



# Math Times

University of Illinois at Urbana-Champaign

Fall 1998

## Letter from the Chair

Dear Colleagues and Friends of the Department:

Our graduation speaker at the spring commencement, **Charles R. Hadlock**, a 1970 Ph.D. from our department, who is now dean at Bentley College in Waltham, Massachusetts, spoke highly of mathematics and said that its teaching at UIUC was a key to his successful professional life, a message which was well received by the audience. He gave his address in verse, a first for our graduation ceremony.

Dean Hadlock remembered and singled out for praise the teaching of **Hiram Paley**. Paley retired this summer after 39 years of service, but I can report that we see him daily in the department as we did before. This is true for many of our emeriti professors, by now a large group of senior mathematicians. The person introducing the speaker reminded the graduates of a

saying by Madeleine Albright: "Graduation is one of the five great milestones of life. The others are birth, marriage, death and the day you finally pay off your student loan."

This fall we were joined by another remarkable group of talented new faculty: **Michael Bennett**, **Jared Bronski**, and **Alexander Buium** (see page 4). **Maria Basterra** and **Nadya Shirokova** are the two new J. L. Doob Research Assistant Professors (page 7). The new Provost on our campus, **Richard Herman**, is a further addition to our mathematics faculty. We also have a large number of visiting professors and visiting scholars, who will contribute to and benefit from the intellectual life of the department. Thirty-four new graduate students, who come from all over the globe, have joined the department.

An interesting feature of the current evolution of the

mathematical sciences is the increasing impact and interaction of mathematics with many other disciplines. Mathematics is fundamentally interrelated with the sciences and this interrelation contributes to the health of the mathematical sciences. Mathematics plays a fundamental role in the growing interdependence of the sciences. The classical view of applied mathematics is becoming absorbed in this broader view of mathematics together with its interdisciplinary aspects. A wide field of new opportunities for mathematical research has opened in the last decades.

This state of affairs should gradually influence a restructuring of the mathematical curriculum, so as to develop the next generation of mathematicians with a somewhat broader profile. It is important to exhibit the natural

inter-relatedness of the subdisciplines and the richness that flows from it. Because of the abstract nature of mathematics it seems to fall to the mathematician to be able to speak the language of the scientist.

If mathematicians can speak that language, it is more likely that they can formulate models and the mathematical questions flowing from them. This makes it desirable that in their studies aspiring mathematicians are exposed to more science than they have been before. This is an essential complement to the now well accepted pervasive significance of computational methods in mathematical research.

Our goal is to secure and provide support for vigorous and first class research and instruction in mathematics, to encourage interdisciplinary mathematical activities, and to support a continuous renewal of the next generation of mathematical scientists through our graduate and postdoctoral programs. The support should also include critically needed infrastructure in the form of supporting the evolving computer network and the mathematical library. We appreciate all the help we receive from friends of the department.

Yours,

Philippe Tondeur

## Number Theory Millennial Year

UIUC number theorists are planning the Millennial Year in Number Theory 1999-2000 which will begin with a two-day number theory conference next September on campus and will be followed by two to three day-long mini-conferences covering six to eight areas of number theory in the following months.

During the year approximately 25 number theorists will visit the department, including several who are internationally known and who will teach advanced courses in their specialties each semester.

### Featured Event

The Millennial Conference in Number Theory will be May 21 to 26. Fifteen of the world's foremost number theorists have already accepted invitations to give plenary lectures. Others are being invited.

At the conference former department head **Paul Bateman**, who will celebrate his 80th birthday in 1999, will be honored at a banquet.

In the past few years many outstanding number theorists have received their Ph.D. degrees at the University of Illinois. Currently more than 20 graduate students are writing dissertations in number theory. To recognize outstanding achievement, a Bateman

Dissertation Prize and the Bateman Fellowship have been established. The prize will be awarded annually for the most outstanding Ph.D. thesis in number theory; the fellowship will be given annually to an outstanding student specializing in number theory.

During the summer of 2000 a two week instructional conference on Fermat's Last Theorem will be held. A four week Number Theory Summer Camp for undergraduates interested in doing research in number theory is also being planned.

People interested in contributing to the Bateman Prize/Fellowship awards should contact Bruce Berndt (berndt@math.uiuc.edu or tel. 2176 333-3970) in the mathematics department, or Robin Fossum (fossum@uif.uiuc.edu, or tel. 217-333-7344) at the University of Illinois Foundation.

