



# MATHEMATICS & STATISTICS

A PUBLICATION OF THE DEPARTMENT OF MATHEMATICS AND STATISTICS AT THE UNIVERSITY OF NEBRASKA-LINCOLN

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## Department Receives Presidential Award

This past fall the Department of Mathematics and Statistics was awarded The Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring in recognition of its success in mentoring female graduate students.

Jim Lewis and Judy Walker (who spearheaded the nomination effort) traveled to Washington, D.C., in September to accept the award on behalf of the department and to participate with the other awardees in a two-day symposium entitled Mentoring for the 21st Century. The Presidential Award honors a decade-long effort by the department, under Jim's leadership, to recruit and mentor women in mathematics. We began to see results of our efforts in 1994 and since that time 14 women have received a Ph.D from our department: 1997 was a particularly successful year, as six of 13 Ph.D's were awarded to women. Our recent success stands in stark contrast with the 1980s, a decade in which the department did not award a Ph.D to any woman. We have also defied the national odds— during this period, 35 percent of our Ph.D's were awarded to women as compared to the national average of 22 percent. Our success with women in our graduate program is ex-



Judy Walker with President Clinton

pected to continue, as currently 27 of 50 graduate assistants are women.

The department believes that this success stems from the following simple philosophy: If you create a positive, supportive atmosphere in which qualified people are expected to succeed, they will. In par-

ticular, we believe that the competitive and often cold environment which is far too common in graduate mathematics programs is especially detrimental to women. The creation of our more supportive environment has positively affected our male graduate

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## Mathematics and Statistics wins Systemwide Teaching Award

Apparently it's the fifth time, not the third, which is the charm. The Department of Mathematics and Statistics was awarded the University-wide Departmental Teaching Award last spring, after being a runner-up for the award four out of the previous five years. This honor is given each year to one department or unit at one of the four University of Nebraska campuses (UNK, UNL, UNMC and UNO) that "has made a unique and significant

contribution to the teaching efforts of the University and which has outstanding *esprit de corps* in its dedication to the education of students at the undergraduate, graduate or professional level."

Evidence for this *esprit de corps* can be found in many departmental programs and initiatives, including our extensive honors program and research experiences

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*... and much more!*



*Presidential award continued from front*  
students as well. In fact, while only 23 men were awarded Ph.D.s in the 1980s, 33 men have earned their Ph.D.s so far in the 90s.

The actual award ceremony was held in the Roosevelt Room of the White House immediately following a photo session with President Clinton in the Oval Office. The awardees were all quite excited to visit the White House and thrilled that the President was able to attend. There was actually some doubt as to whether the President might attend, given that he had not been able to make this ceremony in previous years. But indeed the President was able to attend this time, a fact which was not known until the day of the award ceremony. (This was particularly suprising given that the ceremony took place the day after the Starr Report was delivered to Congress!) The ceremony was quite impressive and attended by several important dignitaries (besides Judy and Jim, of course). At the photo shoot, Judy froze and forgot to look into the camera when shaking President Clinton's hand. Undaunted, she went up to the President afterwards and asked for another photo op! He graciously obliged and the result is the photograph you see here.

The award comes with a plaque, which is visible in the department lounge along with our other awards, and \$10,000. Part of this money was used to help support the Nebraska Conference for Undergraduate Women in Mathematics (more info. page 12) held in March.

### Presidential Awards



FOR EXCELLENCE  
IN SCIENCE,  
MATHEMATICS  
AND ENGINEERING MENTORING

## Department celebrates 100 years since first Ph.D.

A reunion and symposium commemorating more than 100 years of doctoral education by our department was held May 14-16, 1998, at UNL. In 1898, Albert Candy received the first Ph.D. degree awarded by our department. In fact, it was only the third Ph.D. degree granted at the University of Nebraska. In addition we think that it was the second Ph.D. degree in mathematics awarded by any institution located west of the Mississippi River. Through December 31, 1998, our department has awarded 156 Ph.D. degrees and more than 2500 bachelors and masters degrees.

More than 200 people participated in our Centennial Celebration which started off with a reception at the Sheldon Art Gallery on Thursday evening. It was a great time for renewing old friendships, making new acquaintances, and catching up with our more recent graduates.

Another highlight of the celebration was the four plenary addresses. Our own Mel Thornton gave the first plenary address, "Mathematics Education, Innovation and Outreach: Where we've been, where we're going." (This talk was delayed for about 30 minutes while we all filled the hallway in the basement of Burnett Hall waiting out a tornado warning!) On Friday afternoon, Mark Tepley (Ph.D. degree from our department in 1968) of the University of Wisconsin-Milwaukee presented a plenary talk, "Algebra at Nebraska" in which he traced from its roots the growth and development of our current program in algebra and algebraic geometry. On Saturday morning, Frank Gilfeather (a faculty member in our department from 1973 through 1988) of the University of New Mexico gave a plenary talk entitled "Mathematics, Universities and the Federal Government: Issues Facing the Profession in the 21st Century," based on his extensive experience on various issues and policies at the national level in Washington, D.C. Johnny Henderson (Ph.D. degree from our department in 1981) of Auburn University gave the fourth plenary address, "differential equations at Nebraska". In this talk he outlined much of the research work in differential equations carried out at UNL by Ph.D. students and faculty members.

The featured speaker at the Friday evening banquet at the Cornhusker Hotel was our own Jim Lewis who gave a talk entitled "A Century of Mathematics and Statistics at Nebraska". In this talk Jim gave us a wealth of facts, figures, challenges, and highlights of the past 100 years. Some of this information is spelled out in a "History of the Department", largely written by Ed Halfar, Bill Leavitt, Earl Kramer and Dave Skoug for the Centennial Celebration brochure.

In addition, approximately 90 people presented talks in various special sessions during our Centennial Celebration. Listed below are the 10 different areas involved, together with the organizers:

**Combinatorics** — Jamie Radcliffe and Earl Kramer  
**Difference & Differential Equations** — Al Peterson and Lynn Erbe  
**Feynman & Wiener Integrals** — Jerry Johnson and Dave Skoug  
**Mathematics Education** — Mel Thornton  
**Mathematics Outside Academia** — Steve Cohn  
**Recreational and General Interest Mathematics** — Glenn Ledder  
**Ring Theory and Algebraic Geometry** — Brian Harbourne and Roger Wiegand  
**Semigroup Theory** — John Meakin  
**Statistics** — Dan Nettleton  
**Operator Algebras** — Allan Donsig and David Pitts (David Pitts also served as Chair of the Centennial Celebration Organizing Committee)



John Meakin with three of his Ph.D students at the Centennial Celebration banquet: (left to right) Vesna Killabarda (Ph.D., 1994), Joseph "Buck" Stephen (Ph.D., 1987), John Meakin, Pascal Weil (Ph.D., 1988).



# Graduate Students Awards

Each year the department makes several awards to our best graduate students to recognize their achievements. This year Jane Meza won the \$700 award for Outstanding Qualifying Exam. Jane is pursuing a Ph.D in statistics. Also in statistics, Joe Scherer won the Outstanding First Year Student Award (\$500). And Tim Pollis is the 1998-1999 recipient of the Outstanding Graduate Teaching Award (\$500). Tim is writing up his dissertation in combinatorics under the direction of Jamie Radcliffe.

The Emeritus Faculty Fellowship Fund is an endowment honoring our emeritus faculty and supported by annual contributions by department faculty. This year's winners of the \$500 EFF awards were Iyad Jeib, Karl Kattchee, Jane Meza and Patricia Nelson. Iyad, Karl and Patricia are working on Ph.Ds in, respec-



**Tim Pollis,**  
Outstanding  
Teaching Assistant  
Award winner.

tively, numerical analysis (under Professor Tom Shores), commutative algebra (under Professor Roger Wiegand) and combinatorics (under Professor Jamie Radcliffe).

In 1996 Professors Roger and Sylvia Wiegand established the Grace Chisholm Young and William Henry Young Fellowship in memory of Sylvia's grandparents, both of whom were well-known mathematicians in the early 1900s. Grace Chisholm Young was the first woman to receive a Ph.D (in any discipline) in Germany. This year's award of \$600 went to Graham Leuschke, who is working on a Ph.D in commutative algebra with Roger Wiegand.

One of the original intents of the awards was to increase retention of our best students, and in this respect the awards have been successful. For example, of the 37 students who have received Emeritus Faculty Fellowships since 1990 (the first year of the awards), 18 have earned Ph.D's from UNL and 13 are still active in our Ph.D program. (Five EFF awardees have transferred to other Ph.D programs, and only one is no longer

in a Ph.D program.) Of the 11 students receiving the Outstanding First Year Student Award, 6 have received UNL Ph.D's, one has transferred to another Ph.D program, and the remaining four are actively pursuing UNL Ph.D's.

The following is a list of past recipients of these awards since our last newsletter.

**Outstanding First Year Student:** Richard Avery and Victoria Sapko (1996), Graham Leuschke (1997) and Steve Lindblad (1998).

