



Newsletter of the School of Mathematics

University of Minnesota

No. 3

For its members, alumni, and friends

February, 1997

FROM THE DEPARTMENT HEAD

I succeeded Gene Fabes as department head in the Fall of 1995, when he completed his five-year term.

Because of recurring budget cuts, the last few years have been very challenging for the School. In the face of all these problems, we managed to go up in the national rankings done by the National Research Council. We were ranked 14th out of 139 research departments nationwide. A prominent national magazine survey placed our applied mathematics program among the top five in the country.

We have started several new initiatives in the School over the past three years. We now have graduate programs (at the master's and Ph.D. levels) in applied and industrial mathematics. One of the distinguishing features of these programs is an internship in industry where the student gets first-hand experience in working on real-world problems. We have also established the Minnesota Center for Industrial Mathematics (MCIM) whose founder and first director is Avner Friedman. He and the associate director, Fadil Santosa, visit major industrial companies regularly looking for interesting mathematical problems arising there and finding internship opportunities for our students. We have also started a master's program in mathematics education. The goal of this program is to give prospective high school teachers a deeper and stronger basis in mathematics.

We are also making strong efforts to improve our undergraduate teaching. The most notable effort here is the "calculus initiative" whose format was developed by Harvey Keynes. One of the new key ingredients here is a better contact between faculty, teaching assistants and the students, who interact in small groups in weekly

workshops; another innovation is the increased use of new technology. Several of our faculty members are also working on other formats for teaching undergraduate courses more effectively. We are very excited by these new approaches to undergraduate teaching when we notice a positive response from the students.

The new initiatives mentioned above require additional resources. The University administration has been very helpful, but we still are looking for ways to support our expanding computer services staff and equipment needs. As the above programs expand, we need more laboratory facilities. We also need to expand our undergraduate scholarship program to give students a chance to develop their full potential in mathematics and take advantage of the opportunities we offer. In this regard, we appreciate very deeply the gifts from alumni and other friends of the School.

- Naresh C. Jain, Department Head

INCOMING FACULTY

The School has been very fortunate to attract some outstanding faculty members in the past two years. Among the new arrivals are:

PROFESSOR MAURY BRAMSON. He received his Ph.D. from Cornell University in 1977 in mathematics, specializing in probability theory. Since then, he has worked mostly in the areas of interacting particle systems, stochastic networks, nonlinear diffusions, and branching processes. Professor Bramson has a long term interest in the interplay between probability theory and fields such as physics and biology, and the type of questions that thus arise. He joined the School in the Fall of 1996.

ASSOCIATE PROFESSOR CLAUDIA NEUHAUSER received her Ph.D. from Cornell University in 1990. Her specialty is probability theory with major interest in interacting particle systems. Currently her research focuses on rigorous analysis of spatial models which arise in population and community ecology and the study of probabilistic/statistical problems in theoretical population genetics. She joined the School in the Fall of 1996.

PROFESSOR FADIL SANTOSA joined the School as Professor and Associate Director of the Minnesota Center for Industrial Mathematics (MCIM) in the Fall of 1995. He received his Ph.D. from the University of Illinois in 1980. He has broad interests in applied mathematics, and has done research on inverse problems, image processing, wave propagation, behavior of composite media, and optimal design.

MAJOR AWARDS AND RECOGNITIONS

Avner Friedman was named Regents' Professor, the highest honor the University awards its faculty.

Victor Reiner was awarded a McKnight Land-Grant Professorship and a Sloan Research Fellowship.

PROMOTIONS:

Scot Adams was promoted to Associate Professor effective September, 1996.

RETIREMENTS:

George Brauer and *Howard Jenkins* retired in June, 1996.

100th BIRTHDAY

Elizabeth Carlson celebrated her 100th birthday on October 2, 1996. Professor Carlson was born and raised in Minneapolis, graduated from high school in 1913, and went on to the U of M for her college education. In 1917 she earned her B.A. and in 1918 her Master's, both in mathematics. She was active in campus life and a member of Phi Beta Kappa and Sigma Xi. During her graduate years she worked as a teacher in the Minneapolis high schools and at Knox College. She studied under Dunham Jackson and wrote her thesis "On the convergence of certain methods of closest approximation". The degree was conferred in 1924. Our records show that she worked at the U of M as Assistant Professor starting in 1928, was promoted to Associate Professor in 1950 and to Full Professor in 1963. She retired in June of 1965. Professor Carlson's 100th birthday was remembered with flowers by faculty members who knew her before her retirement. Her friend Audrey Larson tells us that she can still read but has difficulty writing. Elizabeth Carlson

lives at the Augustana Home of Minneapolis, 1007 East 14th Street, Minneapolis, MN 55404.