*Math Times* is published twice a year by the Department of Mathematics, University of Illinois, Urbana-Champaign.

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| Editor      | Margot Jerrard |
| Photographs | Hiram Paley    |
| Calligraphy | Pat Martin     |
| Drawings    | George Francis |
| Production  | Lori Dick      |

## Berndt Award

Professor **Bruce Berndt** has won a 1998 John Simon Guggenheim Memorial Foundation Award. He was one of the 168 fellows selected this year from more than 3,000 applicants nationwide on the basis of distinguished achievements in their fields and exceptional promise for future accomplishments.

Berndt will focus on proving



*Bruce Berndt*

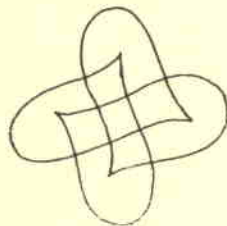
theorems in a notebook that belonged to the late Indian mathematician Srinivasa Ramanujan. The notebook, discovered in the library of Trinity College in Cambridge, England, in 1976, contains approximately 650 theorems without proofs. In his previous

research, Berndt proved claims found in three other notebooks that belonged to Ramanujan.

Berndt plans to go to India and Singapore in February and March, where he will give a number of lectures at universities, including the universities of Madras, Bangalore, and Mysore.

While in India he plans to talk to Mrs. Ramanujan's adopted son Veynanan about his adoptive father. He will visit libraries in Madras and Kumabra, trying to determine which books Ramanujan might have had access to when he was teaching himself mathematics. This has long been a source of debate among mathematicians.

Berndt, who has given approximately 150 lectures here and abroad, is the author of "Ramanujan's Notebooks, Parts I-V", published between 1985 and 1997. In addition, he is the co-author of "Ramanujan: Letters and Commentary" with R.A. Rankin. He received his Ph.D. from the University of Wisconsin in 1966 and spent a year as a lecturer at the University of Glasgow in Scotland before joining the UIUC math faculty in 1967.



## ASL Meeting

In June 2000 the annual meeting of the Association for Symbolic Logic (ASL) will be held in Urbana-Champaign.

**Carl Jockusch, Jr.** is the program chair of the meeting; the local organizing committee includes Professors **Lou van den Dries**, **C. Ward Henson**, Jockusch and **Anand Pillay**.

The ASL has made its home in 331 Altgeld Hall since 1984 but this is the first time that any ASL meeting has been held in Urbana.

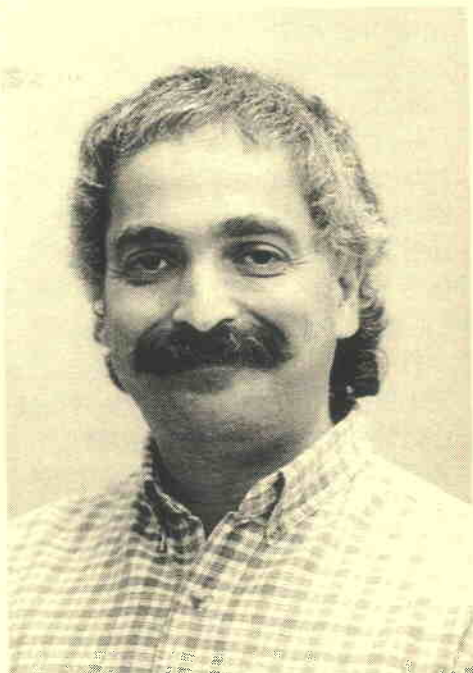
*Although Chance produces Irregularities, still the Odds will be infinitely great, that in process of Time, those Irregularities will bear no proportion to recurrency of that Order which naturally results from Original Design.*

Abraham De Moivre

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## New Faculty Appointments



*Alexandru Buium*

**Alexandru Buium** joined our department this fall. Professor Buium, whose field of research is number theory and algebraic geometry, received his master's and doctorate degrees, in 1980 and 1983, from the University of Bucharest, Romania. His thesis title was "Algebraic Surfaces Embedded in Projective Space."

A native of Romania, he remember wanting to be like his father, a mathematics school teacher, and always being interested in mathematics. In high school he was on the Romanian Mathematics Olympiad team which did pretty well, he says. The team

competed in Moscow and Berlin.