**Outstanding Qualifying Exam:** Victoria Sapko (1996) and Nikolay Silkin (1997).

**Outstanding Teaching Assistant:** Tim Deis and Michelle Homp (1996), Rob Krueger (1997), and Mike Ira (1998).

**Emeritus Faculty Fellowships:** Meral Abdulazizoglu, Tim Deis, Michelle Homp, Ryan Karr and Jennifer Raschko-Mueller (1996); Richard Avery, Iyad Abu Jeib, Karl Kattchee, Patricia Nelson, and Vera Rayevskaya (1997); Keith Agre, Graham Leuschke, Victoria Sapko, Theresa Strei and Chien-Hua Wu (1998).

**Grace Chisholm Young & William Henry Young Award:** Theresa Strei (1997) and Rikki Wagstrom (1998).

Several graduate students have received Certificates of Recognition for Contributions to Students in recent years. These certificates are awarded by the UNL Parents Association and UNL Teaching Council to recognize teachers who have "made a significant difference in a student's life." Graduate students who have received this award are: Iyad Abu-Jeib (1998 and 1999), Tim Pollis (1998), Michael Magwire (1997), Stephanie Fitchett (1997), Jo Hoffacker (1997) and Michelle Homp (1997).



Pictured from left to right  
Theresa Strei, Karl Kattchee,  
Patricia Nelson, Graham  
Leuschke, Rikki Wagstrom,  
Jane Meza, Iyad Jeib.

## Logan publishes fourth book

Last summer, Professor David Logan published his fourth book in applied mathematics. The book, which appears in both hardcover and softcover editions, is entitled *Applied Partial Differential Equations* and was published by Springer-Verlag in their series on Undergraduate Texts in Mathematics. The book is designed for the standard one-semester undergraduate course in Fourier series and boundary value problems. (In our department, this course is Mathematics 324.) The text differs from other books on this topic in that it is a brief treatment of about 200 pages. Most others are over 700 pages. David's book includes derivations of some of the standard equations of mathematical physics (the diffusion equation, Laplace's equation, the wave equation, etc.) and discusses methods for solving those equations on both bounded and unbounded domains. He also discusses solving partial differential equations using computer algebra packages such as Maple. David, who has taught this material for many years, says that the book evolved from rewriting lecture notes many times over. He hopes it will be adopted by those instructors wanting a concise and elegant treatment of this subject. The book can be found at Barnes and Noble book outlets. His highly successful graduate text, *Applied Mathematics*, which is now in its second edition, is used at many of the top universities in the nation.



## Rowlee donation sparks lecture series

In 1996, Howard Rowlee, a Lincoln resident and friend of the department, made a generous donation to the University of Nebraska Foundation to establish a fund to support research in mathematics. The department responded by creating the Howard Rowlee Lectures, an annual series that seeks to bring internationally acclaimed scholars in the mathematical sciences to UNL, and by doing so stimulate mathematical research and bring attention to the department's research activities.

The inaugural lecture was given in 1997 by Efim Zelmanov, Professor of Mathematics at Yale University and the winner of the Fields Medal in 1994 for his seminal contributions to algebra. In 1998 the Howard Rowlee lectures were given by Avner Friedman, Professor of Mathematics at the University of Minnesota. Professor Friedman is the director of the Minnesota Center for Industrial Mathematics and is an elected fellow of the National Academy of Sciences. Professor Friedman is well-known for his contributions to applied mathematics, particularly to partial differential equations and industrial modeling. The titles of his two talks were *What is Industrial Mathematics?* and *Free Boundary Problems in Cell Biology*.

The 1998 Howard Rowlee Lecture was given by Bradley Efron. Professor Efron is the Max H. Stein Professor of Humanities and Sciences in the Department of Statistics and Department of Health Research and Policy at Stanford University. He is a world-renowned statistician and an elected member of the National Academy of Sciences. The title of his lecture was *Shakespeare and the Case of the Suspicious Statisticians*.

## Masters Week

Each fall, five outstanding graduates are invited to campus for participation in Masters Week. The purpose of this program, which is jointly sponsored by the Alumni Association and the Chancellor's Office, is to have these outstanding alumni interact with current students and faculty through presentations, class visits and informal meetings. This past October, the department was pleased to have one of its own graduates, Patricia E. Wirth, selected as a visiting Master. This is the first time a mathematics major has been selected for Masters Week.



Pictured left to right, Patricia Wirth and Sara Russell (ASUN President and math major).

Pat, a native of Nebraska City, NE attended UNL as a mathematics major and earned her Bachelor of Science in Mathematics and Mathematics Education in 1971. She taught high school mathematics in Gresham, NE for one year before moving to St. Louis to work as a statistical research assistant at Washington University Medical School and to attend graduate school. Pat earned her MS degree in 1978 and her Ph.D in Systems Science and Mathematics in 1980, both from Washington University.

In 1981 Dr. Wirth joined AT&T Bell Laboratories as a member of the technical staff in the Teletraffic Theory and System Performance Department. Later, Pat became the supervisor of the performance analysis group of the department. In 1990 she was promoted to Functional Director, Teletraffic Theory and Performance Analysis Department. In this capacity she presently manages fifty engineers and oversees more than fifty projects.

When Pat joined AT&T she was only the second woman hired in her department. She was awarded the Management/Executive Award by the Women of AT&T in 1996. A year later she was named the first female AT&T Fellow. Persons so honored become Fellows for life, receive \$25,000 cash, and join the AT&T Science and Technology Board that helps chart the company's technical direction.

Pat was on campus from Thursday, October 28 through Saturday, October 31. On Thursday afternoon she gave a research presentation ("Telecommunications Traffic Modeling") to a room overflowing with students, faculty, and visitors from other departments and the community. During the day on Thursday and Friday she visited four honors calculus classes, a Contemporary Mathematics class, and a Linear Optimization class. Between these classes she met with smaller groups of graduate students and faculty. A high point of her visit was a presentation Thursday night aimed at students and the general public entitled *Creating a Technical Career: From Nebraska Farm Girl to AT&T Labs Fellow*.

Pat was also in Lincoln briefly last June to be part of the department's Centennial Celebration. She was also a speaker in the All Girls/All Math summer camp. The department is very proud to have an alumna as distinguished as Dr. Wirth and pleased that she has been able to come to UNL to share her experiences with our students and faculty.

## Graduate women in science recognize undergrads

Each year the University chapter of the Graduate Women in Science sponsors an award dinner and ceremony to honor top junior and senior undergraduate women in the sciences. This year nine undergraduates from the math department will be honored. They are Heidi Basler, Tanya Lloyd, Sara Russell, Lisa Schkade, Deborah Zadina, Kristina Kohle, Linda Tran, Anissa McLaren, and Yolanda Rolle. The cer-

emony will be held at the Cornhusker Hotel. Following dinner, there will be a presentation by Associate Vice Chancellor Edna McBreen of the Institute of Agricultural and Natural Resources.

The math department has always been a very enthusiastic supporter of this program as the department feels that recognition of the students' achievements is an important part of supporting and encouraging future

success. Six math department faculty members will also be attending the dinner to show their support and respect for these women's achievements.

At last year's award ceremony, five women undergraduates from the math department were recognized. They were Kathleen Lewis, Gophi Shah, Rachael Yung, Kimberlay Vance and Barbara Zach.



## Skoug receives MAA Distinguished Teaching Award



David Skoug

In recent years the Mathematical Association of America (MAA) has recognized outstanding teaching by instituting the Awards for Distinguished College or University Teaching. We are happy to report that David Skoug was the 1998 recipient of this award for the Nebraska-Southeastern South Dakota Section of the MAA. David was presented this award at a banquet for the 1998 regional meeting of the MAA held at Wayne State University in April 1998. Dave has a long record of distinguished teaching. In 1974, Dave received the UNL Chancellor's Distinguished Teaching Award and in seven different years he has received a Recognition Award for Contributions to Students from the UNL Parents Association and Teachers' Council.

Previous recipients of this award from our department are Mel Thornton (1993), Jim Lewis (1994), Tom Shores (1996) and Steve Dunbar (1997). Dave Skoug also received the MAA Distinguished Service Award in 1995.

## Math Day welcomes Gallup support

The ninth annual UNL Math Day was held on Thursday, November 12 at the city campus union. This was the largest Math Day ever with 1218 students representing 93 Nebraska high schools. Ninety of these schools participated in the bowl competition. This Math Day also enjoyed the generous and enthusiastic support of the Gallup Organization. The day started at 8:00 am with the welcome address from Senior Vice Chancellor Richard Edwards and concluded at 4:30 pm with the award presentations by the head of the Gallup Organization, Dr. Donald Clifton. It was, as always, a jam-packed exciting day.

The purpose of Math Day is to promote the mathematical sciences at UNL. There is one individual and two team mathematics competitions, as well as information about majors and departments, career information, and recreational mathematical activities. It is modeled after a similar program at Colorado State University. All students start with a multiple choice, 25 question, preliminary exam called PROBE I (Problems Requiring Original and Brilliant Effort). The top 50 move on to take the now famous essay exam called PROBE II. The top 10 on PROBE II are awarded a total of \$34,000 in 4-year scholarships to UNL. The first team competition is determined by the schools cumulative scores on PROBE I. The second is a double elimination tournament pitting three-member teams against each other. The team competitions are divided into smallest, small, medium, and large school categories with bowl trophies and PROBE I plaques given to the top two teams in each. All the questions assume only two years high school algebra and one year geometry; however the answers

to PROBE II questions require the creativity and originality that we expect from only the very best students. Plaques are also awarded to the top three females and top three males on the PROBE I exam.