MEMORIALS:

Warren Stenberg died of a heart attack on July 5, 1996. He was born and raised in Oakland, California. From 1942-45 he served in the United States Navy. After the war he attended the University of California at Berkeley. There he worked under Anthony Morse and received the Ph.D. in 1955. That same year he was appointed an Instructor in what was the Mathematics Department in the Institute of Technology of the University of Minnesota. In 1965 he became an Associate Professor.

Warren Stenberg wrote several papers on infinite series, Laurent polynomials and separation of convex sets. He was a gifted teacher and it is clear that this is where his real interest lay. Stenberg worked in the School Math Study Group (SMSG) at Yale and Stanford the Summers of 1960-62. Later, starting in 1968, he was involved with the Center for Research in College Instruction and was the joint author of several books on computer science, one of which has been translated into Chinese, Dutch, French, German, Hebrew, Japanese, Portuguese, and Spanish. At Minnesota he was responsible for developing a computer calculus course and a course in finite math.

Stenberg was a fine chess player; this was a life-long passion and he played on the University of Minnesota chess team. He retired in June of 1992 and after an illness of several months died on July 5, 1996. He is survived by a son, Lars Stenberg.

- Norman Meyers

POSTDOCS IN TEMPORARY POSITIONS DURING 1995-96

Jesus De Loera (Ph.D. Cornell) in discrete geometry (joint appointment with Geometry Center)

Elizabeth Housworth (Ph.D. Purdue) in probability
Mordechai Katzman (Ph.D. U of Michigan) in commutative algebra

Petr Kloucek (Ph.D. Charles University, Prague) in numerical analysis

Michal Kowalczyk (Ph.D. U of Tennessee) in dynamical systems, semilinear PDE

Yi Li (Ph.D. Penn State) in PDE, ODE

Marius Mitrea (U of South Carolina) in harmonic analysis

Marc Sanders (Ph.D. Stanford) in algebraic geometry

Kevin Strobel (Ph.D. U of Wisconsin) in calculus of variations

Rick Wicklin (Ph.D. Cornell) in dynamical systems and algebraic geometry

Huashi Xia (Ph.D. UCLA) in algebraic geometry

POSTDOCS ON FELLOWSHIPS

Mark Fels (NSERC, Canada) in differential geometry

Liliana Forzani (CONICET, Argentina) in harmonic analysis

Robert Milson (NSERC, Canada) in differential geometry

LONG-TERM VISITORS

Yakar Kannai (Weizmann Institute) in spectral theory

Robert Kusner (U of Massachusetts) in geometric analysis

Chi-Sing Man (U of Kentucky) in PDE

Raphael Rouquier (CNRS-Paris) in group representation theory

Michael Solomyak (Weizmann Institute) in PDE

Wilfredo Urbina (U of Venezuela) in harmonic analysis

Ning Zhong (U of Connecticut) in logic

ORDWAY VISITORS

The *Ordway Visitor Program* of the School brings distinguished mathematicians to Minneapolis for one month to lecture and interact with faculty and students of the School. The visitors of academic year 1995-96 were:

Jonathan Alperin, University of Chicago

John Ball, Heriot-Watt University

Kevin Corlette, University of Chicago

Boris Levitan, Minneapolis

Masayasu Mimura, University of Tokyo

Geneviève Raugel, Université Paris-Sud

Vladimir V. Sokolov, Russian Academy of Sciences

J.H.M. Steenbrink, University of Nijmegen

S.T. Yau, Harvard University

GRADUATE PROGRAM NEWS

During the twelve months September 1995 to September 1996, sixteen students received their Ph.D. degrees from the School of Mathematics. One further student, who has accepted a teaching job at Beloit College, received his degree later in the Fall. The placements of the sixteen students are as follows:

MSRI, Berkeley

UCLA

CIMAT (Mexico)

University of Missouri

National Chung Cheng Univ. (Taiwan)

UMTYMP, Univ. of Minnesota (2 students)

KAIST, Korea (2 students)

National Benefits Group

University of Korea

Rosenbaum Fellow, Cambridge

Georgia Tech

University of Nevada

2 students transferred to Computer Science for additional degrees

We presently have approximately 80 supported graduate students including two beginning students with fellowships. We hope that the present numbers can be maintained. We believe that we have an excellent, stimulating program.