To be on the team he had to take a difficult examination. When he finished high school, he was admitted to the university without taking the lengthy examinations that students not on the Olympiad team had to take just to apply for admission.

He was a senior researcher at the Institute of Mathematics of the Romanian Academy. Since leaving Romania he has been a Humboldt Fellow in Germany, a member of the Institute for Advanced Study in Princeton and a visiting professor at the Max Planck Institute of Mathematics in Bonn, Germany.

Before joining our faculty he was a professor at the University of New Mexico.

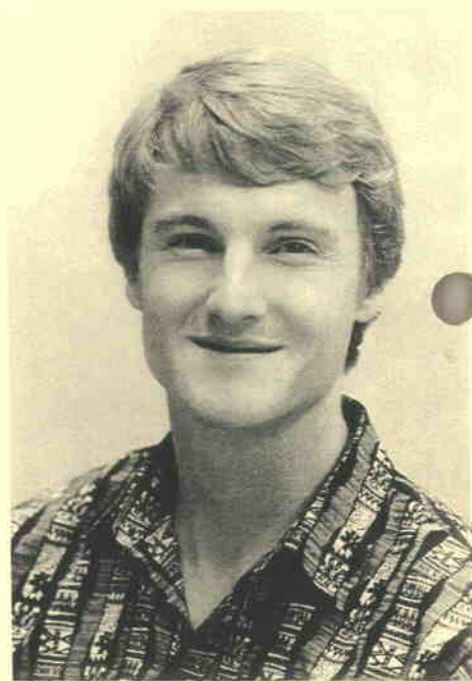
He is the author of 39 papers and has given invited addresses at many universities in east and west Europe and the United states. He and his wife have two children who already like life in Champaign-Urbana.

**Michael Bennett** comes to the department from the University of Michigan. A native of Canada, he travelled across the continent from Nova Scotia for graduate work at the University of British Columbia in Vancouver, where he

received his Ph.D. in 1993.

His current research interests are number theory (principally diophantine and transcendence theory) and Padé Approximation and classical analysis. The title of his thesis was "Fractional Parts of Powers and Related Topics."

Although he had first thought of studying medieval history, while an undergraduate he soon realized that mathematics



*Michael Bennett*

was what he was interested in. He received a B.Sc. degree from Dalhousie University in Nova Scotia in 1987.

In between his research, seminars, and invited lectures and ten years of teaching, Bennett took a year off to travel around the world. Camping

Out, staying in cheap hotels, he spent very little money. He travelled from Senegal across central Africa to east Africa, hiking and hitching for rides. Once or twice as he trekked across Africa he was held up at gunpoint, and there were civil wars in some of the countries but even though he speaks French he often did not realize what was going on.

He still travels a lot. In Urbana-Champaign he enjoys the early half hour walk when it is still dark from his home to his office in the math department.

**Jared Bronski** comes to the department from Stanford University, where he was the Gabor Szego Assistant Professor in the mathematics department and held an NSF Postdoctoral Fellowship. In 1994 he was awarded his Ph.D. in applied and computational mathematics from Princeton. Earlier, in 1989, he received a bachelor's degree in applied math from the California Institute of Technology. While still an undergraduate he was made a teaching assistant and taught an introductory course in applied math.

His research interests are in nonlinear and fiber optics, randomness and nonlinear wave propagation, solitons and integrable systems, perturbations and asymptotic methods and passive solar



*Jared Bronski*

transport. For a while as an undergraduate he was a student in physics. He switched because he saw that while both math and physics have much in common, they had different philosophical approaches and he preferred the mathematical. His research papers have been published in both physics and mathematical journals.

After receiving his doctorate he spent a year at the Institute for Mathematics and its Applications in Minneapolis. That was a city he liked despite the long cold winters. During lunch hour he could ice skate at a nearby pond and he could also go cross country skiing. Here in Urbana he rides his bicycle to work.

## The Optiverse

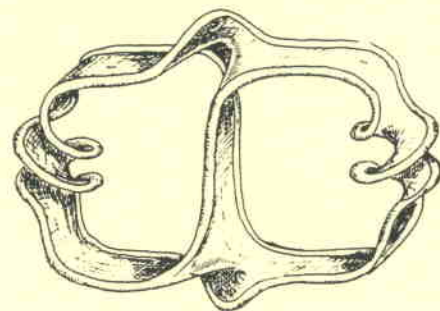
The video, "The Optiverse," on the minimax sphere eversion, produced by **George Francis**, **John Sullivan**, and **Stewart Levy**, with work done by alumni **Chris Hartman**, **Alex Bourd**, and **Glenn Chappell**, was shown at the juried Electronic Theater at SIGGRAPH in Orlando, this past July.

