



Math Times

University of Illinois at Urbana-Champaign

Spring 1995

Letter from the Chair

Dear Colleague,

This month I must announce the sad news of the death in March of Emeritus Professor **Lee A. Rubel**, an enormously productive mathematician who made fundamental discoveries in a number of fields.

He will be very much missed by his colleagues and the many young mathematicians here and abroad who have been inspired by his work. See page 6.

During this spring term we have had a lively series of colloquium lectures by faculty members and visitors. In addition to the usual seminars at which graduate students, visitors and faculty discuss their research, there has been much interest in a new weekly series, *Mathematics in Science and Society*, at which outside experts who use mathematics speak.

Professor Nigel Hitchins of Cambridge University gave the 24th Arthur B. Coble Memorial lectures on April 4, 5, and 6.

Professor Hitchens, a Fellow of the Royal Society, is a leading expert on complex geometry and gauge theory. He spoke on monopoles.

The lecture series honors the memory of **Arthur Coble**, professor of mathematics at UIUC from 1918 to 1947. Professor Coble's family established a fund to endow a series of public lectures to be delivered by outstanding mathematicians.

Three of our long term faculty members are retiring this academic year. They are Professors **Eva Gray** who came in 1963, **Franz Kamber**, here since 1968, and **Richard Jerrard**, who came in 1958.

Professor Gray, who received her Ph.D. from the University of Zurich, initially worked in complex functions. For the past four years, she has devoted much time and energy to advising students who are working on their master's degrees. She will remain in

Champaign-Urbana.

Professor Kamber, who works in geometry and has won international acclaim for his work in foliations, also received his Ph.D. from the University of Zurich. He retired at the end of the fall term and this spring is visiting universities in Denmark and Germany and continuing his research.

Professor Jerrard, whose papers are in applied mathematics, geometry and topology, has been director of graduate studies for the past four years. See page 4.

The retirees are being honored at a reception at 2:00 p.m. May 21 at the Levis Faculty Center. All of our readers are invited to attend. You do not need a formal occasion to visit the department. We are glad to see or hear from any of you at any time.

Jerry Janusz

An Alumna Remembers

When she was a senior during 1940-1941, alumna **Eleanor Ewing Erlich** (A.B. 1941, A.M. Mathematics 1943) remembers, **Professor Henry Brahana** taught the first semester of introduction to higher algebra and the second was taught by **Professor Olive Hazlett**, "who was tall, thin, her long grey hair done up in a bun, wisps of hair always hanging down in her face. She seemed so different that we in her class were rather frightened of her. One day I received a written invitation to tea. I was afraid to go alone and persuaded my sister Mary to come along."

The tea was "a frightening affair." The large German shepherd that Miss Hazlett brought to class every day was "barking and threatening, rearing up to place his paws on my shoulders, and Miss Hazlett in a nervous frenzy, serving us tea and little cakes on a very elegant set of china."

That summer before the United States found itself at war, life on campus was already changing. One day Dean of Women **Maria Leonard** asked Eleanor to lead a group of University of Illinois women to meet officers from Chanute Field on blind dates. She met a second lieutenant, **Leon Williams**, who was soon driving from Chanute Field

every evening to see her. When summer school ended, he came to visit her at her family's home in Pontiac.

In September the mathematics department head, **Professor Arthur Coble**, asked her to come to his office and there offered her a teaching assistantship. Eleanor's mother was furious. She had wanted her daughter to be a high school teacher, not a mathematician. "Mother cut off all funds and support from that day forward."

Eleanor had a job but no money. A friend lent her enough so she could survive until her first paycheck, and she found a room on the third floor of a chemistry professor's duplex. One day in early fall she received a telegram from **Leon Williams**, telling her that he had been sent to the Phillipines. She lost consciousness. Two days later when she came to she had no memory of what had happened.

That fall, the wife of her statistics professor, **Arthur Crathorne**, invited her and a woman instructor to tea and told them to bring their needlepoint. This threw the two young women into a panic. Neither of them had ever done any needlepoint in their lives. But they rushed out, bought

needles, thread, etc, and tried to learn some "rudimentary aspects of needlepoint [and] the afternoon went well, as Mrs. Crathorne was a gracious white haired lady."

