionate supporter of higher education. Built to house the university library, Altgeld later became the law building and then the mathematics building.

Altgeld has been called "the most important structure on campus." The magnificent library is the main feature. Much care was taken with the library's interior decoration, which was designed by Newton A. Wells and completed in March 1900. With its colonnaded arcades, portrait medallions, and murals in the lunettes below the domed ceiling, the library was planned to create an environment for faculty and students that was beautiful as well as useful.

But through the years the decorations on the walls and ceiling of the rotunda have deteriorated. Many of the murals and floral designs have been covered or painted over and those that remain are flaking away and disappearing.

Work currently underway includes restenciling of the walls and ceiling, new lighting which will resemble the original light fixtures and the refinishing of the wood floor. Other areas will be restored as time and funding permit.

To contribute towards the Altgeld Hall Restoration project see "*How to Donate*" on page 9.

## NSF VIGRE grant awarded

The National Science Foundation (NSF) has awarded the UIUC Department of Mathematics a grant for Vertical Integration of Research and Education (VIGRE) for \$3.68 million for 5 years.

In response to many recommendations, the NSF's Division of Mathematical Sciences (DMS) designed this program. Its goals are (1) to prepare undergraduate students, graduate students, and postdoctoral fellows for the broad range of opportunities available to individuals with training in the mathematical sciences, and (2) to encourage math departments to consider the full spectrum of educational activities and their integration with research, with particular attention to the interaction of scholars across boundaries of academic age and departmental standing.

Each VIGRE proposal had to present a coherent plan to integrate vertically three main components: (1) a graduate traineeship program, (2) an undergraduate research experience program, and (3) a post-doctoral fellowship program. Two optional components, developing curriculum/educational materials and outreach activities, were also considered for funding, as long as they were properly aligned with one or more of the main components.

The Department of Mathematics has 73 full-time faculty members who are experts in many mathematical areas, it teaches 10,000 students each academic year, and it uses technology in teaching mathematics. The department's objectives include conducting research of the highest quality, encouraging interdisciplinary research, creating seminars and teaching initiatives that enable postdoctoral associates and graduate students to participate in research, and improving the undergraduate experience so that the students will be prepared for a world in which mathematics plays an increasingly important role. The VIGRE grant will enable the department to create vertical integration for accomplishing these objectives.

Successful mathematics departments in this new century must be diverse in instructional and research pursuits and intellectually integrated in how they follow these pursuits. Our faculty are active in broad areas of research and are developing new and better methods of instruction. At the same time, the Department of Mathematics has strong links with other departments on campus for both research and instruction.

With the VIGRE funding, the department will be able to extend the innovative programs it has and to plan others in order to realize such a vision.

The co-principal investigators responsible for applying for the successful grant are: Joseph Rosenblatt, John D'Angelo, Paul Weichsel, John Gray, Graham Evans and Phil Griffith.



## Special Year in Number Theory 1999–2000 activities

The Special Year in Number Theory 1999–2000, which began last fall with three conferences in Number Theory, Arithmetic Geometry and Cryptography, and Model Theory, is continuing. Visitors this spring include Helmut Koch of Humboldt University in Berlin, who holds a George A. Miller Visiting Professorship and is giving a course on class field theory; Visiting Professor Robert F. Tichy of the University of Graz, Austria, who is teaching a class on uniform distribution, normal numbers, and discrepancy; and Visiting Scholars Mary Armon of Knox College, James Carter of the College of Charleston, Jeff Thunder of Northern Illinois University, and Wen-Bin Zhang of the University of the West Indies.

Michael Bennett and Mark Bauer, a student of Nigel Boston, organized a Graduate Student Conference in Number Theory, which took place March 25–26.

The culmination of the Special Year in Number Theory will be the Millennial Conference on Number Theory, to be held May 21–26 on the UIUC campus. With an expected attendance of more than 250 number theorists from around the world, and well over 100 talks, this conference is likely to be the largest of its kind in recent years.