John Sullivan had a second piece accepted for and shown in the Videomath Reel on "Knot Energies."

The "Optiverse" was also shown in Berlin at the Urania Film Palace in downtown Berlin at the ICM. Designs from it and from "Knot Energies" were used on ICM 98 posters and program covers. It is featured in a recent issue of the magazine "Science News".

*Whenever a large sample of chaotic elements are taken in hand ... an unsuspected and most beautiful form of regularity proves to have been latent all along*

Francis Galton



## Fellowships

Professor **John Gray**, director of graduate studies, has announced that the Department of Education is awarding the UIUC mathematics department six Graduate Assistantships in Areas of National Need fellowships. These will be given to twelve graduate students who will each receive the fellowship for one semester.

The GAANN fellowships are awarded in areas where the Department of Education feels there is the greatest national need. These fellowships address the need for better mathematics education in the schools from kindergarten to grade 12. Our department does not train teachers for grades K through 12 but trains the people who teach the teachers.

Every fellowship holder will take a new course in which nationally known experts will speak each week on various issues of K through 12 mathematics education. The question to be addressed is what the role of university mathematics should be in teaching prospective teachers.

Emeritus Professor **Peter Braunfeld** will be in charge of this course.

## Simulation

**John Sullivan**, one of three mathematics department members involved, has announced that a new interdisciplinary team has been formed at UIUC to study simulation and optimization of casting and extrusion processes. Headed by Robert Haber, professor of theoretical and applied mechanics, the team has funding for the next two years from OPAAL at the National Science Foundation. In addition to Sullivan, other math department members on the team are **Daniel Grayson** and **Robert Jerrard**.

The funding will be used to support postdocs and graduate assistants in the mathematics, computer science, and engineering departments. They will work within the Computation Science and Engineering program on campus and receive interdisciplinary training in addition to working in their own fields.

This collaboration between mathematicians, engineers, and computer scientists will enable them to construct new geometric algorithms backed by rigorous mathematical analysis to ensure accuracy and reliability. The representation of

## AMS Meeting

Former faculty member in the UIUC mathematics department, **Alexandra Bellow**, will give one of the invited addresses at the Central Section AMS meeting to be held here in Urbana March 18 -21. A number of faculty members are organizing special sessions for the meeting. Among them are: **Daniel Grayson**, **Sankar Dutta**, **Robert Fossum**, **Philip Griffith**, **Michael Bennett**, **Harold Diamond**, **A. J. Hildebrand**, **Nigel Boston**, **Douglas West**, **Maarten Bergvelt**, **Steven Bradlow**, **John D'Angelo**, **Joseph Rosenblatt**, **Renming Song**, **Richard Sowers**, **C. Ward Henson**, **Peter Loeb**, **Zhong-Jin Ruan**, **John Sullivan**, **John Wetzel**, **Eugene Lerman**, and **Susan Tolman**.

The deadline for contributed papers to be considered for the special sessions is December 2, 1998.

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complex geometries, especially those with evolving topology, is a significant challenge.



## New Doob Assistant Professors

Two new J. L. Doob Research Assistant Professors, **Maria Basterra** and **Nadya Shirokova**, joined the department this fall.

Maria Basterra received a B.S. with special honors in mathematics in 1992 from the University of Texas in Austin,



*Maria Basterra*

and did her graduate work at the University of Chicago. Her dissertation title is "Andre-Quillen Cohomology of Commutative  $S$ -Algebras."

Her research interests are in algebraic topology and



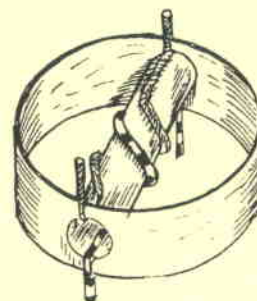
*Nadya Shirokova*

homological algebra. While in graduate school she held a NSF Graduate Fellowship and was both a teaching assistant and a lecturer in math while at the University of Chicago.