In addition to the annual financial support from the department and the College of Arts and Sciences, this year Math Day welcomed the generous support of the Gallup Organization. Starting with this year's winners, Gallup will be providing up to \$10,000 per year toward the Math Day winners' scholarships. The 4-year awards are divided as follows: 1st place receives \$8,000 scholarship; 2nd - 5th receive \$4,000; 6th - 10th receive \$2,000. In the past, the money for these scholarships had come from various temporary funds in addition to the Eastman Memorial Fund in Mathematics and Statistics. With Gallup's generous gift we now have a much more stable base of support for these scholarships. We also benefited from the help of many Gallup workers who volunteered their time on Math Day. Also, in early December Dr. Clifton and Gallup sponsored an award gathering and dinner for the top 10 students, their families, and their teachers at the Gallup headquarters here in Lincoln.

The effort of the entire department (faculty, graduate and undergraduate students, and staff) is needed to make Math Day a success. Math Day requires over 100 volunteers on the day itself and about 10 volunteers for the previous month. However, most of the organizational work is accomplished by two people — Lori Mueller and Gordon Woodward, who attend to Math Day details all year long.

## Mientka named executive director of IMO 2001

Professor Walter Mientka has been named executive director of the 2001 International Mathematics Olympiad, which will be held in the U.S. that year. To make time for this assignment, Walter resigned his position as director of the American Mathematics Competitions Examination Center in Lincoln, although he still holds the position of executive director emeritus of AMC. The International Math Olympiad is an annual competition of six-person teams representing over 70 countries. This past year, 76 countries participated in the Olympiad held in Taipei, Taiwan. The American team finished in a tie for third place with Hungary, behind Iran and Bulgaria. All 6 members of the team won personal medals. The U.S. team is chosen on the basis of performance in the annual USA Math Olympiad held each year in May. Twenty-four top finishers in that competition are invited to the

University of Nebraska for a 4-week intensive program to train for the International Olympiad. The USA has a excellent history of achievement in the International Math Olympiad, scoring among the top five teams in 21 of the 24 years in which it has participated. Most outstanding was the unprecedented perfect score by every member of the US team led by Professor Mientka at the 1994 International Math Olympiad in Hong Kong.

A representative question which appeared on the 1998 Olympiad exam is:

*In a competition, there are  $A$  contestants and  $B$  judges, where  $B$  is an odd integer greater than 1. Each judge rates each contestant as either "pass" or "fail". Suppose  $N$  is a number such that, for any two judges, their ratings coincide for at most  $N$  contestants. Prove that  $N$  divided by  $A$  is greater than or equal to  $(B-1)$  divided by  $2B$ .*



# FACULTY

## Department adds five new faculty

Since 1996 five new tenure-track faculty have joined the department.

Arriving in 1996 were Dan Nettleton and Judy Walker. Dan, a native of Iowa, earned his B.S. in mathematics at Wartburg College and did his graduate work in statistics at the University of Iowa. He received his Ph.D. in 1996, specializing in statistical genetics. Dan teaches primarily graduate and upper-level undergraduate courses in statistics. This year Dan's position is partially supported by a research grant from the Gallup Research Center, which allows him to spend more time on his research. He is also co-



Dan Nettleton

organizing a major conference in statistics this spring. Dan also will be awarded the College Distinguished Teaching Award at the spring honors convocation in April. Judy received her baccalaureate degree from the University of Michigan in 1990 and her Ph.D. from the University of Illinois, Urbana-Champaign in 1996. Her research area is coding theory. In particular, she is interested in studying algebraic codes over certain commutative rings using algebraic geometric methods. In addition to being an outstanding teacher and an NSF-funded researcher, Judy has been actively involved in many other departmental initiatives, such as the All Girls/All Math program. She also spearheaded the effort to nominate the department for the Presidential



Judy Walker

Mentoring Award, which we received last fall.

Also joining our faculty in 1996 was Mark Walker, who has been a postdoc in our department the last three years. Mark



Mark Walker

will become a member of our tenure-track faculty starting in August of 1999. He received his Ph.D. in Algebraic K-theory from the University of Illinois in May of 1996. Upon completion of his Ph.D., Mark was

awarded a prestigious National Science Foundation Postdoctoral Fellowship. This is a three-year award during which Mark has split his time between UNL and Northwestern University.

Allan Donsig joined our faculty in the fall of 1997. Allan, whose research interests are in the theory of operator algebras, received his Ph.D. from Texas A&M in 1993. Prior to his arrival at UNL, he had postdoctoral positions at the University of Waterloo, the University of Toronto, and at Lancaster University in England, where he was an NSERC Postdoctoral Fellow. In addition to the usual slate of undergraduate courses, Allan teaches graduate courses in analysis and operator theory. He is also one of the faculty advisors for Pi Mu Epsilon.



Allan Donsig

Susan Hermiller, a geometric group theorist, is the newest member of our faculty. A native of Toledo, OH, Susan received her Ph.D. from Cornell University

in 1992. She then held two one-year postdocs, one at the Mathematical Sciences Research Institute (MSRI) in Berkeley, CA and the other at the University of Melbourne. Susan spent the next four years as a member of the mathematics faculty at New Mexico State University. In the fall of 1998 Susan was once again a

visiting fellow at MSRI before joining our faculty this spring.



Susan Hermiller

## Five faculty promoted to full professor

Five faculty members of our department have been promoted to the rank of full professor during the last year. They are Rao Chivukula, Steve Dunbar, Brian Harbourne, Partha Lahiri and Richard Rebarber.

Rao Chivukula, who retired from the faculty in 1998, was a professor of mathematics in our department for 35 years. He received his Ph.D. in mathematics from two institutions: Andhra University in India in 1960, and the University of Illinois, Urbana, in 1962. He served a one-year stint as a postdoc at the University of Michigan before coming to UNL in 1963. His research area is functional analysis and he has authored numerous research articles and other scholarly works. He had five Ph.D. students. In addition, Rao taught a wide range of graduate and undergraduate courses, was the chair of the graduate exams committee for many years, and was one of the chief organizers (along with Gordon Woodward) of Math Day since its inception. We wish Rao well in his retirement.



Steve Dunbar, a member of our faculty since 1985, grew up in Omaha and attended UNL as an undergraduate majoring in math. He did his graduate work at the University of Minnesota, receiving his Ph.D. in 1981. From there Steve worked as a postdoc for four years at the University of Utah. He also was a research visitor for one year at the University of Heidelberg before joining our department. Steve's research involves the study and application of non-linear differential equations. He also works occasionally in numerical analysis. He was the Ph.D. supervisor for Paul Dawkins, who graduated in 1997, as well as the advisor for three undergraduates who wrote honors theses under his direction. He was the vice-chair of the department from 1992-1998 before accepting the directorship of the J.D. Edwards Honors Program in Computer Science and Management at UNL this past summer (see article on page 10). Steve, who won the College Distinguished Teaching Award in 1991, has worked hard at incorporating technology, particularly computer software programs such as MAPLE, into his mathematics courses. He and Tom Shores were the principal forces



**Brian Harbourne**

behind the start-up of our Math Computer Lab and high-tech classroom in Bessey Hall. Steve is also the one of the principal investigators of a \$4 million dollar NSF grant entitled "Multi-Media Mathematics: Across the Curriculum and Across the Nation."

Brian Harbourne has been on our faculty since 1986, four years after receiving his Ph.D. from M.I.T. He does research in algebraic geometry, which he describes as "the study of geometric spaces defined by algebraic equations." He has supervised two Ph.D. students: Sandeep Holay, currently head of the mathematics department at Southeast Community College in Lincoln, and Stephanie Fitchett, who this year is finishing up a two-year postdoc at Duke University. Brian is working with the two of them on a combined research project concerning the infinitesimal structure of a finite set of points in projective space.

Brian served as the department Graduate Chair from 1996-1998. On the teaching side, Brian won the College Distinguished Teaching Award in 1992. Recently he has been introducing web technology into his courses, particularly his large lecture calculus courses. His web page provides an on-line syllabus, practice exams and information on grades.

Partha Lahiri, a native of Calcutta, India, joined our department in 1986 after finishing his Ph.D. in statistics at the University of Florida the same year. Since 1993 he has also served as the Director of the Division of Statistics at UNL. His research specialty, survey sampling, has brought him into close collaboration with the Gallup Research Center in Lincoln. This has led him to recently being named a Senior Research Advisor by the Gallup Organization. Additionally, he was recently elected to the prestigious International Statistical Institute. He has had three Ph.D. students graduate under his supervision: Vipin Arora (1994), Ferry Butar-Butar (1997), and Chien-Hua Wu (1998). Partha has organized two major statistics conferences at UNL. The first, "Current Topics in Survey Sampling," was held in October 1997 and drew 170 statisticians from around the world. The other conference, "Model Selection, Empirical Bayes and Related Topics" was held this spring in conjunction with the Rowlee Lecture Series.



