

Math Times

University of Illinois at Urbana-Champaign

Spring 1999

Letter from the Chair

Dear Colleagues and Friends of the Department,

During the last few years, the faculty has thought a great deal about the direction of future developments in the mathematical sciences, specifically as practiced at a research university like the University of Illinois, with the inextricably linked research and education missions. To reinforce this integration of research and education also in the undergraduate program is a challenging and uncompleted task.

The guidelines for our activities can be summarized as follows:

Promote first class mathematical research of world class level in our areas of greatest strength.

Promote interaction with the sciences and more generally all users of mathematics.

Emphasize undergraduate education. We have an enormous variety of innovative

programs. We want to be a laboratory for undergraduate mathematics education.

Broaden our traditional basis in graduate education by preparing more students for careers in non-academic environments.

Provide postdoctoral mentoring as a preparation for careers in a research university.

Recruiting this year is not quite complete, but already we have commitments from several new faculty members: **Marius Junge**, **Richard Gorvett** and **Matthew Ando** will join us as assistant professors in fall 1999, **Alexandr Kostochka** will join us as a professor in Spring 2000, and **Alexandru Zaharescu** will join us as an assistant professor in Fall 2000.

The first two offers of postdoctoral **J.L. Doob** Research Assistant Professorships were accepted by **Marcin Mazur** and **Wai Yan Pong**. There are short profiles of these new faculty members on page 3.



Philippe Tondeur

This summer, I will move to Washington, D.C. where I have been appointed Director of the Division of Mathematical Sciences at the National Science Foundation, beginning July 21, 1999. The offer of this position was a challenge I found impossible to decline. As a result, the department is currently conducting a search for my successor, to be chosen from the ranks of the current

UIUC faculty.

The affairs of the department are in excellent shape, and I have no doubt that a talented successor will be found within a short period of time. It has been an honor and an exciting experience to serve as chair for these three years in a department of such overwhelming richness of talent. The actual progress comes from the specific achievements of faculty and staff, and is also based on the achievements of my predecessors in this office. To all of them, and to the faculty, and staff, I am deeply grateful.

Yours,

Philippe Tondeur

As long as a branch of science offers an abundance of problems, so long it is alive; a lack of problems foreshadows extinction or the cessation of independent development.

D. Hilbert

Prize Winners

For the second year running, undergraduates **Christopher Francisco** and **Matthew Rodriguez** shared the equal first prize in the Greenwood-Trijitzinsky Prize Competition for a research paper by an undergraduate. They each receive \$200.

Mathematics Education

"What can mathematics departments and mathematicians do to help improve mathematics education?" asks Emeritus Professor **Peter Braunfeld**, who has developed a new course for graduate students who will someday teach the teachers.

Studies have shown that elementary and high school students in the United States do poorly in mathematics compared to young people from some other countries. In an effort to help the situation, the UIUC mathematics department has started this program in which some of the country's best known mathematics educators and researchers are coming to campus this spring to discuss the ways to improve math K-12 education.

The course is aimed at graduate students in mathematics, including those planning a career primarily in research; they can make significant contributions to mathematics education. It is designed to give students some of the background they will need to contribute to K-12 mathematics education, and will look at such questions as the connections between elementary and advanced mathematics.

The course explores areas in

which mathematicians can contribute, and surveys such issues as what is important in teaching elementary and secondary school mathematics, and how can higher mathematics help in selecting and presenting elementary topics.

It discusses how advanced mathematics can help teachers to become better at teaching and looks for effective methods of teaching college-level programs for future teachers. The course also surveys current classroom practices, what is involved in developing "standards," and what testing is appropriate, and examines the role of technology in the classroom.

The visitors are speaking on such topics as reshaping and reforming high school mathematics, what skills elementary teachers need, and what international studies say.

John Thorpe, executive director of the National Council of Teachers of Mathematics, gave the first lecture in January on "K-12 Mathematics Standards: Past, Present and Future." Other mathematicians who are visiting include Hyman Bass, Adrian Professor of Mathematics, Columbia University, and Ralph Raimi, Professor Emeritus of Mathematics, University of Rochester.

New Faculty

Department Chair **Philippe Tondeur** has announced the appointment of four new assistant professors, three of whom will join the department this coming fall and one new professorial appointment for Spring 2000.

Marius Junge, who has a 1991 Ph.D. from the University of Kiel, has accepted an appointment beginning Fall 1999. He is considered one of the most promising young operator theorists. He has had appointments at Kiel and Odense University and this year has been at Texas A&M and UCLA. He is known as an enthusiastic and good lecturer.