Nadya Shirokova, whose research interests are in low-dimensional topology, singularity theory and group actions on manifolds, also did her graduate work at the University of Chicago. She received her B.S. in 1988 from Moscow University. In Russia,

## Logic Visitors

**Anand Pillay** has announced that several internationally known logicians will be visiting the department during the 1998-99 year. They include Enrique Casanovas, University of Barcelona, Hirotaka Kikyo, Tokai University, David Ross, University of Hawaii, and Philipp Rothmaler, from the University of Kiel.



at Kazan University she was a lecturer and group leader for high school students in the Young Scholars Program "Quantum."

A permanent resident in America, her application for citizenship is now pending. Since leaving Russia while a graduate student she has been a research assistant, lecturer and College Fellow in mathematics at the University of Chicago, and been a visitor at the Max Planck Institute in Bonn, Germany.

## Faculty News

In March **Derek Robinson** gave an invited lecture at St. Andrews University in Scotland. In May he spoke at the Ohio State-Denison Conference on group theory.

On leave this spring semester, **Zoltan Furedi** was an invited speaker at a conference in honor of Hungarian mathematician Lazlo Lovasz's 50th birthday. Furedi also was invited to lecture at a Budapest conference in honor of the late Hungarian mathematician **Paul Erdos**, a frequent visitor to this department. Among other countries Furedi visited during his sabbatical was Brazil where a conference on combinatorics was being held at the University of Sao Paulo and at Caraguata-Tuba on the coast.

**John D'Angelo** gave a lecture at the Midwest PDE meeting in Chicago on October 31. He also lectured in October at the Differential Geometry Day at Eastern Illinois.

**Alexander Tumanov** was an invited speaker at the conference on CR geometry in Fribourg, Switzerland in August. That was a satellite conference of the 1998 ICM.

In October **C. Ward Henson** participated in a meeting on model theory at the Mathematics Institute in Oberwolfach, West Germany. He is also one of the organizers

of an Oberwolfach meeting on nonstandard analysis which will take place February 21-27, 1999

In April **Julian Palmore** gave an invited talk at the Strategic Effects of Air Power Workshop held at the Air University, Maxwell Air Force Base, in Montgomery, AL. The subject was the effect of the new sciences on operations research, especially modeling and simulation. In June he gave an invited talk at the Naval Postgraduate School in Monterey. In August he went on a USAF sponsored trip to the Naval Postgraduate School, to Stanford University, to the University of New Mexico, Los Alamos Laboratories and Washington D.C. for research for the Institute for National Security Studies, U.S. Air Force Academy.

Between January and June **Anand Pillay** was at the Mathematical Sciences Research Institute in Berkeley (MSRI) for the Model Theory of Fields Program, of which he was one of the organizers. Pillay also gave a series of lectures at the Isaac Newton Institute in Cambridge in March 1998 on Model Theory and Diophantine Geometry, a mathematics colloquium talk at Stanford University and a talk in the June 1998 workshop at MSRI. He also spoke at the German Mathematical Logic

Association in Berlin at the end of August.

Pillay is organizing a joint AMS-ASL special session on Model Theory and its applications which will take place in the January 1999 AMS meeting in San Antonio and at which both he and **Lou van den Dries** will give lectures.

**Joseph Rosenblatt** travelled to Israel this summer where he lectured at universities in Be'er Sheva, Jerusalem, and Haifa. This year Rosenblatt was awarded an LAS fellowship for study in a second discipline and has used the time to work with DSP and Communications groups in CSL on signal processing and inverse problems. In conjunction with this he began a new seminar. He is also organizing a Mathematics in Science and Society Seminar this year.

In May **Robert Jerrard** was a participant at a meeting on phase transitions at Oberwolfach, where he presented a paper.

**John Sullivan** presented a paper at a geometry conference in Oberwolfach in September. He also lectured at the Differential Geometry Day at Eastern Illinois earlier in October.

**Susan Tolman**, who has been awarded a Sloan fellowship for the years 1998-2000, attended a conference in the spring at the



University of Warwick in England where she gave a paper.

**Lou van den Dries** was one of the organizers of the Model Theory of Fields program, at MSRI at Berkeley this spring. He is also giving two talks at the Harvard-MIT meeting this November on "Current Developments in Mathematics." His talks are "On Minimal Structures and Real Analytic Geometry." There are a total of six speakers at the meeting which takes place once a year and was started in 1995. Each speaker has been asked to prepare a manuscript which will then be published in a book.