**Partha Lahiri**

Richard Rebarber has been a member of our department since 1984. Originally from New Jersey, Richard received his bachelor's degree at Oberlin College in Ohio, where he was a math and



**Richard Rebarber**

music major. He attended graduate school at the University of Wisconsin-Madison and received his Ph.D. in 1984. He does research in control theory, which he describes as "the stabilization of systems modelled by PDE's." Richard is currently planning a major research conference in control theory to be held at UNL this coming August. He has received several external research grants from such funding sources as the NSF, Air Force, and NATO. These grants not only help support his own research but have also allowed him to support six undergraduates as part of the Research Experience for Undergraduates (REU) program. Partly because of his work with REU's and his excellence in teaching honors courses, he was awarded the College Distinguished Teaching Award in 1995.

## Four faculty retire

Since May of 1997, four of our faculty members have retired after giving a total of 133 years of devoted service to our department. They are Rao Chivukula (1963-1998), Gary Meisters (1959-1963 and 1972-1997), Lal Saxena (1965-1997), and Al Zechmann (1961-1998). All four of them say that being retired is a wonderful change of pace. None of them will admit that they miss grading exams and homework even a little bit; and here some of us were hoping they would



**Al Zechmann**

stop by during final exam week and insist on helping! One thing they all enjoy is the opportunity to visit extensively with their children and relatives without having to rush back to Lincoln and UNL. As a group they are doing a lot of traveling and reading, very typical of people in our profession.

We expect that many, if not most, of our graduates during the past 30 years had some kind of contact with at least one of

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Rao Chivukula (left) and Lal Saxena

*Faculty continued from page 7*

Al, Gary, Lal, or Rao during their studies at UNL. We are very proud of their many achievements. As a group they had 12 Ph.D. students at Nebraska: Walter Woodward (Rao, 1970), Randy Heckman (Rao, 1971), William May (Rao, 1971), Todd Franke (Gary, 1977), Sarma Ivatury (Rao, 1977), Edith (Kregelius) Peterson (Gary, 1977), Sastry Sivasankara (Rao, 1981), Steve From (Lal, 1985), Brian Coomes (Gary, 1988), Karunarathna Kulasekera (Lal, 1988), Yuanzhang Li (Lal, 1990), and Nancy Campbell (Lal, 1995).



Gary Meisters

## Graduate program reaches new heights

Our graduate program is riding a wave of accomplishments. We have produced a string of outstanding Ph.D.'s who have done extremely well in the job market. Many of these students have already established themselves as outstanding teachers and scholars and are achieving national recognition. We are enjoying a growing reputation for excellence in graduate education, a reputation that reached national proportions when we received the Presidential Mentoring Award.

One obvious reason for the success of our program is our outstanding faculty and the cohesive research clusters that have formed over the years. Each of these clusters has substantial support for visitors and for professional travel by faculty and graduate students. (In fact well over half of our faculty have external research funding, a figure considerably higher than that at most of our peer institutions.)

Another reason for our students' success in the job market is the department's balanced approach to teaching and research. Graduate students are given many opportunities to grow professionally in their dual roles as teachers and scholars, and those with academic aspirations are well-prepared for all aspects of their chosen career.

Our graduate students travel widely, to regional, national and professional meetings. For example, in the summer of 1996, three of our graduate students participated in the Summer School in Commutative Algebra in Barcelona, and this past January, 12 of our students attended the Annual Meeting of the American Mathematical Society in San Antonio. Each year our department spends around \$15,000 in support of professional travel by our graduate students. Attendance at professional meetings is important to our students' mathematical development and helps them make professional contacts that will benefit their future careers. Moreover, the strong presence of our graduate students at professional meetings has greatly enhanced the visibility of our program.

Another reason is less tangible but equally important—the friendly environment we enjoy. The atmosphere among graduate students is one of cooperation and mutual support, rather than competition. We have an unusually supportive environment for women, an environment that is reflected in the number of outstanding women we have attracted to our program: Currently 27 of our 50 graduate assistants are women.

With the brilliant technical assistance of Greg Payne, a freshman Eastman Scholar, we have radically remodeled our graduate website (<http://www.math.unl.edu/Dept/Info/Grad/>), including pictures and testimonials about our program from some of our successful graduates. Some of these pictures occur also on a brochure we have distributed to thousands of people nationwide. We are hosting two major events for advanced undergraduates—the Regional Workshop in Mathematics February 26-27 and the Nebraska Conference for Undergraduate Women in Mathematics. We hope that in addition to creating research ties with other institutions and providing a national showcase for undergraduate women in mathematics these events may inspire a few top students to take a close look at our graduate program. These recruiting efforts have required a lot of hard work on the part of many of our faculty, but much of the credit must go also to Joyce Zach, a departmental secretary whose unflagging energy and uncanny ability to juggle a multitude of projects has propelled these projects from fantasy to reality.

The following seven students are expected to receive Ph.D.'s in 1999:

**Daryl Bell** (advisor Bo Deng) will defend his thesis in April. His thesis concerns traveling waves in reaction-diffusion equations for nerve axons.

**Tim Deis** (advisor John Meakin) works in semigroup theory. A tentative title for his thesis is "Equations in free inverse monoids".

**Lance Nielsen** (advisor Jerry Johnson), an instructor at the University of Nebraska—Omaha, is on track to finish his PhD in May. His thesis is on Feynman's operational calculus for noncommuting operators.

**Krista Taylor** (advisor Bo Deng) will defend her thesis in August. Her research deals with chaotic attractors for a class of differential equations which have a special kind of orbit called "Shilnikov's saddle-focus homoclinic orbit".

**Shu-Mei Wan** (advisor Partha Lahiri) is expected to graduate in August. The tentative title of her thesis is "Jackknifing in Prediction Problems with Applications". She and Lahiri, along with J. Jiang, have submitted a paper "Jackknifing the mean squared error of empirical best predictor".

**Rikki Wagstrom** (advisor Steve Cohn) is working on the mathematical and numerical analysis of a nonstandard, nonlinear integro-differential system of equations which governs ion transport in a controlled



potential experiment. Next year Rikki will start at Calvin College in Grand Rapids, Michigan.

**Tim Pollis** (advisor Jamie Radcliffe) is working on the existence of Hamiltonian paths and cycles in self-complementary graphs. He has produced a polynomial-time algorithm for finding a Hamiltonian path, and is working on an elegant characterization of self-complementary graphs with Hamiltonian cycles.

Four Ph.D's were awarded in 1998:

**Robert Krueger** (advisor Allan Peterson) is an assistant professor and NeXT Fellow at Coe College in Cedar Rapids, Iowa. His dissertation, titled "Disconjugacy of  $N$ th Order Linear Difference Equations", concerns the factorization of linear difference equations. One of his main results is that an  $N$ th order disconjugate linear difference equation has an essentially unique Trench factorization, which enables him to get nice asymptotic properties of solutions of these difference equations.

**Serpil Saydam** (advisor Sylvia Wiegand) graduated in December and is currently a lecturer in our department. Her thesis, titled "Prime Ideals in Birational Extensions", characterizes the partially ordered set of prime ideals in birational extensions of the polynomial ring  $D[x]$ , where  $D$  is an order in an algebraic number field. Her results confirm an important case of a 1986 conjecture on the prime ideal structure of two-dimensional domains of finite type over the ring of the integers.

**Ruizhong Wei** was lucky enough to have two advisors, our own Earl Kramer, and Doug Stinson in Computer Science. He now holds a postdoc at Waterloo University (Canada), Stinson's current home. His thesis title was quite a mouthful: "Traceability Schemes, Frameproof Codes, Key Distribution Patterns and Related Topics — A Combinatorial Approach".

**Chien-Hua Wu** (advisor Partha Lahiri) works as a statistician for Advanced Clinical Services, a consulting company, where he is responsible for providing statistical safety tables and efficacy tables for projects involving non-ulcer dyspepsia. In his dissertation, titled "On a Test for Multivariate Normality and on Certain Statistical Procedures for Complex Surveys", Chien-Hua extended the Shapiro-Wilk test for checking normality, and the Wilks Lambda test for testing regression coefficients, in multivariate linear regression when samples are collected using a complex survey design.

In 1997 our department turned loose 13 new Ph.D's, a record that will be hard to beat.

**Douglas Anderson** (advisor Allan Peterson) is an assistant professor at

Concordia College in Moorhead, Minnesota. His thesis, "Discrete Hamiltonian Systems", dealt with generalizations of a 2nd order discrete Sturm-Liouville equation. He, Ron Mathsen (1965 UNL Ph.D, currently at North Dakota State University) and Tim Peil (1990 UNL Ph.D, currently at Moorhead State University) run a seminar on their common interests.

**Richard Avery** (advisor Allan Peterson) is an assistant professor at Dakota State University in Madison, South Dakota. His dissertation, "Multiple Positive Solutions to Boundary Value Problems", dealt with the problem of finding positive solutions for a boundary value problem for a nonlinear ordinary differential equation.

**Ferry Butar Butar** (advisor Partha Lahiri) has had held two one-year visiting assistant professorships, at the University of Central Florida in Orlando and at Sam Houston State University in Huntsville, Texas. The title of his thesis was "Empirical Bayes Methods in Survey Sampling".

**Paul Dawkins** (advisor Steve Dunbar) is an assistant professor at Lamar University in Beaumont, Texas. His thesis, "Spurious Eigenvalues in the Spectral Tau Method", resulted in a paper that has just appeared in the Journal of Computational Physics.