A new Ph.D. program in Applied and Industrial Mathematics is approved and is scheduled to enroll its first students in the Fall of 1997. The new Master's with emphasis in Applied and Industrial Mathematics has graduated its first students during academic year 1995-96. Industrial internship is an important feature of this program.

In addition, the School of Mathematics is now offering, jointly with the College of Education, a master's degree with emphasis on math education. It will simultaneously lead to a license to teach high school mathematics.

The recipients of the *Good Teaching Award* for 1995-96 were the following Teaching Assistants:

Scott Brown

Dorina Mitrea

Anthony Dunlop

Evelyn Sander

Alexander Frenzt

Xiaolong Shih

Bo Li

Dong-Ho Tsai

Durward McDonell

Luis Valero-Elizondo

- Don Kahn, Director of Graduate Studies

UNDERGRADUATE PROGRAM

A *new calculus sequence* was developed for freshmen math, science, and engineering students with the goal of improving their use of calculus as a tool for mathematical analysis and solving problems in other disciplines. The three-course sequence is intended for the middle 67% of the calculus-ready science and engineering students and other students with strong mathematical preparation and interests. Insistence on better readiness, increased contact with instructors, especially in small-group workshops, increased use of computer lab time, and increased student expectations brought good results. 97% of students achieved a grade of C or better during the first year of the program. 80% of students enrolled in the pilot group have registered for a second year of calculus.

Scholarships

The School has awarded a total of \$15,000 in scholarships to undergraduates during 1995-96.

- David Frank, Dir. of Undergraduate Studies

Math Club

A group of math majors have formed a student chapter sponsored by the Mathematical Association of America. Contact the Math undergraduate office at lawson@math.umn.edu.

PUTNAM EXAM RESULTS

Putnam Exams take place in December of every year. In 1995 there were four contestants from Minnesota. They placed 1549-1/2, 1318-1/2, 988, and 821 out of 2648 contestants nationally. The exam lasts 6 hours and is given at over 400 schools throughout the United States. 2-hour practice sessions were offered by the School twice weekly for the 6 weeks before the examination. Professor Emeritus Warren Loud generously contributed his experience and expertise to these sessions, and also helped proctor the examinations.

- Charles McCarthy, Putnam Exam Coordinator, 1995

ACTUARIAL PROGRAM

The Actuarial Program continues to provide one reason to major in mathematics, thanks to reasonable prospects for decent employment. In the Actuarial Mathematics class which began in the fall quarter, we had 23 students. This compares with 17 in the fall of 1995.

Documented placements in 1996 stand at 11. With the IBNRs yet to be factored in, it appears to have been a good year for employment. (Your correspondent has picked up one of the acronyms from the casualty insurers: IBNR stands for "incurred but not reported"). If anyone ever asks about our placement rate, I have to say in all honesty that it is 50%, but I hasten to add that this should be viewed as 70% of the 70% who successfully pass at least one actuarial exam. (The 70% seem to be coincidentally the same.)

One new development of which Math faculty should be aware: the Carlson School of Management has recently restructured their undergraduate program, and is admitting freshmen. One of their new majors is "Actuarial Science". The bad news is that this will almost surely cost us (and IT) some of our precious few math majors. For example,

in this year's Actuarial Mathematics course there are six students from the Carlson School, compared to a historical average of one or two. The good news is that the actuarial students from the Carlson School are required to take a full lower division math program, plus Actuarial Math (4 quarters), plus a full year of calculus-based upper division statistics. Further good news is that the "program" is a unified cross-college entity. We can't avoid competing for majors, but we cooperate in fundraising, advising, and placement. There is still only one class in Actuarial Mathematics, and that is extremely unlikely to change.

- Steve Agard, Actuarial Program Coordinator

SPECIAL PROJECTS OFFICE

During 1995-96 the University of Minnesota Talented Youth Mathematics Program (UMTYMP) offered special courses to 550 Minnesota students in grades 5-12. These students came from 192 schools around the state of Minnesota and attended their classes at sites in Minneapolis, St. Cloud, Rochester and Duluth. Eight Mathematics faculty were involved in teaching honors-level college calculus courses which are offered to advanced UMTYMP students.

In May, 43 students graduated from UMTYMP after completing coursework at the college level. They will bring a strong background in mathematics to a variety of universities in the fall, including the University of Chicago, Harvard University, and the University of Minnesota.

In May 1996, UMTYMP students Michael Korn, Carolyn Jones, and David Freedman placed as the all-around top individual winners of the 1996 High School Math League tournament. Michael Korn also won a gold medal as a USA representative in the 1996 International Mathematics Olympiad.