Emeritus Professor **Gaisi Takeuti** was awarded the Bolzano Medal at the Czech Academy of Sciences in August.

**J. Jerry Uhl** was honored with the 1998 Award for Distinguished Teaching at the Illinois meeting of the Mathematical Association of America. The MAA publication cited his contagious zeal for mathematics as well as his work on the question of how students learn mathematics. His teaching has won him outstanding student evaluations and, along with co-author **Horacio Porta**, he received the 1996 AMOCO award for Innovation in Undergraduate Instruction.

## Awards



*Joann Hower*

**Joann Hower**, assistant to the chair for program development, has been awarded the LAS Academic Professional Award. This prize honors academic professionals who have made outstanding contributions to the college.

Joann has been with the department since 1982, serving with one head and three chairs, and will retire at the end of this academic year. When asked what she will do after she retires she says, "Anything I feel like."

At a Liberal Arts and Sciences banquet last semester, mathematics graduate student **Christopher B. Hill** was

## ICM Speakers

As announced in the last issue of the Math Times, **Sergei Ivanov** was an invited speaker at the International Congress of Mathematicians in Berlin this past August.

In addition to Professor Ivanov, several other faculty members of our department have had the honor of being invited to be plenary speakers at earlier ICM meetings. This is the most prestigious lecture invitation a mathematician can receive. Among those who have had this distinction since 1983, is Professor **Jean Bourgain**, who spoke at the ICM in 1983 and again in 1986. Professor Bourgain also received the Fields Medal at the 1994 ICM.

**Peter Loeb** was an invited speaker at the ICM in 1983, **Lou Van den Dries** was invited in 1990, and at the 1994 ICM meeting both **Anand Pillay** and **Zoltan Furedi** were plenary speakers. Other invited speakers from UIUC at earlier ICMs include **Donald Burkholder**, **Wolfgang Haken**, **Joe Doob**, and **Michio Suzuki**.

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honored for the excellence of his teaching. He is one of only six graduate assistants in the college who received this honor.

## Putnam Exam

About a dozen undergraduates are meeting each week with Professors **Harold Diamond** and **Adolph Hildebrand** to prepare for the annual William Lowell Putnam Competition. This contest, open to all undergraduates at American colleges and universities, will be held on Saturday, December 5.

In the weekly session the students are taught techniques, discuss strategies, try out problems, and take mock Putnam exams. On the first of these, **Eiji Aoki**, a junior in LAS from Osaka, Japan, was the top scorer with 37/50.

Ten students from UTUC took part in last year's competition, and seven placed among the top third of all participants. **Brad Friedman**, a junior in LAS from Deerfield, ranked 55.5 out of more than 2500 participants with a score of 42 out of a possible 120 points. The UTUC team ranked 53rd among the 408 participating institutions.

Information about the Putnam contest, other mathematical competitions, and historical data about past UTUC Putnam Teams can be

## Graduate Students

This fall 34 new students began their graduate education at the UTUC mathematics department. Of this group, the number of American students is less than had been expected. Only one third of the new students are American. **John Gray**, director of graduate studies says there are two possible reasons for the decline.

One reason might be that in the past few years the job situation has not been good. As many as 10% of mathematics Ph.D.s did not have jobs; probably this discouraged a number of potential students. However, now the situation has greatly improved. The unemployment rate for entry

level mathematicians is only 3.8%.

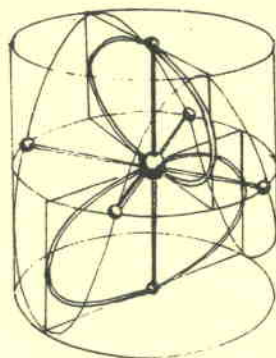
Another reason that Americans are not starting their graduate study in mathematics might be that there are so few fellowships available. For example, the NSF gives many more graduate fellowships to students in physics and biology than to student mathematicians.

The 34 new students do not replace the 55 who left after the end of the academic year, but although the number of beginning Americans has declined, there are plenty of international students. One third of the entering students are from Asia and another third are from eastern or western Europe.