**Stephanie Fitchett** (advisor Brian Harbourne) is currently a postdoc at Duke University in Durham, NC. Her thesis, "Generators of Fat Point Ideals on the Projective Plane", is motivated by a conjecture of Nagata on the behavior of the Hilbert function of ideals defining multiple points in the projective plane. Before Steph's thesis, only the case of five or fewer points was understood completely. She worked out the case of six points and almost completed the case of eight points. This case has since been completed in joint work with Harbourne and Sandeep Holay (a 1994 Ph.D who also worked under Harbourne).

**Darren Holley** (advisor Roger Wiegand) completed his PhD while teaching full time at Omaha North High School. His dissertation, "Quotients of the Multiplicative Group of a Field", answers questions motivated by earlier work by Wiegand and Robert Guralnick in representation theory.

**Michelle Reeb Homp** (advisor David Logan) is an assistant professor at Concordia University in Seward, NE, her undergraduate alma mater. Her dissertation, "A Transport Equation in Porous Media with an Oblique Evolutionary Boundary Condition", dealt with modeling the flow of contaminants in aquifers with fractures, such as might appear near a waste disposal site. In some cases the porous medium can retard the flow of radionuclides through these fracture systems by absorbing the sub-

stances and giving them time to decay. The techniques involved Laplace transforms and numerical methods.

**Tatiana Jajcayova** (advisor John Meakin) has an assistant professorship at Comenius University in Slovakia, but this semester she is a visitor at Indiana State University (Terre Haute, IN) with her husband Robert Jajcay (1995 UNL Ph.D). She is currently writing up, for publication, the results of her thesis, "HNN Extensions of Inverse Semigroups".

**Jennifer Mueller** (advisor Tom Shores) is an NSF postdoc at RPI in Troy, New York. Her thesis was titled "Inverse Problems for Singular Differential Equations".

**Cheryl Olsen** (advisor Earl Kramer) is an assistant professor at Shippensburg University of Pennsylvania. Her thesis was titled "On Graphical Designs".

**Robert Ruyle** (advisor John Meakin) wrote a dissertation titled "Pseudovarieties of Inverse Monoids". He is a visiting assistant professor at Nebraska Wesleyan University.

**Olga Sapir** (advisor John Meakin) is a lecturer at Vanderbilt University. Her thesis was titled "Identities of Finite Semigroups and Related Questions".

**Dan Van Beursem** (advisor Glenn Ledder) is an assistant professor at the University of South Dakota. His thesis, titled "Analytical Modeling of Groundwater Flow" comprised work done on three related problems in groundwater flow. Each problem consisted of a partial differential equation model, with differences in the domains and in the mechanism driving the flow. The mathematics involved the use of various classical solution techniques, such as transforms and Green's functions, supplemented by numerical computation. A major focus of the work was the use of these models to make scientific predictions.

In 1996, Ph.D's were awarded to **Kamel Al-Khaled** (advisor Tom Shores), **Kurt Herzinger** (advisor Roger Wiegand), **David Jorgensen** (advisor Roger Wiegand), **Michael Morelli** (advisor Allan Peterson), **Zsuzsanna Szaniszló** (advisor Jamie Radcliffe), **Kaicheng Wang** (advisor John Meakin) and **Akihiro Yamamura** (advisor John Meakin). Al-Khaled, Herzinger, Jorgensen, Morelli and Szaniszló are assistant professors at, respectively, Jordan University of Science and Technology, the US Air Force Academy, University of Texas—Arlington, University of Wisconsin—Stout and the University of South Dakota. Wang is a data analyst at National Indemnity in Omaha, and Yamamura is a research scientist at Telecommunications Advancement Organization in Japan.



## Steve Dunbar named director of Honors Program

Steve Dunbar, vice chair of our department from 1992-1998, has been named the founding director of the J.D. Edwards Honors Program in Computer Science and Management at UN-L.



Steve Dunbar

This program was established with a \$32 million private gift—the second largest to date for the university. The purpose of the program is to produce top quality graduates who combine business skills with

knowledge of computer science fundamentals. Steve, who began his two-year appointment as director in June 1998, says that the program's innovative curriculum will blend instruction in technology and information management with the liberal arts. It will also provide a student-based living and learning environment housed in a high-tech residential center. The first master's level students will be admitted for the fall 1999 semester. Undergraduate classes will begin in the fall of 2000, and the residential academic center is scheduled for occupancy in the fall of 2001.

## The All Girls/All Math Program

For the past two summers, UNL math department faculty Judy Walker and Wendy Hines have organized the All Girls/All Math program for high school girls. The program has a number of components: there are two week-long summer camps, a weekend conference called "It's a Math Thing" which is open to all high school girls, and an email mentoring program, also for high school girls.

During the camps, the girls (14 in the first camp, 18 in the second) stayed in a university residence hall, ate dormitory food, studied mathematics and made friends. Each day the girls attended two three-hour classes, one on coding theory and the other on iteration of functions and chaos. Each class was a mixture of lecture and problem sessions. Classes were taught by Wendy and Judy along with two recent Ph.D graduates from our department, Michelle Homp of Concordia University in Seward, NE and Cheryl Olsen of Shippensburg State University in Pennsylvania. In addition, they were assisted by Lincoln Public School teacher Ms. Sue Graupner and graduate student Theresa Strei. Camp evenings were spent in social activities. During each camp, the girls were treated to a visit from a woman working in mathematics in industry. The first camp was visited by Vicki Lance from the National Security Agency, while

the second heard from Pat Wirth of AT&T. Throughout the camp the girls were exposed to a number of applications of mathematics that they would not normally see in their high school classes.

"It's a Math Thing" was a weekend conference organized by Judy Walker with the intention of giving girls the opportunity to attend workshops on math-related topics and to meet other girls interested in math. Participants came from as far away as Chadron.

Email mentoring is a program in which mentors from the University, usually faculty or graduate students from mathematics and related fields, are matched with high school girls with the purpose of establishing an email communication. Girls talk with their mentors about everything from career plans to math problems to social issues. It is hoped that the girls will benefit from a relationship with someone who has "been there" and who can provide moral support and advice.

The Nebraska Math and Science Initiative was instrumental in planning and providing technical support for the program. Financial support came from the Nebraska Math and Science Initiative, the Math and Science Education College Area of Strength, the University of Nebraska and the Department of Mathematics and Statistics.



Participants in the All Girls/All Math Summer Camp



## Visiting scholars

In recent years the department has benefited from a number of longer term research visitors in various areas. These visitors, though usually working intensely with one or two professors, enliven the research environment of the whole department by their seminar participation and through spontaneous hallway interactions with other faculty.

The 1998-99 academic year was a banner year for visitors:

**Tathagata Banerjee** is currently working with Partha Lahiri in statistics.

**Mark Brittenham** (University of North Texas), whose research area is low-dimensional topology, is working with Susan Hermiller, John Meakin and the rest of the DEAM group.

**Lynn Erbe** (University of Alberta) is working with Al Peterson in differential and difference equations. Lynn was here during the 1997-98 academic year as well.

**May Nilsen** (University of Newcastle, Australia) is finishing the second year of a two-year post-doc at UNL. Her research area is operator theory.

**Seung Chang, Jeong Kim, Jung-Ah Lim, Yeon-Hee Park**, all from Korea, are here this year working with Dave Skoug and Gerry Johnson in functional integration. Kim and Lim were visitors in 1997-98 as well.

**Vijay Kodiyalam** (Institute of Mathematical Sciences in Madras, India) worked with Roger Wiegand in commutative algebra during the fall semester.

**Ron Mathsen** (North Dakota State University), who received his Ph.D. in 1965 under Lloyd Jackson, is working with Al Peterson and Lynn Erbe in differential and difference equations.

**Lisa Orlandi-Korner** began a two-year post-doc in our department last fall. She received her Ph.D. from Cornell University in geometric group theory and is working with Susan Hermiller and John Meakin.

**John Ritz** (University of Rochester) worked with the statistics group last fall.

Visitors for the 1997-98 academic year were:

**Richard Evans** (Case Western Reserve University and University of Kansas), who worked with the statistics group;

**Joe Skopp** (UNL Agronomy Department) who consulted with Glenn Ledder and Steve Cohn;

**Kunitaka Shoji** (Japan), who worked with John Meakin in semigroup theory.

Visitors for the 1996-97 academic year included:

**Sue Graupner** (Lincoln Public School System), who worked with Steve Dunbar, Jim Lewis and Mel Thornton in mathematics education.

**Gauri Sankar Datta** (University of Georgia), **Tapabrata Maiti** and **A. Chaudhuri** (both of the Indian Statistical Institute), all of whom researched with Partha Lahiri and the statistics group.

**Alemndar Hasanov** (Kocaeli University, Turkey), who worked with Steve Cohn and Tom Shores in applied mathematics.

**Florin Pop** (Romania), who consulted with David Pitts and John Orr in operator theory.

## Undergrads compete in math competition

This past December, 16 UNL students participated in the William Lowell Putnam Mathematical Competition, an extraordinarily challenging exam which has been offered for about 60 years. This is a six-hour exam taken by over 2,000 undergraduates at colleges and universities across the U.S. and Canada. Teams from UNL have had considerable success in recent years (including a 10th place finish in 1995, which was the highest finish of any public university from the U.S. or Canada). The results from the 1998 exam are not yet available, but we can report that our 1997 team once again did quite well. Of the 419 participating schools fielding full teams (i.e., consisting of at least three members), our team ranked 47th. Our highest scores were obtained by Toby Bartels (28), Jaclyn Kohles (20), and Travis Fisher (19).