During the summer of 1996, the Office of Special Projects ran a mathematics enrichment program for students in grades 6-8. From 8:30 to 3:00 each day, the talented mathematics students in this program learned about topics in applied and theoretical mathematics, used the World Wide Web, and visited a variety of math-related sites in the Twin Cities. Among the topics touched on were fractals, graph theory, coding theory, algorithms, civil engineering, and hyperbolic geometry.

A new mathematics program for female students, recruited especially from the Minneapolis and St. Paul public schools, was initiated in the Fall of 1996. With a grant from the Tensor Foundation and the Mathematical

Association of America, Project PRIME will offer mathematics and mathematical career events to girls entering the 5th and 6th grades.

- Harvey Keynes, Director, Special Projects Office

MINNESOTA CENTER FOR INDUSTRIAL MATHEMATICS

The Center's activities for the past academic year included industry outreach, arranging graduate internships, and design of the Ph.D. graduate program. In addition, the Center hosted a workshop on graduate studies in industrial mathematics in November 1995 that drew over 50 participants nationally.

Since the beginning of the fall quarter of 1995, the Center staff has made several visits to industrial research laboratories. The companies visited include Schlumberger, 3M, Motorola, General Motors, Ford, Bellcore, IBM, Hutchinson Technologies, and Merck. As a result of these visits, we were able to place seven graduate students in summer internships. Our internship program is unique in that the Center identifies an industry mentor and a problem that the student would work on, thus assuring that the research has strong mathematical content and can be written up as a Master's thesis, or can serve as the underpinnings of a Ph.D. thesis.

The Center submitted two proposals during the fiscal year, and received funding for both. One of the awards, through NSF's GOALI program, allows us to conduct collaborative work with Schlumberger-Doll Research, which has committed about half of the total funding. The other proposal was jointly submitted with the School's Numerical Analysis Group to NSF's Group Infrastructure Grant program. The School was one of two in the country awarded the \$1 million, 5-year award.

On the educational side, the Center played a major role in designing a Ph.D. program in Industrial and Applied Mathematics. The program includes development of two new year-long courses in Modeling, Applied Mathematics, and Numerical Methods. The proposed program was approved by the department in May and is approved by the Graduate School.

The Center's homepage, <http://www.math.umn.edu/mcim>, has the latest information about the Center's activities. A description of the degree programs can also be found at the site.

- Fadil Santosa, Associate Director, MCIM

CONFERENCES

8TH INTERNATIONAL COMBINATORICS CONFERENCE

The 8th International Conference on Formal Power Series and Algebraic Combinatorics (FPSAC96) was held at the University of Minnesota June 25-29, 1996. There were 125 participants, including over 50 from outside of the US. The site of this meeting alternates between Europe and the US: 1995 (Paris), 1997 (Vienna). The principal speakers were Noga Alon, Rodney Baxter, Francesco Brenti, Jeff Kahn, Bernard Leclerc, Victor Reiner, Michelle Wachs, and Gunter Ziegler. The conference was supported by the School of Mathematics, the Institute of Technology, the Institute for Mathematics and its Applications, and the Geometry Center.

- Dennis Stanton and Dennis White,
Organizing Committee

UPCOMING CONFERENCES

Future Directions in Mathematical Science. The School of Mathematics and the Institute for Mathematics and its Applications (IMA) will jointly hold a conference on April 18-20, 1997 to honor five members of the School for their contributions over the years to various areas of mathematics, to the School of Mathematics, and the IMA, and to celebrate their respective birthdays. The honorees are *Donald Aronson, Walter Littman, Willard Miller, George Sell, and Hans Weinberger.*

Contact dept@math.umn.edu for more information.

Gene Fabes' 60th birthday will be celebrated at the Midwest PDE Spring Seminar scheduled to take place April 4-6 in Minneapolis.

Contact safonov@math.umn.edu for more information.

MATHEMATICS LIBRARY

The search for a permanent librarian is currently underway. The search committee is chaired by former Mathematics Librarian Janice Jaguczewski and includes faculty representatives Max Jodeit (Mathematics) and Charles Geyer (Statistics). The committee anticipates to have the position filled by the Fall of 1997. Until then, Carol Zinda (M.A., library science, U of Illinois) works afternoons as the interim librarian. She can be reached by phone at 624-9365 or by e-mail at c-zind@gold.tc.umn.edu. Lynn Tran is the new full-time library assistant (10 years experience in Walter Library's circulation and fines department). She can be reached at 624-8317 or by e-mail at l-tran@tc.umn.edu. The library staff wants to assist you and welcomes your comments, questions, and concerns.