The conference will honor Emeritus Professor P.T. Bateman, who recently celebrated his 80th birthday and who, during his 15 years as department head, built the UIUC Department of Mathematics into one of the leading number theory centers in the world. Professor Bateman will give a short talk on Sunday, May 21, which will include some reminiscences about mathematicsand mathematicians. Also that evening, a former student of Bateman's, Professor Marvin Knopp of Temple University, will speak on Bateman's work; and Professor Robert Rankin of Glasgow University, the last student of the great British mathematician G.H. Hardy, will speak about Hardy and his work. The conference banquet will be held Thursday evening, May 25.

Immediately before and after the Millennial Conference, two workshops will be held: May 19–20, a workshop on problems at the interface of probability and number theory, organized by A.J. Hildebrand and Walter Philipp; and May 27–28, a workshop on problems in transcendence theory, organized by Michael Bennett.

During the summer there will be a two-week instructional conference, organized by Nigel Boston, on algebraic number theory related to Fermat's Last Theorem. The final event of the Special Year will be a conference on q-series with applications to combinatorics, number theory and physics, to be held on October 26–28; the organizers of this conference are Bruce Berndt and Ken Ono of Penn State University.

More information about these and other special year activities can be found on the Special Year website **www.math.uiuc.edu/nt2000**.

# Alumni After Math

If you have news to contribute to *Alumni After Math*, please complete this form, send it on a separate sheet, or e-mail to Tori Corkery, Asst. Editor, *Math Times*, 263 Altgeld Hall, 1409 W. Green St., Urbana, IL 61801, or e-mail: corkery@math.uiuc.edu

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About *After Math*: In cases where we receive more news items than we can accommodate in an issue, we will include them on a first received–first included basis as space permits.

## Faculty Notes -

Aimo Hinkkanen recently became a Faculty Affiliate at the National Center for Supercomputing Applications here at the UIUC. Since January 1999 he has been working on a project on visualization in complex dynamics using NCSA supercomputers with Hartje Kriete of Germany's University of Göttingen and Bernd Krauskopf of the University of Bristol, U.K. Some animations related to this project can be found on Hinkkanen's web page at www.math.uiuc.edu/~aimo/.

This summer Hinkkanen will go to Oberwolfach for three weeks under the Research-in-Pairs program where he will collaborate

Math Times is published twice a year by the Department of Mathematics, University of Illinois at Urbana-Champaign. Editor Margot Jerrard Asst. Editor/Layout Tori Corkery George Francis Drawings Distribution Sara Nelson and Lori Dick **Department** of **Mathematics Main Office 273 Altgeld Hall** 1409 W. Green Street **Urbana, IL 61801** tel: 217-333-3350 fax: 217-333-9576 office@math.uiuc.edu www.math.uiuc.edu with Professor J.M. Anderson of University College, London. In July Hinkkanen will give a short course at a summer school at the University of Joensuu, Finland, and in August will give a talk at the Rolf Nevanlinna Colloquium in Helsinki, Finland.

This fall while on sabbatical **Alex Tumanov** participated in a Complex Analysis Program in the Erwin Schrödinger Institute in Vienna, Austria where he gave a talk. He also gave invited talks at the University of Bonn in Germany and in Sweden at the universities of Gothenburg and at Uppsala.

**Robert Jerrard** is on leave and is spending this year at the Max

Planck Institute in Leipzig, Germany, which was formerly in East Germany.

In February **Robert Fossum** was made a fellow of the American Association for the Advancement of Science at the association's annual meeting in Washington, D.C. Each year the AAAS Council elects fellows whose "efforts on behalf of the advancement of science or its applications are scientifically or socially distinguished." Professor Fossum is being honored for his contributions to ring theory and for more than 15 years of outstanding service as secretary of the American Mathematical Society.