The following is a sample problem from that exam. Try your hand at it!

### PUTNAM PROBLEM

Let  $f(x)$  be a twice-differentiable real-valued function satisfying

$$f(x) + f''(x) = xg(x)f'(x),$$

where  $g(x)$  is non-negative for all  $x$ .

Prove that  $f(x)$  is bounded.

The solution can be found on page 16.



Pictured from left to right are Putnam Exam participants Travis Fisher, Ellen Veomett, Brian Wickman, Vincent Chia and faculty advisor David Jaffe.



# Research conferences bring visitors to UNL

The 1999 spring semester has seen an unusually high number of research conferences organized by members of our department. In all, four research conferences will be held this semester: the Regional Workshop in Mathematics (February 26-27), the Nebraska Conference for Undergraduate Women in Mathematics (March 5-7), the Workshop in Mathematical Methods in the Geosciences (March 10-19), and the Symposium on Model Selection, Empirical Bayes and Related Topics (March 24-26). In addition, Richard Rebarber is organizing a CBMS (Conference Board of the Mathematical Sciences) conference series on Control Theory which will be held in early August 1999.

The Regional Workshop in Mathematics was designed to establish and improve research interactions among faculty, graduate students and advanced undergraduates at UNL and neighboring institutions (say, within a state and a half of Nebraska). In all, there were around 90 participants including more than 50 from outside UNL. The conference was chiefly organized by John Meakin, with help from Glenn Ledder, David Pitts, Jamie Radcliffe, Judy Walker and Roger Wiegand. Financial support came from DEAM (Discrete, Experimental and Applied Mathematics Initiative) and the De-

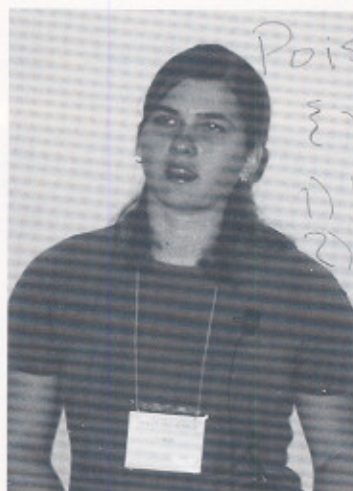
partment of Mathematics and Statistics, which paid for meals (including a banquet on Friday evening) and lodging for the out-of-town participants. The program consisted of six plenary talks on Friday afternoon given by six UNL faculty covering the major research areas in our department. The speakers were Professors Susan Hermiller, David Jaffe, David Logan, John Orr, Allan Peterson and Sylvia Wiegand. On Saturday morning, the participants broke up into six parallel sessions of 20 minute talks in the following areas:

This conference was organized by Allan Donsig, Susan Hermiller, Jim Lewis, Lisa Orlandi-Korner and Judy Walker. Funding was provided by the Math and Science Education Initiative and additional money was received as part of the Presidential Mentoring Award.

The two other research conferences have yet to take place as we go to press. The Workshop in Mathematics and the Geosciences is part of a special semester-long program in applied mathematics focusing on problems in hydrogeology. It is



Pictured above are some of the participants in the commutative algebra session of the Regional Workshop in Mathematics.



Holly Hauschild, an undergraduate at the University of Wisconsin, Eau Claire, presents her research at the Nebraska Conference for Undergraduate Women in Mathematics.

Applied Mathematics and Mathematical Modelling, Combinatorics and Coding Theory, Commutative Algebra and Algebraic Geometry, Differential Equations and Difference Equations, Geometric Group Theory, and Operator Algebras.

The Nebraska Conference for Undergraduate Women in Mathematics was in part a celebration of our department receiving a Presidential Mentoring Award in the fall of 1998. The conference brought to UNL approximately 50 undergraduate women from across the country, 24 of whom gave talks on their own research. Professors Sylvia Wiegand from UNL and Carolyn Gordon of Dartmouth College gave addresses, and there was also a panel discussion on choosing a graduate school.

being organized by Professor David Logan and is sponsored by DEAM and NSF. The Symposium on Model Selection, Empirical Bayes and Related Topics is a major conference in statistics which will bring approximately 100 statisticians to UNL in late March. The conference is being organized by Partha Lahiri and Dan Nettleton, with help from graduate student Jane Meza and staff member Joyce Zach. Financial support for this conference comes from the US Postal Service, the Gallup Organization, Inc., the National Center for Health Statistics, the College of Arts and Sciences, the Department of Mathematics and Statistics and the Gallup Research Center.



## More conferences!

In addition to the conferences being held this spring, several other mathematics conferences have been held at UNL in the last couple of years.

In May 1997 the department hosted a conference honoring the mathematical work of our own Gary Meisters who retired from the faculty that year. As well as local participants, the conference drew 30 out-of-town visitors, including prestigious speakers such as Czeslaw Olech, David Wright, and Jerry Bebernes.

More than 150 participants congregated in Lincoln in October 1997 for the conference on Current Topics in Survey Sampling, organized by Partha Lahiri. Supported by, among others, the National Science Foundation and the U.S. Census Bureau, the conference featured a keynote address by J.N.K. Rao of Carleton University, Canada. Over twenty other researchers presented talks, and about 40 graduate students and young researchers partici-

pated in a poster session. The conference had the misfortune to fall on the weekend of Lincoln's worst October snow-storm in decades, which added to the camaraderie among those whose flights were cancelled.

In May 1998 the department hosted the International Conference on Algorithmic Problems in Groups and Semigroups. This NSF-funded conference drew together many of the world's top researchers in two different fields, geometric group theory and combinatorial semigroup theory. The participants, who came from 16 different countries, met to discuss current research in algorithmic problems in algebra.

A number of quite exciting results were announced for the first time at this conference. For example, Rhodes announced a solution to what may be the most important problem in finite semigroups, a problem which had defied solution for 30 years. And Kharlampovich and

Myasnikov announced solutions to a series of unsolved problems posed by the famous mathematician Tarski some 50 years ago.

Also in May 1998, the Mathematics and Statistics Department, in conjunction with Physics and Astronomy, hosted Shaping the Future, a conference on undergraduate education in science, mathematics, engineering and technology. The conference focused on three key issues; preparation of future K-12 teachers, assessment of the effectiveness of educational reforms, and the role of new technology in education. Speakers, who included prestigious names in national education and science policy, spoke on topics ranging from broad issues of policy to specific curricular innovation within disciplines. Over 200 participants from two-year and four-year colleges as well as research institutions attended, representing at least 23 different states.

## Internships in statistics

Three graduate student in Statistics have had research internships in the past year. Chien Hua Wu, who received his Ph.D. in Statistics this past August, worked as an SAS programmer and statistical consultant for Harris Labs during the 1997-98 academic year. This experience (along with his Ph.D., of course!) helped him get a very good job at TAP Holdings, a pharmaceutical consulting firm in Chicago.

Lily Trofimovich worked last summer for the Marketing Research Department of ConAgra Frozen Foods at ConAgra Headquarters in Omaha. Her research entailed modeling and forecasting retail sales of various brands and categories of frozen foods. A total of 12 models were built. According to monthly departmental reports, the models are showing excellent promise. Lily says it was a very valuable learning experience for modeling time-series data and for programming in SAS.

A third student, Jane Meza, has just begun an internship at Gallup. More on that in next year's newsletter.

## Pi Mu Epsilon

Pi Mu Epsilon, the national mathematics honorary, continues to meet on a regular basis. Last year members participated in "Science Day at the Mall," a day-long program to present math and science demonstrations to visitors to Lincoln's Gateway Mall. The Pi Mu Epsilon table featured computer demonstrations of fractals, mathematical puzzles and games. PME was again a presence at Math Day by helping out as moderators and timers for the Math Bowl. Members also set up a table with information about the organization's activities and membership requirements.

Last fall, Pi Mu Epsilon designed a neat mathematical T-shirt featuring a fancy integral and declaring our department as the value of this integral. Any guesses as to what this number is? (Hint: it's not 3.14.) This January, the organization sponsored a panel discussion on Research Experiences for Undergraduates. The 1998-99 officers are Rory Michaelis (President), Gopi Shah (VP), Barb Zach (Secretary), Mustafa Bashir (Treasurer), Karen Meier and Angie Child (PR officers). Faculty advisors are Allan Donsig and John Orr.



Pictured left to right, Pi Mu Epsilon officers; Allan Donsig (faculty advisor), Rory Michaelis, Barb Zach, Mustafa Bashir, Gopi Shah, John Orr (faculty advisor), Angie Child.