On December 7, 1941, the Japanese bombed Pearl Harbor. In the next months they conquered and occupied all of the Phillipines, except for Bataan which the Americans defended until it finally fell. **Lieutenant Williams** was taken prisoner by the Japanese and forced, along with other American servicemen, to go on the Bataan death march. It was on that march that he died.

Mrs. Ehrlich says, "I have always remembered most keenly the encouragement with my studies shown me by all the faculty of the Illinois Mathematics Department; the same was certainly not the case in first year physics where **Professor John Manley** was most cool to me during the first day of class [and] ordered me to sit by myself in the row for the lady students, of which I was the sole one...During my student days at Illinois I received full and cordial encouragement from the Illinois mathematics faculty members with whom I came into contact."

She notes that there were four

Faculty News

Sergei Ivanov is the recipient of an Alfred P. Sloan Research Fellowship for 1995-97 for his work in combinatorial group theory. Professors Ivanov and **Everett Dade** will be members of the Center for Advanced Study here for the academic year 1995-96.

Robert Fossum has been named to the Royal Norwegian Society of Sciences and Letters, the oldest learned society in Norway. Membership in the natural sciences section is limited to 200, of whom 50 may be non-residents of Norway.

He was a Fulbright Scholar at the University of Oslo, and has been a visiting professor at universities in Denmark, and in Paris. He is now the Secretary of the AMS.

mathematics majors in the University graduating class in 1941. Three of the four were women. In 1941 the department had seven women faculty members: **Beulah Armstrong, Ruth Boyd, Josephine Chandler, Olive Hazlett, Echo Pepper, and Henrietta Terry.** The Dean of Women, **Maria Leonard**, was also a mathematics graduate.

The 1941 yearbook reveals that out of 58 members of Phi Beta Kappa, only two were mathematics majors, and one of them was Mrs. Ehrlich.

In January at Victoria University, Wellington, New Zealand, **Carl Jockusch** worked on joint research with Rod Downey, supported by a United States-New Zealand binational grant. In March, he gave a half-hour invited talk at the annual meeting of the Association for Symbolic Logic in Irvine, CA.

Leon McCulloh was invited to Oberwolfach to speak on "Orders in Arithmetic and Geometry," in mid April.

Joe Rosenblatt recently gave a colloquium at the University of Maryland on Convergence in Ergodic theory. He also gave an invited talk on ergodic theory at DePaul University in Chicago, and has been invited to speak at the 75th anniversary of Harbin Technological University in northeastern China.

In April **Gaisi Takeuti** gave a one hour invited talk at the Oberwolfach mathematical logic meeting in Germany, and was also invited to speak at the Czech Academy of Science.

Derek Robinson gave a colloquium talk at the University of Kentucky this winter.

Julian Palmore lectured at the Society for Computer Simulation Conference at Las Vegas in January and at the SCS Symposium at Phoenix in April. He also gave lectures on Distributed Simulations in Orlando FL and at the U.S.

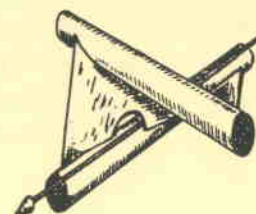
Military Academy in November, and was guest editor of the June issue of *Phalanx*, the bulletin of Military Operations Research.

Nigel Boston was a co-organizer of a national AMS Special Session on arithmetic geometry in Chicago in March. He gave talks at the AMS national winter meeting in San Francisco in January and at an AMS meeting in Florida.

Bruce Berndt has won a Lester R. Ford Award for his paper "Ramanujan for Lowbrows" in the *American Mathematical Monthly*, Vol. 100, pp 644-646. Ford awards are given annually for the best papers in the *American Mathematical Monthly* during the previous year.

Emeritus Professor **Joseph Doob** has recently written a book, *Measure Theory*, which was published by Springer in 1994. He says that he wrote it in order to have a reason for buying a computer.