Richard W. Gorvett who earned his Ph.D. from the UIUC Department of Finance under Steve D'Arcy in 1998 and is currently an assistant professor at the College of Insurance in New York City, is joining our department in the fall. In addition to his academic credentials he has skills in actuarial science and finance and with his considerable skill in teaching, he will be valuable in our actuarial program.

The third new assistant professor is **Matthew Ando** who has a 1992 Ph.D. from MIT under the direction of Haynes Miller. Currently Ando is an NSF postdoctoral fellow and visiting assistant professor at

Johns Hopkins University. His research centers around homotopy theory, formal groups, and analysis on loop spaces. His work on elliptic cohomology and representation theory is considered of exceptional interest. He is described as an innovative thinker, a wonderful colleague and an excellent teacher.

In Spring 2000 **Alexandr Kostochka** will join our department as a professor. He comes from Novosibirsk where he is currently a leading researcher in the Institute of Mathematics and a professor in the Department of Theoretical Cybernetics of the Novosibirsk State University. A leading figure in combinatorics, Professor Kostochka's research centers around the areas of graph theory, random graphs and finite ordered sets, with outstanding results in graph coloring.

Alexandru Zaharescu, who has a 1995 Ph.D. from Princeton University and is currently a postdoctoral fellow at McGill, will join our department in fall 2000. He will spend the next academic year on a fellowship at the Institute for Advanced Study in Princeton. His research is in number theory and he is described as brilliant with the ability to solve interesting and difficult problems.

Reception

Robert Fossum welcomed the over 80 people who came to the first UIUC gathering at the American Mathematical Society's Annual Meeting in San Antonio on January 18. They were faculty members, alumni, former faculty and graduate students, as well as spouses. Special guests included Cheri Bourgin, whose late husband **David Bourgin**, was a former faculty member, and Rebecca and Ken Fine.

Guests came from all over the United State, and UIUC graduate Professor **Seongtag Kim** came from South Korea.

Postdoctoral Appointees

Wai Yan Pong has accepted an offer of a J.L. Doob Research Assistant Professorship beginning Fall 1999 for three years. He will complete his Ph.D this summer at UIC under the direction of David E. Marker. His thesis is concerned with applications of model theory to differential algebra and algebraic geometry.

Marcin Mazur will also begin a three year J.L. Doob Research Assistant Professorship in Fall 1999. He will complete his Ph.D. at the University of Chicago under the direction of Spencer Bloch. His research has been in number theory and group theory.

John D'Angelo Wins Prize

Professor **John D'Angelo** has been awarded the 1999 Stefan Bergman prize. D'Angelo was cited for "his remarkable geometric insight which has led him to make several spectacular contributions to complex analysis. His study of boundaries of weakly pseudoconvex domains, which resulted in a deep understanding of points of finite D'Angelo type, uses completely original techniques that are a mixture of real and complex geometry. This work has led to spectacular progress in the study of holomorphic functions on such domains."

John D'Angelo's "work on holomorphic and rational mappings again shows his insight accompanied with a powerful technique. Recently he has written, jointly with David Catlin, a series of highly original papers generalizing Hilbert's 17th problem (expressing functions as sums of squares) which uses the theory of the Bergman kernel function in an essential way. D'Angelo has made many other contributions to the theory of several complex variables, much of it closely related to the study of the Bergman projection".

The prize honors the memory of Stefan Bergman, best known for his work in several complex

variables, as well as the Bergman projection and the Bergman Kernel Function which bear his name. Awards are made every year in the following areas: (1) the theory of the kernel function and its application in real and complex analysis; and (2) function-theoretic methods in the theory of partial differential equations of elliptic type with attention to Bergman's operator method.

Coble Lecture

Professor Yuri I. Manin of the Max Planck Institut für Mathematik in Germany is presenting the three Coble lectures April 28, 29, and 30. This lecture series is named in honor of the late Professor **A.B. Coble** and each year a distinguished mathematician has been invited to give the lectures.

Professor Manin is the director of the Max Planck Institut. From 1965 to 1992 he was professor of algebra at Moscow University. He has held visiting professorships at such universities as Harvard, Columbia and MIT.

In addition to the lecture series Professor Manin has been invited to visit the department for a month during April and May.

New Ass't Chair



Jean Paley

Chair **Philippe Tondeur** has announced that **Jean Paley** will come to the department on May 24, 1999, when she will start to work as Assistant Chair for the Department of Mathematics. She will replace Joann Hower who is retiring as of June 20.

She has been Assistant to the Head of the Department of Political Science since October 1991. She comes with glowing recommendations on her strong administrative and analytical abilities, combined with excellent interpersonal skills.