## Undergraduate news

The department continues to be proud of its very active and highly accomplished undergraduate majors. Currently we have 145 majors, 58 of whom are women. Sixty-four have second majors, which run the spectrum of computer science, actuarial science, physics, chemistry, biology, economics, psychology, philosophy, and English. Several others have a strong minor in business. Many of our majors are heavily involved in extracurricular activities. Sara Russell (Omaha) is student body president and student Regent; Lisa Schkade (Lincoln) was homecoming queen, is an honors calculus assistant, and is in the marching band; Bret Stohs (Lincoln), Katie Lewis (Omaha) and a 2nd generation math/stat major, James Bayer (Omaha), and others work for New Student Enrollment and Admissions; another 30 work for our department in various jobs such as math counselors, lab assistants, graders, and undergraduate teaching assistants in calculus. Travis Fisher (Gering) has published research on computer recognition of map features; this is in addition to his work with John Orr on web testing, which is the topic of his honors thesis. Lisa Schkade is developing a statistical economic model for her thesis. Tamara Barnum did a statistical workplace model for hers. Steve Whalen (Altoona, Iowa) and Paul Macklin (Fremont) have recently completed their theses. Steve's was in control theory on the stabilization of certain wave equations and Paul modeled ground water percolation through the soil. All these theses were completed just within the last year.

Research Experience for Undergraduates (REUs) is a summer program funded by the National Science Foundation to offer undergraduates a chance to experience research first hand. REUs exist in a variety of areas including math/stat, physics, meteorology, computer science, and economics. There are site REUs and there are REUs that are attached to an individual researcher's NSF grants. In math/stat the site REUs are all similar in structure. There are about 20 sites located at colleges or universities around the country, and each takes 6-10 students to work with a mentor on some research project for usually 6-8 weeks in the summer. The student gets roundtrip airfare, room and board, and a stipend of about \$2,000. The

projects vary considerably. Some discover new and publishable results; others might be led to rediscover known results; some work on new research related to the mentor's research. All have one common element: the student does research on his or her own with direction from a mentor who is also a researcher. The programs usually have a daily seminar in which all the students participate and, of course, planned social events. Our first REU student was Jennifer (Raschko) Mueller, back in 1989. Since then we have had 26 students attend REUs. Most of these went to site REUs, while some worked here under one of our own faculty. Ten of the 26 are currently in or have completed graduate programs. Jennifer (Raschko) Mueller and Mike Lewis currently have very prestigious post-doc positions: Jennifer is at Rensselaer Polytechnic Institute in New York and Mike is at the National Institute of Health in DC.

The Ronald McNair program for minorities and first generation students also offers a chance for students to experience research. This national program, whose goal is to nurture these students into and through a Ph.D. program, came to our campus in 1995. Jane Meza and Rafael Vigil were our first McNair scholars that summer. Rafael was a sophomore and Jane a senior. Jane is now in our Ph.D. program in statistics and should be finishing up in a year or two. Rafael will get his B.S. this spring and is now deciding on graduate school. Other McNair scholars are Jeff Garza, who is in the graduate statistics program at Texas Tech, and Dzuan Nguyen who will get his B.S. next year.

REUs are not the only off campus math experiences for our majors. The Mathematics Special Semester (MASS) program at Penn. State is in its 3rd year. Each year they select up to 25 students from around the country to attend an intense 14-credit hour semester of math courses. The students pay the tuition, room and board equal to the minimum of their home institution or Penn. State's. The program consists of 3 courses and two seminars. The courses vary, but often include a number theory course and a dynamical systems or an algebraic geometry course. We've sent 5 students so far and two more will apply for next year. Jaclyn Kohles, a sophomore from Omaha, offers an example of what these experiences can do.

Last summer she attended a special REU for sophomore women at Carleton/St. Olaf College in Minnesota. In the fall she went to the MASS program, and now she is in Budapest, Hungary, in the Budapest Semesters in Mathematics program. There she is taking mathematics and liberal arts courses. That program is aimed mainly at mathematically advanced American undergraduates. When Jackie returns this summer, she will have covered the equivalent of most of our undergraduate math requirements, and she will have an incredible list of student and faculty contacts, not to mention the experiences.

In addition to off campus math programs, we have more students taking advantage of the semester abroad exchange programs that our International Affairs office has been developing. Lisa Schkade spent last spring semester studying in Spain while Dan Augustyn was at Oxford. There is also a summer program in business at Oxford that two of our majors have recently attended. This year Michelle Swenson is enrolled in the math and liberal arts program at the University of Bath in England. Our own Richard Rebarber helped set up that exchange program.

The Barry M. Goldwater scholarship is a national competitive scholarship that pays up to \$7,000 per year in college related expenses. It is open to juniors and seniors in mathematics and the natural and life sciences who expect to enter graduate school. UNL has had 12 Goldwater scholars since it began in 1989. All have been math majors. No doubt our majors are worth it, but it does help that until just recently no other department has put forth a



Lisa Schkade, math major and Homecoming Queen.



good candidate. Our first? Well, it was the very same Jennifer (Raschko) Mueller who was our first REU. Jennifer got us started on two really good programs.

Our own Eastman scholarship fund has paid out over \$800,000 in scholarships since its beginning in 1990. This includes 43 of the 4-year, \$12,000 scholarships and about 450 one-year renewable scholarships. The one-year scholarships range between \$1,000 and \$2,000 per year with most at the \$1,000 level. The Eastman fund has really helped us attract some very good students. This year 78 of our majors are receiving departmental scholarships and 68 of these are from the Dean H. and Florene G. Eastman fund.

We graduate about 35 majors each year. Where do they go? Since 1995 we have conducted exit interviews with our graduating students in order to assess our undergraduate program. One of the questions asked is, "Where are you going next?" Of those interviewed, over half are going on to graduate or professional schools. Currently we have students in the Operations Research programs at the University of Michigan, University of Texas at Austin, and the College of William and Mary; in Statistics at North Carolina State, the University of Minnesota, Texas Tech, and UNL; and in mathematics at UC Berkeley, University of Oregon, and University of Vermont, and UNL. Other areas in which our graduates are currently pursuing graduate studies include economics, finance, chemistry, and computer science. Several students are now in medical school and one is in the seminary. Among those not going to graduate school, two are at Microsoft; several are in various areas of insurance; several more are in actuarial science; some are high school math teachers; at least one is with Anderson and Anderson; one is working for Koch Industries (after getting her masters in agriculture economics); several others are statistician/computer analysts; and a few go into management. Rarely does a student nowa-

days graduate without job or graduate school offers. We would certainly like more information on the whereabouts and job placement of our graduates.

**Let us know where you went after graduation, what you are doing now, and how your math/stat major has helped.**

**Send your information to [careers@math.unl.edu](mailto:careers@math.unl.edu) and help us better serve our students.**



**Pictured left to right are undergraduate math majors Paul Macklin, Elliott Campbell and Jackie Kohles at the Centennial Celebration.**

## ***Bouska, Fisher and Russell to receive Alumni Awards***

The Arts and Sciences Alumni Leadership Awards are presented each year to outstanding alumni and students who have demonstrated truly exceptional leadership in their profession or community. The NU Foundation and the College are the sponsors. There are three award categories: The Senior Alumni awards are for those who have a long history of continued, truly outstanding contributions to their profession or community. The Junior Alumni awards are for those who have made significant contributions to their

profession or community in the ten years or less since they graduated from UNL. The Student Leadership awards go to seniors who personify by their actions and contributions the characteristics of the ideal campus or community leaders. Each department in the College is given the opportunity to nominate individuals for these awards. There are usually four to six recipients in each category. Our Department has always been well represented at this ceremony. This year we have three outstanding awardees. Amy Bouska obtained her BA with honors in 1969 from our department and then an MA degree in mathematics from Duke and an MS degree in statistics from VPI. For the past 20 years she has been an actuary with various firms and is now a principal with Tillinghast - Towers Perrin (an actuarial consulting firm) and manager of their North America western region. She is recognized as a pioneer in the development of some of the first probabilistic models used to simulate exposure-based liability losses in mass tort cases (such as with cosmetic implants). Amy was as an expert witness before a US House of Representatives subcommittee that was investigating the risk exposure of the insurance industry to such cases.

Travis Fisher of Gering, NE, who is currently a senior Math/Stat and Computer Science major, is another awardee. He has established a truly astonishing academic record with several significant research projects while at the same time maintaining a strong commitment to diversity issues on campus. Travis has a remarkable appetite for knowledge, absorbing it as easily as the rest of us absorb a good dessert.

The third awardee, Sara Russell from Omaha, NE, is a senior Math/Stat major with a strong minor in biology. Sara is ASUN Student Body President. She has been very active in campus government since her freshman year. It is difficult to imagine the time commitment required by such an office. She is the student representative to the Regents, the administration, the faculty and staff, and the community at large. This means that she not only is responsible to carry the concerns of the students to these groups, but that she also must respond to the queries of these groups. Since the administration is in a constant search of the viewpoints and attitudes of the students, this is a big task. Sara has done an excellent job without sacrificing her superior academic record.



Teaching award continued from front

accessible to undergraduates; our efforts to reform the calculus curriculum at UNL; the integration of new and exciting technologies into our courses; our many outreach programs, such as Math Day and the All Girls/All Math program; the involvement of our faculty in important initiatives at the national level, such as the Nebraska Math and Science Initiative and the Mathematicians and Education Reform Department Network; our TA training workshops given at the start of every year; and perhaps most importantly, the excellent classroom teaching done by our faculty, over half of whom have received college or university Distinguished Teaching Awards. In addition, several other faculty have been given sectional awards by national organizations. We take good teaching seriously," says Chair Jim Lewis. "It's an important part of our job description and a meaningful factor in promotion."