In August Emeritus Professor **Frank Knight** will give an invited talk at the 21st European Meeting of Statisticians in Aarhus, Denmark. He is also doing editorial work for the *Annals of Probability*.



Graduate Advisor Changes

On May 21 John Gray will become Director of Graduate Studies when Richard Jerrard retires.

Professor Gray will be instrumental in deciding which applicants to admit to graduate study, and who should get financial support as a fellow or a teaching assistant. Once students have begun their graduate work he will help them progress through course requirements, comprehensive examinations, language requirements, and thesis research to their degrees.

Professor Gray's specialty is category theory. He has published papers in algebra, topology, analysis and theoretical computer science as well as category theory. He has lectured in many countries, has held visiting positions at universities in the United States and abroad and been a Fulbright Hayes Senior Scholar at the University of Sydney in Australia.

Richard Jerrard's specialty is topology; he has also published papers in applications, geometry and analysis, and held visiting positions at Cambridge and Warwick Universities in England. For the past four years he has been Director of Graduate Studies.

Jerry Janusz said "When I

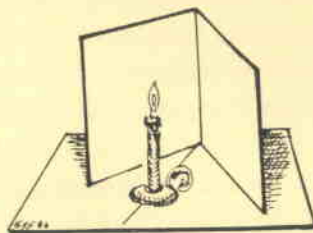
became chair of the department three years ago Dick was already the graduate advisor. I have had a great deal of contact with him, and been impressed with his leadership of our graduate program.

"He has computerized student's records so their progress can be easily followed, and amassed the materials required to help our graduate students win national fellowships, such as, among others, the Sloan Doctoral Dissertation, now held by James Colliander and the Claire Booth Luce Fellowship, awarded to Judy Walker.

"Due to his grant applications the department has been awarded 74 full Department of Education Fellowships for students over the past four years."

All science requires mathematics.

Roger Bacon



World Wide Web

This semester several members of the department have begun to make local information available on the World Wide Web.

John Gray, who will become graduate advisor in May, and Elliot Weinberg, undergraduate advisor, encourage students to use the World Wide Web as a means of access to information about the department. Already there is information to help the students look for a job, to get descriptions of programs and courses, to see a history of departmental award winners, etc.

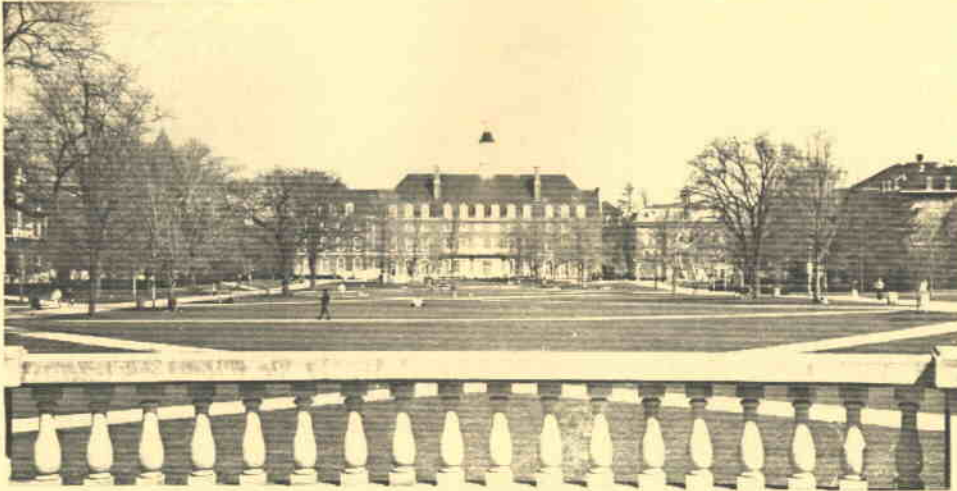
For anyone who has access to the internet, the address of the department home page is <http://WWW.math.uiuc.edu>

The mathematician has reached the highest rung on the ladder of human thought.