## Kostochka joins mathematics faculty

Professor Alexandr Kostochka joined the faculty in February, and says he likes Urbana because he finds the campus here similar to the one at Novosibirsk, Russia, where, until now, he spent his professional life, and that "he found the university people here very friendly."

He was a leading researcher at the Siberian Branch of the Institute of Mathematics of the Russian Academy of Sciences and also a professor in the Department of Theoretical Cybernetics of the Novosibirsk State University. A graduate of Novosibirsk State University he received his degrees there, including his doctorate of science in mathematics from the Sobolev Institute of Mathematics.

Professor Kostochka is a leader in combinatorics. His research centers around the areas of graph theory, random graphs, and finite ordered sets, and he has had outstanding results in graph coloring. He has worked with

mathematicians in the United States as well as in many countries in Europe. They say his work is impressively original, and displays high technical ability and ingenuity. He has lectured at many universities and at international meetings. Among the talks he gave in 1999 were two in Hungary, one on Paul Erdös and his mathematics and another at the Budapest Coloring Workshop. He also spoke in Urbana at the AMS Meeting #941.

With him in Urbana is his wife Elena and youngest child Tatyana.



Alexandr Kostochka

## New faculty and postdocs to join faculty in Fall 2000

Three new assistant professors are joining the UIUC Department of Mathematics and will start in August 2000. They are:

Andreas Stein, a native of Germany, is from the University of Waterloo in Canada where he has been a postdoctoral fellow in the Department of Combinatorics and Optimization. Before that he had been a postdoc at the University of Manitoba in the Department of Computer Science. He received both his diploma in mathematics and his doctorate from the University of Saarlandes where his dissertation title was "Algorithms in Real Quadratic Function Fields." His research interests include number theory, hyperelliptic and elliptic curve cryptography, analytic number theory and computational algebraic geometry.

Iwan Duursma was born and educated in The Netherlands where he received first a masters in aerospace engineering from Delft University of Technology, then a masters in mathematics from the University of Amsterdam and, in 1993, a Ph.D. in mathematics from Eindhoven University of Technology. The title of his thesis is "Decoding Codes from Curves and Cyclic Codes," and many of his publications have been about codes and decoding. He has been a researcher at the University of Puerto Rico, a senior member of the technical staff of AT&T's Research Laboratory in New Jersey, and most recently has been at the University of Limoges in France.

**Ilya Kapovich,** a graduate of Novosibirsk State University in Russia, received his masters and his Ph.D. from the CUNY Graduate Center in New York. His Ph.D. thesis was on quasiconvex subgroups of one-relator groups with torsion. His research interests are in geometric and combinatorial group theory, CAT(0)-spaces and R-trees, low-dimensional topology and Kleinian groups. Recently he has been an assistant professor at Rutgers University and before that he was a Lady Davis Postdoctoral Fellow at Hebrew University in Jerusalem.

#### **Doob Postdocs**

Also joining the department this fall will be three new J.L. Doob Assistant professors. These professorships are in honor of Emeritus Professor Joseph Doob. The recipients are:

Luis Alvarez-Consul, a student of mathematics at the University Autonoma of Madrid where he was awarded a four year pre-doctoral fellowship, expects to receive his Ph.D. this spring. His thesis title is "The Geometry of Dimensional Reductions in Gauge Theory." His research interests are in gauge theory and algebraic geometry.

**Peter Brinkmann**, who received his Dipl.-Math in 1997 from the University of Bonn, is now a graduate student and teaching fellow at the University of Utah. His Ph.D. thesis is "Mapping Tori of Automorphisms of Hyperbolic Groups." He has been a visitor at the Henri Poincaré Institute in Paris and at the summer graduate program at MSRI in Berkeley.

**Marco Schlichting**, born in Germany, is now at the University of Paris 7 where he received his Ph.D. this year with the thesis "Delooping the K-theory of Exact Categories and Negative Kgroups." He completed his undergraduate work at Germany's University of Bonn, his graduate work in Paris.