The award comes with a \$25,000 grant which the department may use in any way it chooses. The department is currently mulling over possible uses for this money which will further enhance its teaching mission.

The department was nominated for the award by the UNL campus in 1993, 1994, 1995 and 1997. Perhaps it was the magic of our centennial year (see story on page two) that put us over the hump! Many thanks are due to Professor Steve Dunbar for doing the lion's share of the work involved in nominating our department those five years.

## Fisher, Macklin and Whalen awarded NSF fellowships

This just in: Three UNL math majors, Travis Fisher, Paul Macklin, and Steve Whalen, won prestigious three-year graduate fellowships from the National Science Foundation. A fourth, Mike McQuistan, received an honorable mention for the award. These appear to be UNL's first NSF fellowship winners in mathematics in 25 years, and perhaps in its history. What's more, only one school, Harvard, had more NSF fellowship winners in mathematics than UNL. (MIT and Princeton had three each as well.) There were only 45 winners in mathematics nationwide.

The NSF graduate fellowships are open only to senior or first-year graduate students in science, mathematics and engi-

neering for use toward research-based master's or doctoral degrees. The awards carry stipends of \$15,000, \$18,000 and \$20,000 in the first, second and third years, respectively.

Travis, from Gering, NE, will be heading to graduate school at Penn State University, where he hopes to study dynamical systems. Paul, a native of Fremont, plans to attend graduate school here at UNL for one year and then enter the Industrial and Applied Mathematics program at the University of Minnesota. Steve, who hails from Altoona, Iowa, also intends to enroll in the IAM program at the University of Minnesota, but starting this fall. Mike, from Pender, NE, plans to attend graduate school in mathematics at the University of Wisconsin-Madison.

## PUTNAM PROBLEM SOLUTION

$$\text{Let } H(x) = f(x)^2 + f'(x)^2$$

By the chain rule

$$H'(x) = 2f'(x)f(x) + 2f'(x)f''(x) \\ = -2xf'(x)f''(x)$$

Thus,  $H'(x)$  has sign opposite to that of  $x$ , which means  $H(x)$  is increasing for  $x < 0$  and decreasing for  $x > 0$ . As  $H(x)$  is bounded above by  $H(0)$ , the absolute value of  $f(x)$  is bounded by the square root of  $H(0)$ .

## Othmer gift to help fund endowed professorships

On August 18, 1998, the Board of Regents accepted a \$125 million dollar gift to the University from the estate of Mildred Topp Othmer. Chancellor James Moeser called the gift "the most important asset" ever passed to the institution. "I see this as an excellence fund, which will allow the University of Nebraska-Lincoln to rise to a whole new level of excellence, especially in the areas of research and graduate studies," said. Moeser outlined one of the uses for the fund in his State of the University address last August. He issued a challenge to the university to "create within the next five years 24 new \$1 million dollar endowed university distinguished professorships by designating a portion of the income from the Othmer Endowment to match new contributions one-to-one. These positions will be filled by competitive national searches subject to our own rigorous internal review processes."

## In Memoriam

### Paul Krajcikiewicz

Professor Paul Krajcikiewicz, known to all of us as simply "P.K.", passed away on Dec. 27, 1998 from complications of a stroke he suffered on Nov. 19, 1998. He was a faculty member in our department from August, 1965 until his death. He grew up in Chicago and received his bachelor's and master's degrees at DePaul University and his Ph.D. degree in mathematics from the Illinois Institute of Technology in 1965. He has one brother, Leonard, who teaches mathematics in the Chicago area.

P.K. served as the Ph.D. thesis advisor for William Bosch who received his Ph.D. degree from our department in 1970 and is currently at the University of Northern Colorado. During the past few years, P.K. (together with Al Zechmann) prepared most of the problems used for the Math Placement Exam, and for the Probe I Exam given each year to all participants in our Math Day.

For the past 20 years or so, P.K. was a very avid and successful antique collector specializing in Tiffany lamps and Tiffany glassware. He also built a rather unusual sundial in his backyard. This backyard, by the way, also contains at least 10 different varieties of pampas grass. We miss him greatly.



P.K. (right) receiving congratulations from NU President Dennis Smith for the department's University-wide Teaching Award.



## Two awards for Jim Lewis

Jim Lewis, chair of our department since 1988, received two awards in the past three years in recognition of his outstanding efforts to create a supportive atmosphere for women in our department. In 1996, Jim was given the Outstanding Contributions to the Status of Women Award by the Chancellor's Commission on the Status of Women. The following year, he received the Erasmus Correll Award given by the Lincoln/Lancaster County Women's Commission. The latter award is given each year to a man in the Lincoln area who has done the most to improve the status of women in the community.

In supporting letters, women in our graduate program made frequent mention that the 50-50 ratio of men to women among graduate students makes the department unusually conducive to success for women. By comparison, one woman wrote that at her previous university there were only four women among 60 mathematics graduate students. Nationally, 22 percent of mathematics Ph.D.s are awarded to women; at UNL since 1994, 35 percent of Ph.D.s have gone to women.

Jim was also commended for his willingness to accommodate maternity leave and family needs creatively, by such means as scheduling extra class time before a maternity leave starts or setting up an email correspondence for part of the semester. He has worked hard to find appointments for spouses of faculty who are also professors (the infamous "two-body" problem), leading to an increase in the number of women on the faculty. He is an active member of the Association of Women in Mathematics and the local chapter of Graduate Women in Science. He has been especially encouraging of talented undergraduate women to attend graduate school in mathematics and has set up an undergraduate women's roundtable to hear their concerns. He has also set up special luncheons for female faculty and graduate students to meet with visiting female professors, so they can interact on a more personal level and share common concerns and interests.



## Letter from the Chair

I hope that you enjoy our department's newsletter. We regard this newsletter as our report to our alumni. Many of you returned to Lincoln last May for our Centennial

Celebration and we enjoyed meeting old friends and making new ones. For that celebration we produced an outstanding program book which tells the history of the department. We still have a few copies of the program book so if you would like a copy, send us a request.

The past few years has been a period of incredible activity for our department. In terms of undergraduate and graduate education, research and outreach there is much to talk about. Many of our successes have been reported in this newsletter so I will just mention a few highlights.

In 1998 the department was recognized as the winner of the University-wide Departmental Teaching Award. In addition, 16 of our 32 tenure-track faculty have won College or University Distinguished Teaching Awards and five have won MAA Sectional Distinguished Teaching Awards. In the past decade, three of our GTAs have won the Alumni Association's Outstanding GTA award. These awards constitute public recognition of our faculty and graduate students' commitment to outstanding teaching.

There is plenty of evidence of excellence among our undergraduates and our graduate students. The median GPA of our majors is 3.67 and 80% have a GPA above 3.0. Over the past decade, 12 math/stat majors have won a national Goldwater Scholarship. These awards are for students in the sciences and are highly competitive. In the past three years five of our undergraduates won spots in Penn State's MASS program, an intensive semester in mathematics. For UNL to win 5 of about 50 total spots in a national competition speaks very favorably of our students.

At the graduate level, the past four years has been a hugely successful period for the department. During the period 94/95 to 97/98 we graduated 59 students with a masters degree and 34 students with a Ph.D. This is the most productive period in the history of our graduate program. It is especially noteworthy to point out that 13 of these 34 Ph.D.s were awarded to women, a fact that has earned a lot of publicity for the department as well as the

Presidential Award for Excellence in Mentoring that is discussed in this newsletter.

It is harder to measure the quality of the department's research program but some of the secondary measures are worth mentioning. The faculty average 1.5 papers per faculty member per year and within the past 3 years about 3/4ths of the faculty have had some form of external funding. There is also a significant rise in the number of conferences organized by members of the faculty.

Outreach activities give further evidence of the department's excellence. The American Mathematics Competitions is our oldest, largest and best known program. It sponsors the high school mathematics competition that leads to the selection of the U.S. Math Olympiad Team. UNL's Math Day has grown to about 1300 students from 100 Nebraska high schools. This year we welcomed The Gallup Organization as a sponsor of Math Day. A more recent program, All Girls/All Math continues our efforts to mentor women who are interested in mathematics.

If you have enjoyed reading this newsletter, how about taking a few minutes to send us a note and tell us how you are doing? My email address is [jlewis@math.unl.edu](mailto:jlewis@math.unl.edu) if you would like to send an email message. We enjoy hearing from you and it is a special pleasure when alumni are able to visit the department.

Many of you have designated the department as the recipient of your donations to the UN Foundation. I want you to know how important your donations are as we strive to build a great department. The Eastman Fund has made a significant difference as we work to recruit outstanding high school students. Our Emeritus Faculty Fellowship Fund provides supplementary fellowships for our most outstanding graduate students. Donations to the Math/Stat fund help with recruiting new faculty and assisting faculty and graduate students with travel to professional meetings. The Don Miller Math Education Fund helps us offer professional development opportunities for math teachers and enrichment programs for K-12 students. If any of our alumni want to make a targeted donation, I would be happy to discuss with you a range of possibilities so that you will know exactly which program your donation helps fund.

Sincerely,

*Jim Lewis*  
Jim Lewis





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