Havelock Ellis

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The Quad and the Union from Foellinger Auditorium

Conference Honors Halberstam

Professors **Bruce Berndt**, **Harold Diamond**, and **Adolph Hildebrand** are organizing an international conference on analytic number theory to be held May 16 through 20 at the university's conference center at Allerton Park. The meeting will honor Professor **Heini Halberstam**, former department head, who will retire next year, and will be devoted to recent advances in analytic number theory, particularly arithmetic functions, prime number theory, sieves, and combinatorial number theory.

There will be twelve one hour principal talks by renowned number theorists from the

United states and abroad, about 60 invited half hour talks, and several dozen contributed talks. Altogether about 120 participants are expected to come from five continents. Thirty UIUC faculty members and graduate students will take part.

The conference is supported by grants from the National Science Foundation, the National Security Agency, the LAS College, the Institute for Mathematics and Its Applications, and the Mathematics Department. The proceedings will be published by Birkhauser, Boston, in its Progress in Mathematics series.

Lecture Series

This spring the Mathematics Department is sponsoring a series of talks on Mathematics in Science and Society. Among the speakers have been an economist, computer scientists, physicists, and astronomers.

The first talk in February was on equilibrium theory by UIUC Economics professor Nicholas Yannelis. This was followed by Thomas Huang from the Beckman Institute on computer vision, and by UIUC Physicist David Campbell.

Other speakers scheduled included: UIUC Astronomer Dimitri Mihalas; University of Chicago Mathematician Andrea Bertozzi; Hassan Aref, UIUC Department of Theoretical and Applied Mechanics; computer scientist Nicholas Pippenger, from the University of British Columbia; UIUC physicist Michael Stone; and UIUC computer scientist Bruce Hajek.

I like mathematics because it is not human and has nothing in particular to do with this planet or with the whole accidental universe - because, like Spinoza's God, it won't love us in return.

Bertrand Russell

Lee Rubel 1928-1995

Emeritus Professor Lee A. Rubel died March 25 in Urbana after a nine-month battle with a bone marrow illness that became leukemia. He continued to work on mathematics until five days before his death.

Professor Rubel joined the University of Illinois Mathematics Department in 1958 and was a member of the faculty until May 1993 when he retired to devote full time to research. Earlier, he spent two years at Cornell University and two years at the Institute for Advanced Study in Princeton. From 1960 to 1962 he was a visiting professor at Columbia University.

He is survived by his wife of 40 years, Nina, his son Mark, daughter Natasha, and his brother Arthur.

Born in New York City, he was a graduate of City College of New York, and earned his doctorate at the University of Wisconsin, Madison, in 1954.

Professor Rubel made fundamental discoveries in a number of mathematical fields. These include: one and several complex variables, real variables, harmonic analysis, number theory, ordinary differential equations, partial differential equations and

algebraic differential equations, mathematical logic, and the brain as an analog computer.

He was the author of more than two hundred papers. He travelled widely and gave hundreds of lectures at universities and mathematics meetings all over the world. During one week in 1966 he presented three one hour colloquia in three languages - French in Paris, German in Vienna, and English in Budapest.

Anil Nerode, of Cornell, says, "Lee Rubel was an outstanding expert in the field of entire functions starting with his first publication in 1955. Starting in about 1980 he began fundamental studies on the logic of analysis. In the 1980s to his death he became the world's outstanding researcher in the theory of algebraic differential equations, an old and important subject. In this period he also made fundamental contributions to our understanding of analog computation.... I regard Lee Rubel's work as the most significant in differential algebra since the 1930s."

C. Ward Henson, former chairman of the mathematics department, said he was "one of

the most original and inspiring mathematicians of his generation. The example of his dedication to mathematical research and the challenge of his work made better mathematicians of the rest of us."

Jonathan Mills, computer science professor at Indiana University, views Professor Rubel "as a pioneer in areas of computer science that few people believed had interest." His work has led to "an achievement that is as important to analog computing as Alan Turing's machine is to digital computing. He leaves a body of work that will be the foundation of research for the next decade and beyond."