#### **VIGRE** Postdocs

The new VIGRE postdocs joining the department this fall are:

Sean Sather-Wagstaff, from the University of Utah where he has been a University Research Fellow, as well as a teaching fellow. He received his undergraduate degree from the University of California at Berkeley. He has worked in algebraic geometry.

Jozef Skokan expects to receive his Ph.D. on "Uniformity of Set Systems" this summer from Emory University where he held a full graduate school fellowship and tuition scholarship. He received an M.S. in applied mathematics from the Czech Technical University, Prague, in 1995.

**Karen Shuman** is from Dartmouth College, Hanover, NH, where she is a Ph.D. candidate. Her thesis title is "Signal Processing Bases and the Jacobi Group." In January at the AMS/MAA Joint Meeting she gave a talk on "Completeness and the Jacobi Group."

#### **CPSD** Postdoc

Yangsuk Ko, who went to Seoul National University for his undergraduate work, then to Purdue for his M.S., will arrive here in August, after he receives his Ph.D. from Purdue University. His thesis title is "Analysis of Solutions to a Coupled Ginzburg-Landau System for Layered Superconductors." His postdoctoral appointment at UIUC is funded by the Center for Process Simulation and Design and the Department of Mathematics.

## Congratulations to student and faculty award winners

In 1996 the Department of Mathematics established prizes in the four undergraduate majors. A student may be selected once in her/his undergraduate career for such a prize. This year's winners are:

Undergraduate Major Award in Actuarial Sciences Michael Mielzynski, a senior student in Actuarial Sciences, was awarded the Award in Actuarial Sciences. He has an impressive academic record and has been recognized as one of the strongest students in the actuarial program.

#### **Undergraduate Major Award in Mathematics**

Alison Mastny, a senior student in Mathematics, received the Award in Mathematics. She has a very strong academic record which she achieved on a demanding course schedule. She was recognized as one of the highest ranking LAS students.

# Undergraduate Major Award in Math and Computer Science

**Matthew Gill Byron,** a senior in Mathematics and Computer Science, was awarded the Award in Math and Computer Science. He has a very strong academic record and was nominated by both the Departments of Mathematics and Computer Science as an excellent candidate for the award. His work in math classes was very well received.

## Undergraduate Major Award in Teaching of Mathematics

**Anh Ly,** a third year student in Education, received the Award in Teaching of Mathematics. Her academic performance is extremely good. She has done this on a very challenging course schedule for a third year student. Her performance in math classes compares favorably with that of graduate students.

#### The Brahana Prize

The Brahana Prize is awarded to a graduating senior that had a distinguished mathematics career as an undergraduate. Professor H. Ray Brahana was a distinguished member of this department from 1920 to 1963. His work involved finite groups and related geometric structures. This year's winner is **Eiji Aoki**, a senior in Mathematics. In 1998, he became the "Mock Putnam Champion" (highest scorer in a series of Putnam practice exams that the Department of Mathematics has been organizing). He won the Salma Wanna Award in 1998 and was awarded the Undergraduate Major Award in Mathematics in 1999.

#### **Bateman Prize in Number Theory**

The Bateman Prize, which is given annually, is awarded in recognition of outstanding research on partitions and related asymptotic analysis. This year's winner is **Yifan Yang**, a fifth year student in number theory working with Professor A.J. Hildebrand.

#### Greenwood-Trjitzinsky Prize

The winner of this year's Greenwood-Trjitzinsky Prize Competition was **Mark Hoemmen**. The title of his entry was "An extension of the square recurrence relation, and properties of the square matrices it generates." Mr. Hoemmen is a second year undergraduate.

**Campus Award for Undergraduate Teaching Joe Miles** and **Boris Petracovici** are among this year's recipients of the Campus Award for Undergraduate Teaching. Professor Miles specializes in analysis. Mr. Petracovici, a graduate teaching assistant, is a third year graduate student working with Robert Jerrard in partial differential equations.