One of the new students, **Katarina Jegdic**, is from Serbia near Belgrade. She was among 20 students that philanthropist George Soros brought to Chicago this summer. She came to Urbana-Champaign for the summer session where she worked with professors **Joseph Rosenblatt** and **Zhong-Jin Ruan**. She then decided to stay here to work on her doctorate and has now begun her graduate work.

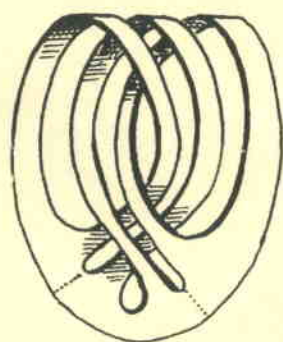
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found on the UTUC Math Contests Web Page at <http://www.math.uiuc.edu/hilde/-contests.html>



## Alumni Gathering

All alumni and friends of the department are invited to the first annual UI Alumni gathering at the winter meeting of the American Mathematical Society in San Antonio, Friday, January 15, 1999, 5-7pm. The reception will be held in the Salon-Grand Ballroom of the Marriott Rivercenter.



*Mathematical statements are necessary truths.*

Roger Penrose

*The function of a mathematician is to do something, to prove new theorems, to add to mathematics, and not to talk about what he or other mathematicians have done.*

G. H. Hardy

## Michio Suzuki 1926 - 1998

A memorial service was held September 18 in Smith Music Hall for **Michio Suzuki** who died June 1 in Tokyo of cancer. Professor Suzuki, who had been a member of our department for 47 years, made important contributions, both in research and teaching. He had at least 21 doctoral students here at the University.

He was a leader in the development of finite group theory which led to the classification of the finite simple groups, one of the outstanding accomplishments in algebra in the last 50 years. Suzuki made one of the most important contributions in 1954 by applying character theory to obtain the first progress on the conjecture that all nontrivial finite simple groups have an even number of elements, a problem that had formerly seemed to be unapproachable.

In 1962, building in part on Suzuki's method, other mathematicians showed the conjecture to be true. Later all finite simple groups were found, and Suzuki made several important contributions to this by finding and characterizing the Suzuki groups.

Suzuki was born in Chiba

City, Japan, October 2, 1926. He earned a doctorate at the University of Tokyo in 1952 and accepted a postdoctoral fellowship at the University of Illinois that year. He was appointed a professor in 1955 and in 1968 was named a professor in the Center for Advanced Study at Illinois.

He was a research associate at Harvard University, a visiting professor at the University of Chicago, a member of the Institute for Advanced Study at Princeton, and a visiting professor at the University of Tokyo. He also taught at the universities of Hokkaido and of Osaka in Japan and was at the University of Padua in Italy.

In 1974 Suzuki was awarded the Academy Prize from the Japan Academy for his work in group theory, the highest honor awarded to mathematicians in Japan. He was awarded an honorary doctoral degree from the University of Kiel, Germany, in 1991.

He is survived by his wife, Naoko Akizuki, of Champaign, a daughter Kazuko Suzuki Boyce of Laurel, Md. and brothers Tatsuzo Suzuki and Sadao Suzuki, both of whom live in Japan.



# Seeing is Believing

An hour long PBS production, "Seeing is Believing," was broadcast nationwide on PBS last spring, shown at the International Congress of Mathematics in Berlin and rebroadcast on WILL-TV this summer. This is the first episode of the series "Life by the Numbers" which was made for high school students to stimulate their interest in mathematics.

Several sequences in this video production credit current members, alumni, and visitors to the department.

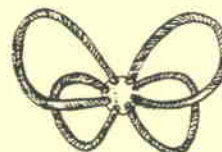
A ten minute section is devoted to the collaboration of **George Francis** with Donna Cox in the CAVE. George is also shown drawing a picture on a chalk board in Altgeld Hall.

The opening visuals behind Danny Glover, the narrator, and the final scene in the CAVE with **Paul McCreary** and graduate students feature pieces created by former graduate students **Alexei Bourd, Chris Hartman, and Glenn Chappell.**

**John Sullivan** served as educational adviser.

*I can scarcely remember that there is such a thing as Geometry [i.e. mathematics]. I recognize Geometry to be so useless that I can find little difference between a man who is a geometrician and a clever craftsman. Although I call it the best craft in the world it is, after all, nothing but a craft.... It is quite possible I shall never think of it again.*

Blaise Pascal



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