He loved talking and thinking about mathematics, often aided by a cigar, says his wife, and continued his mathematical work through frequent blood transfusions and pneumonia during the last few months.

He directed the doctoral dissertations of fourteen students and in addition to his papers was the author of two books *Complex Analysis - A Functional Analysis Approach* with D.H. Luecking and *Entire and Meromorphic Functions*, assisted by James Colliander.

Graduate Student Honors

Graduate student **Mark Walker** has been chosen to receive the **Irving Reiner Award** which is awarded each year to an outstanding student in algebra. This award is in honor of the late Professor Reiner and his contributions to mathematics.

Another graduate student, **Jeffrey Ho** has been chosen to receive the **Kuo-Tsai Chen** award in topology and geometry. This honors the memory of Professor Chen. Ho, who has a teaching assistantship, has been named by his students in third semester calculus as an outstanding teacher.

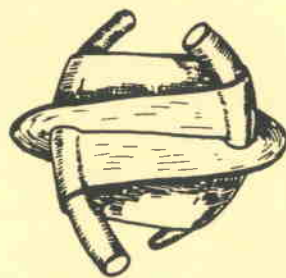
Excellent Teachers

Graduate student **Steven Knox** was named one of the outstanding teaching assistants on the Urbana-Champaign campus this spring. He will receive the **Harriet and Charles Luckman Distinguished Undergraduate Teaching Award** at a banquet for the campus winners. Last year **Bradford Kline** received LAS College honors for his teaching. The winners of this year's department of Mathematics TA Instructional Awards are **Abby Hoit, Bryan Mosher, Ross Christofferson and Paul Gies**.

A total of thirty department

teaching assistants were rated as excellent teachers by the students in their fall classes on the Instructor and Course Evaluation Forms that students fill out at the end of each semester. Eight of these teaching assistants were rated as outstanding. They are: **Amy Andrews, Louis Beuschlein, Paul Gies, Christopher Hill, Jeffrey Ho, Jaebum Ko, Teri Murphy, and Gary Salsbery**.

About forty students are supported by full fellowships. These include National Science Foundation, Sloan Doctoral Dissertation, Department of Education, Clare Booth Luce and Fulbright fellowships, as well as fellowships for international students awarded by their home countries.



*The only way I can distinguish
Proper from improper fractions
Is by their actions.*

Ogden Nash



*Fountain of Diana between
Altgeld and the Union*

IMA Summer

An Institute for Mathematics and its Applications summer program for graduate students in differential geometry will be held here beginning July 9. Participating students have been nominated by their departments and will take part in an intensive four week program, at which four senior mathematicians will lecture. There will also be problem sessions and group projects.

Organizers are Professors **Stephanie Alexander, Richard Bishop and Philippe Tondeur**.

Greenwood Prize

Our undergraduate students have been invited to enter the M.L. Greenwood Prize competition. They can get a list of possible project titles, suggested by faculty members, from Professors Nigel Boston or Elliot Weinberg or propose a project of their own. The best work will be awarded a certificate and a prize of \$180. To enter, students choose a mathematical topic and hand in a report of their work by September 11.

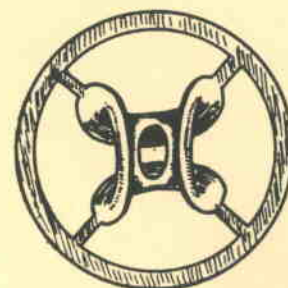
Last fall, the first Greenwood

Prize was awarded to **Thomas Insel**. Second prize went to **Sonny Vu** and third to **Lynn Zhang**.

This prize has been established by **Marshall Greenwood** of San Diego, CA, a friend of the department and self-taught number theorist who publishes and distributes a mathematical newsletter and who corresponds regularly with several members of the department. Mr. Greenwood has co-authored an article with Nigel Boston on quadratic

expressions representing prime numbers which will soon appear in the *American Mathematical Monthly*.

The department sent Mr. Greenwood a card to mark his 80th birthday on April 7.



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