Winners of the Irving Reiner Memorial Award, Kuo-Tsai Chen Award, and the TA Instructional Awards were not available in time for this issue of the Math Times. They will be reported in the fall issue.

There has not been any science so much esteemed and honored as this of mathematics, nor with so much industry and vigilance become the care of great men, and labored in by the potentates of the world, viz, emperors, kings, princes, etc.

—Benjamin Franklin

# UIUC math students compete in 60th annual Putnam Competition

Eleven UIUC students participated in the 60th annual Putnam Competition, held in December 1999. The UIUC team, consisting of **Eiji Aoki, Kaushik Roy**, and **Ken Scheiwe**, placed 32nd out of 431 participating colleges. The highest scorer was **Eiji Aoki** who received 40 out of 120 possible points and was ranked 80th among 2,900 participating students. The team was coached by Professors Diamond and Hildebrand. The 1999 UIUC Undergraduate Mathematics Contest was held April 15, 2000. This contest is a local version of the Putnam Competition, formerly known under the name of "Orange and Blue Contests." The winners will receive cash prizes totaling \$200.

More information about contestrelated activities at UIUC can be found at the math contests webpage at http://www.math.uiuc.edu/ ~hildebr/contests.html.

## Friedman awarded Churchill Scholarship

Brad Friedman has been awarded one of 10 Churchill Foundation Scholarships for U.S. students for the 2000–2001 academic year to study mathematics at Cambridge University. The level of competition and the caliber of successful candidates place this scholarship among the most prestigious in the world.

Brad has had a distinguished career as a mathematics major at the University of Illinois. He took Math 347, Real Analysis, one of the most difficult undergraduate mathematics courses, as a first semester freshman. He took no mathematics courses as a sophomore, but instead worked his way through most of the required courses for the major by passing proficiency exams. He emerged from this exile to take the graduate algebra course Math 401 at the start of his third year. During this time he was also completing a degree in performance piano for which he has won several awards. In his third year, he was appointed as an undergraduate teaching assistant, a position granted each year to a few truly outstanding undergraduate mathematics majors. Last year he won the Brahana Prize for the undergraduate with the most outstanding career in mathematics.

Brad has been a successful competitor in the W. L. Putnam Undergraduate Mathematics Competition, a contest that is open to all undergraduates in the U.S. and Canada, which each year attracts over 2000 of the most talented mathematics students. In each of the three years that he participated in the contest, Brad ranked among the top 80 contestants overall and was the highest scoring participant from UIUC. Brad was also the winner of the 1999 UIUC Undergraduate Mathematics Contest.

Brad is currently a graduate student and teaching assistant in mathematics while continuing to take courses in music.

## Jerry Uhl NetMath Fund established

Because many talented high school students cannot take the mathematics courses they need because the schools they attend do not offer them, the **Jerry Uhl NetMath Fund** has been established. This fund will provide financial assistance for these students to get computer-based mathematics classes through the university's NetMath program.

Illinois NetMath was founded in 1992 as a joint venture of the Department of Mathematics and the Office of Academic Outreach to provide students, through the internet, with computer-based calculus courses in their own high schools, using the same awardwinning Calculus&Mathematica course taught on the UIUC campus and at other universities and community colleges. This software was written by Professor Jerry Uhl. Emeritus Professor Horacio Porta and Professor William Davis of Ohio State.

Since then hundreds of high school students have taken NetMath and entered the university well prepared in mathematics. But not all students can afford the tuition for these courses. Without them many students in science, engineering or mathematics start at a disadvantage and some are unable to graduate in four years.

The Jerry Uhl NetMath fund has been set up by the UI Foundation to help these students. To contribute see "*How to Donate*" on page 9.

More information about the NetMath program is available on the web at:

http://www-cm.math.uiuc.edu and http://netmath.math.uiuc.edu.

## Babakhanian, Gray and Sherbert retire in Spring 2000

Three faculty members who have contributed much to the department will retire this year and will be honored at a reception this spring.