*Ah! why, ye Gods, should two
and two make four?
Alexander Pope*

AMS Sectional Meeting Here

Prof. **Alexandra Bellow**, a former UIUC faculty member, now at Northwestern University, gave the invited address at the 1999 Spring Central Section Meeting of the AMS held in Urbana, March 18-21, 1999. After her address a reception was held in the Beckman Institute to welcome the approximately 500 mathematicians who participated, a record number for a regional meeting, who came from Europe, Australia, and Asia, as well as from many locations in the North America.

The meetings began the morning of Friday, March 19. Many UIUC faculty members organized special sessions. Among them were **C. Ward Henson** and **Peter A. Loeb** on Nonstandard Analysis, **Harold Diamond** and **A. J. Hildebrand** on Elementary and Analytic Number Theory, **Michael Bennett** on Diophantine Equations, Inequalities and Related Arithmetic Problems, and **Zhong-Jin Ruan** on Operator Spaces and their Applications. Sessions were also organized by **Sankar Dutta**, **Robert Fossum**, and **Phillip Griffith** on Commutative Algebra, **John Wetzel** on Recent Progress in Elementary Geometry, **Nigel Boston** in

Galois Representations, **Joseph Max Rosenblatt**, **Renming Song** and **Richard Sowers** on Martingales and Analysis, **Douglas B. West** on Graph Theory, and **Maarten Bergvelt**, **Steven Bradlow**, and **John P. D'Angelo** on Homomorphic Vector Bundles and Complex Geometry.

John M. Sullivan was an organizer for the Special Sessions on Optimization Problems in Geometry; he also gave a video presentation. **Eugene M. Lerman** and **Susan Tolman** organized sessions on Symplectic Geometry and Topology, and **Daniel Grayson** and **Randy McCarthy** organized special sessions on Algebraic K-Theory and also the 5th Annual Great Lakes K-Theory Conference which was held concurrently.

Many of the organizers gave lectures on their research. In addition a number of department members also gave papers at the meetings. These include Professors **Douglas C. Bowman**, **Bruce Reznick**, **Kenneth Stolarsky**, **Paul T. Bateman**, **Zoltan Furedi**, **Nadya Shirokova**, and **Robert Craggs**.

UIUC graduate students **Joung M. Song**, **Yifan Yang**, **Seon-Hong Kim**, **Dennis A.**

Math/Physics

The UIUC departments of mathematics and physics, announce a joint workshop in Mathematics from Physics, Recent Trends and New Developments. This is being held on campus May 19-22 in Altgeld Hall.

The aim is to bring together people with overlapping interests, to facilitate understanding and collaboration. Topics will include string theory, condensed matter systems, gauge theory, differential and algebraic geometry.

Conference organizers **Steven Bradlow**, **John D'Angelo** and **Maarten Bergvelt** represent the mathematics department.

Eichhorn, **William F. Galway**, **Youn-Seo Choi**, **Soon-Yi Kang**, **Jaebum Sohn**, **Markus Pomper**, **Vladimir Troitsky**, and **Darrin M. Doud** also were among the participants who presented lectures.

An Operator Space Workshop was held here on campus on March 18 and 19. Organizers were **Zhong-Jin Ruan** and **Gilles Pisier**. Many of the participants stayed in Urbana and took part in the AMS Sectional Conference immediately following.

Faculty News

In January **Leon McCulloh** gave a seminar talk to the Number Theory Seminar at the University of Bordeaux I and an hour talk at Oberwolfach on various aspects of his work on Galois's module structures and class groups of integral group rings.

Derek Robinson is visiting Warwick University in England in May and June and has received a research grant from the Engineering and Physical Sciences Research Council (U.K.).

In January **Doug West** gave a lecture at the University of the Philippines and three lectures in Taiwan: at National Central University, at the National Politics University and at Academia Sinica.

CAVE Tours

The annual CAVE tours for visitors to the Engineering Open House this March were a great success, reports **George Francis**. Almost 400 people witnessed a CAVE demonstration. Others watched the show on the I-Wall in the Numerical Lab. Graduate students involved were **Ann Delano, Matt Hall, John Estabrook, and Ulises Cervantes-Pimentel**. Campus Honors Program undergraduates **Kevin Vlack, Paul Whitaker, and Eric Stauffer** wrote the code for many of the

animations.

Better Teaching

Two faculty members have been finding new ways to teach mathematics more effectively.

A few years ago **Nigel Boston** revised Math 118, a course on quantitative reasoning, to draw material from newspapers, magazines, etc. to show undergraduates how math can make them better informed. Now the course is being put on the web as part of NetMath. With the help of the department and an ETB grant, a team of graduate TAs and undergraduate web assistants is working on preparing the course for distance education.