**Ararat Babakhanian** received his B.S. and, in 1966, his Ph.D. from Columbia University where he had been a science faculty fellow.



Ararat Babakhanian

In the summer of 1966 he was Deputy Chairman of the Mathematics Department at Columbia. While a graduate student, he was an instructor at Hunter College, Steven's Institute of Technology and NYU, where he received an award recognizing him for excellence in teaching. He joined the **UIUC Department of Mathematics** in Fall 1966. He has been a visiting faculty member at Columbia and, many times, a visiting scholar and professor at Harvard. Since 1977 he has been an editor of the Teheran Journal of Mathematics.

John Gray, who received his B.A. from Swarthmore, was awarded his Ph.D. from Stanford University in 1957. From 1957 until 1959 he was at the Institute for Advanced Study in Princeton, and from 1959 to 1962 a Ritt Instructor at Columbia University. That fall he joined the UIUC Department of Mathematics. Since 1986 he has also had a zero-time appointment as a professor in the UIUC Department of Computer Science.

In 1995 he became the Director of Graduate Studies for the Department of Mathematics.

He has been a Fulbright Hayes Senior Scholar at the University of Sydney, Australia, and twice been an associate in the UIUC Center for Advanced Study. Among the universities at which he has held visiting positions are the ETH in Zurich, Switzerland; Heidelberg University; and the University of Saarbrucken, Germany. Professor Gray has been the organizer or chairman of almost 20 international meetings in category theory and one on computer science and logic, which was funded by the NSF. He has given more than a hundred invited lectures in the United States and Europe, and has had editorial positions on the Journal of Pure



John Gray

and Applied Logic, Mathematical Developments in Computer Science, and Applications of Category Theory.

**Donald Sherbert** graduated from the University of Wisconsin in 1957 and received his Ph.D. from Stanford University in 1962. His thesis, "Banach Algebras of Lipschitz Functions," was written under the direction of Karel de Leeuw.

He joined the UIUC Department of Mathematics in 1962. He has written a number of research papers and expository papers, directed Ph.D. dissertations and coauthored four textbooks on under-



Donald Sherbert

graduate mathematics. The third edition of *Introduction to Real Analysis*, written with Robert Bartle, was published in 2000.

From 1973 to 1987 he was the Department of Mathematics Director of Undergraduate Programs and Advising Chairman, during which he served on two national panels sponsored by the MAA. He has taught at a technological institute in Malaysia and been invited to Monash University in Melbourne, Australia. In 1981, he joined the math department's actuarial science program where he has devoted much of his time to teaching and advising students.

Sherbert has always had a strong commitment to teaching. In 1985, he was awarded the LAS College Award for distinguished teaching, and in 1996 he won the campus Luckman Award for Distinguished Undergraduate Teaching.

#### Nancy Anderson, Librarian, retires Library Endowment Fund Established

Mathematics Librarian Nancy Anderson, professor of library administration who is retiring this spring, has pledged \$5,000 annually over the next ten years to initiate an endowment to support the Mathematics Library in perpetuity. This pledge is a challenge to be matched by gifts from faculty, students, alumni, and friends.

The Math Library, which has been ranked as third in the world, is in danger. The cost of books and journals keeps rising and funding from the state has been increasingly inadequate. The average cost of a mathematics book last year was \$85 and the cost of a journal was \$740.

As the mathematics librarian from 1972 until now, Nancy Anderson has been responsible for all aspects of service and collection development in the library. The library has nearly 100,000 volumes and 1000 current serial collections. In the early 1980s she was awarded a two year Title II-C grant to acquire unowned mathematical monographs reviewed by Mathematical Reviews and to input cataloging records into OCLC in order to establish a national document delivery center for mathematics.

A graduate of Smith College, she received her M.S. from Columbia University in library science in 1966. Among the honors she has received is an Achievement Award from the Physics-Astronomy-Mathematics Division of the Special Libraries Association. She haspublished articles in the *Notices of the American Mathematical Society* and has served on the MAA steering committee of the undergraduate program in mathematics which worked to revise the basic library list. The findings were published as "Library Recommendations for Undergraduate Mathematics" and "Two-Year College Mathematics Library Recommendations" by the MAA.

To contribute to the Anderson Library Endowment fund, see "*How to Donate*" below.

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Department of Mathematics, UIUC

## Advancement of science depends on mathematics, Tondeur says

"Mathematics is a key to current research in science and engineering," says Philippe Tondeur, the National Science Foundation's Director of the Division of Mathematical Sciences, and former chair of the UIUC Department of Mathematics. The NSF, through the Division of Mathematical Sciences (DMS). provides over 70% of all federal support for mathematics in the United States and is responsible for building a broad knowledge base and developing a diverse, internationally competitive workforce in the mathematical sciences.

"Recent decades have seen extraordinary advances in mathematics and its applications," he continues. The mathematization of science and engineering will accelerate, and new mathematical modeling will transform data into knowledge. Mathematics will also provide critical support for emerging areas across the science spectrum. In particular, there are fantastic opportunities for contributions to biology and medicine.

These developments are possible because of fundamental research in mathematics. An increased investment in mathematics at this time is important. It will bring enormous added value.

#### **Educational Needs**

A pressing national need is to improve education at all levels, Tondeur says, and to prepare a scientific and technical workforce for the challenges of the 21st century. Knowledge is constantly advancing. Not only will specific skills be needed, but even more important, people must be adaptable. Skills in mathematics are essential and will be needed in the future.

Increased investment in the mathematical sciences will affect both research and university education; research is done in an educational context, education takes place through research. Research and education are two sides of the same coin—discovery. The DMS must aim for areas where its impact will be greatest.

#### Assessment of the U.S. Mathematical Sciences

A panel of leading mathematicians, most of them from outside the United States, was asked by the NSF to assess mathematical sciences in the U.S. and issue a report in 1998.

The report states that the current achievements of U.S. mathematics is built on a fragile personnel basis. More than half of the mathematicians in the U.S. today began their scientific studies abroad. The report warns that U.S. leadership in mathematics is at risk. It also states that at the current level of federal support, it is doubtful if the U.S. can continue to lead.

While U.S. mathematics is now dominant, there are several trends undermining it. The report states that if the position of U.S. mathematics erodes "we will pay a heavy price in delayed progress in technology, science, and economic productivity. Only if policy-makers, legislators, and the mathematics community all understand this danger alike can they effectively act to avoid it." At least two actions are clearly urgent:

• using existing resources in more effective ways, and

• providing more resources for the mathematical sciences.

#### **DMS's** Actions

DMS has begun to act on this report by creating a new national institute in multidisciplinary mathematics, the Institute for Pure and Applied Mathematics at UCLA, and through innovative training programs such as Vertical Integration of Research and Education program (VIGRE). With increased resources, DMS could pursue a broad agenda. It could enlarge such training programs, increase size and duration of grants to individual investigators, strengthen links to science and engineering, fund involvement in other disciplines, and support a recently started Focused Research Groups program.

The Focused Research Group program, initiated immediately after Tondeur's arrival at the NSF, allows groups of researchers in the mathematical sciences to respond to pressing scientific needs, to take advantage of current scientific opportunities, or to prepare the ground for anticipated scientific developments in mathematics. Projects should be timely, limited in duration to one to three years, and substantial in scope and impact. After the program was announced in late summer 1999, more than 100 proposals were received by the FY 2000 deadline and are currently being reviewed.

#### Conclusion

Mathematics must attract talented young people and must train a mathematically sophisticated science and engineering workforce

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#### **Tondeur**, continued

in order to avert the risk described in the report of the senior mathematicians. Otherwise the number of U.S. mathematical scientists will dwindle, with the corresponding danger to U.S. scientific interests.