In the fall, **Richard Laugesen** taught Math 385, Differential Equations II, in an unusual way. He wrote up a daily reading guide to the textbook for the students. Each day in class they would talk over the reading they had done and Laugesen could probe their understanding. He found that this increased contact with the students enabled him to communicate to them something of the spirit of higher mathematics.

The moving power of mathematical invention is not reasoning, but invention.

A. De Morgan

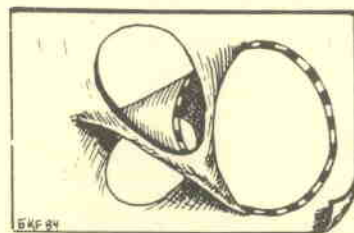
Putnam Contest

The UIUC mathematics team placed 24th out of over 400 participating colleges in the 1998 Putnam competitions, one of the highest rankings our students have received in recent years. The team was headed by **Brad Friedman** who, for the third time in a row, turned in the highest score of all the UIUC students and received an honorable mention for his performance. The other team members were **Eiji Aoki** and **Michael Roman**; the first alternate was **Sham Bhat**. **Harold Diamond** and **Adolf Hildebrand** were coaches.

The 1999 UIUC Undergraduate Mathematics Contest is being held April 17. This contest is a local version of the Putnam Competition. Winners receive cash prizes.

In creative thought common sense is a bad master. Its sole criterion for judgement is that the new ideas shall look like the old ones, in other words it can only act by suppressing originality.

A. N. Whitehead



Felix Albrecht

1926-1998

Emeritus Professor **Felix Albrecht** died in December at his home in Urbana after a long illness. Albrecht's major research contributions were to the qualitative theory of dynamical systems. In particular he was recognized for his research on the Pontrjagin theory of optimal control, and the associated stability problem.

Throughout his research career, Albrecht kept in close contact with modern developments in topology and global analysis. He had a wide and constantly expanding mathematical background and his lectures were lucid and interesting. Students found him a mentor and friend who inspired them. His integrity, culture, intelligence, and mathematical talent were an inspiration to all who had the privilege of knowing him.

Felix Albrecht was born April 19, 1926, in Cernauti, Romania, which later became part of the U.S.S.R. and is in the Ukraine. He studied mathematics in Bucharest and in 1951 received a diploma in mathematics from the University of Bucharest. He was an assistant professor at the Bucharest Institute of Technology from 1951 to 1955 and was a senior research fellow at the Institute of Mathematics of the Rumanian



Felix Albrecht

Academy.

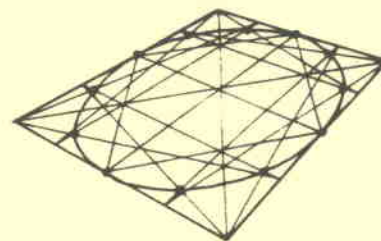
In 1963 he emigrated from Romania and went to Zurich where he was named a research associate at the Federal School of Technology. He joined Wesleyan University in Connecticut in 1964 as an assistant professor, and two years later was made a professor. After a year at the Institute for Advanced Study in Princeton, he was appointed Professor of Mathematics at the University of Illinois in Urbana-Champaign in 1968.

In 1992 he became an emeritus professor. His love of mathematics and his interest in his students remained throughout his retirement,

during which he continued to chair the library committee. He kept working on mathematics until the last few days of his life.

He is survived by his wife Isidora whom he married in 1947 and two nieces living in France. Mrs. Albrecht has made a significant financial contribution to the Mathematics Library to which he was devoted.

The Department of Mathematics held a memorial service for Felix Albrecht in March. Contributions in his honor may be made to the University of Illinois Foundation for the Mathematics Department Library.



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Number Theory Year

The Special Year in Number Theory 1999/2000, sponsored by the UIUC mathematics department, will start off on campus with a two day conference September 17-18. During the academic year, there will be several small conferences including one for graduate students in number theory which is planned for early spring.

The high point will be the Millennial Conference of Number Theory, May 21-26,

2000, which will be held on campus and will cover all areas of number theory. During the summer following the special year a two-week instructional conference is planned on algebraic number theory related to Fermat's Last Theorem.

I have often been surprised that Mathematics, the quintessence of truth, should have found admirers so few and so languid.

Samuel Coleridge

NSF Award

Darrin Doud (a student of **Nigel Boston**) has won an NSF Postdoctoral Award for 1999-2000 and will go to Harvard for the next two or three years beginning in the fall. Doud last year won the Hohn-Golub prize, the first year it was given.

There are 30 such mathematics awards given by the NSF annually. One of our graduate students has been the winner of one for each of the last three years.

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