With increased support, mathematics in the U.S. will continue to develop successfully. At one end of the scale, cosmologists are constructing a detailed picture of the history and structure of the universe-and it is an account couched in mathematics. At the other end, particle physicists give an account of quantum theoryagain couched in mathematical terms. On the medium scale, genetics is turning a significant part of biology into a chapter of information science, a predominantly mathematical theory. The flow of waters in rivers, the flow of air around wings, and the flow of blood in arteries are modeled by partial differential equations. The manufacturing of higher capacity micro-chips uses stochastic partial differential equations models. All of these advances depend on advances in mathematics.

We are living in an exciting period of scientific discovery, and mathematics plays an increasing role in the sciences. There is a great need for major advances. With increased support, the mathematical sciences will be able to respond to the challenge.

The public, which relies on mathematical sciences to an increasing degree in everyday life and is beginning to understand its importance in fundamental discovery, will be the ultimate beneficiary.

## **Pat Coombs retires**

Office Supervisor Pat Coombs, who worked for the Department of Mathematics since February 1965, retired January 31, 2000. A native of Champaign, Pat attended the University of Illinois before she began to work for the department in a variety of jobs beginning as a mail room clerk, becoming a typist, then an advising secretary for the undergraduate office, graduate advising secretary and finally as office supervisor.

During the 35 years she was with the department she saw the revolution in office technology occur, from typewriters to word processors with programs designed specifically for mathematical typing, from ditto masters and mimeographs to today's photocopying.

In her retirement Pat will not be idle. She has a realtor's license and is looking forward to new challenges.

## **Distinguished lectures series held**

Two mathematicians, one from Pennsylvania State and the other from Princeton, were invited to give this spring's Coble and Trjitzinsky Memorial Lectures. The lectures are named in honor of two late UIUC Department of Mathematics faculty members. Each year a distinguished mathematician is invited to give each series.

#### Arthur B. Coble Memorial Lectures

Professor George E. Andrews, Pennsylvania State University, gave the Coble Memorial Lectures on the campus March 7–9. Professor Andrews, who has been collaborating with Bruce Berndt on solving equations in Ramanujan's lost notebook, gave two talks on the notebook. The notebook contains much of the mathematical work done by Ramanujan during the last year of his life when, although he was very ill, Ramanujan was at the height of his mathematical powers and produced what Andrews described as overwhelming mathematical surprises. His final talk was on partitions and positivity. He was hosted by Bruce Berndt.

#### **Trjitzinsky Memorial Lectures**

Professor Elliott Lieb of Princeton University was the speaker at the Trjitzinsky Memorial Lectures April 5–7. The titles of his talks were "The Quantum Mechanical View: A Highly Successful but Still Incomplete Theory," "The Mathematics and Physics of the Second Law of Thermodynamics," and "The Bose Gas: A Subtle Many-Body Problem."

## **Joseph Landin**

Emeritus Professor **Joseph Landin** died on Sunday, February 27, 2000, in Florida. Professor Landin received his Ph.D. from Notre Dame and joined the UIUC Department of Mathematics in 1946. In 1964 he left to become head of the mathematics department at the University of Illinois at Chicago and remained there until 1975 when he was appointed head of the math department at Ohio State University.

## Education grant received for web-based math program

Emeritus Professor **Tony Peressini** and Lecturer **Debra Woods** have been awarded a grant from the Higher Education Cooperation Act for a web-based program to teach high school math teachers how to use technology in their classrooms. The program offers course modules in such subjects as the use of software packages such as Geometer's Sketchpad and Mathematica as well as the development of web-based classroom resources.

Teams of Illinois community college mathematics instructors are being trained as instructors for the course modules they will offer to the high school teachers. These teams will then help the high school teachers to complete these course modules themselves through a combination of community college workshops and on-line instruction. The course modules and other resources are available on the university's Math Teacher Link website at http://mtl.math.uiuc.edu. The initial group of cooperating community colleges are: Oakton, Sauk Valley, Parkland, and Lincoln Land.

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