MATH-STAT NEWS

DEPARTMENT OF MATHEMATICS AND STATISTICS

MAY 1990 LINCOLN, NE 68588-0323 402-472-3731

RESEARCH EXPERIENCES FOR UNDERGRADS

Jennifer Raschko, a UNL undergraduate, spent last summer attending a National Science Foundation (NSF) funded Research Experience for Undergraduates (REU) program hosted by the University of Colorado at Boulder. Jennifer has the option to return this summer, and another UNL undergraduate, Chris Heckman, will go to the College of William and Mary in Williamsburg, Virginia, to attend an REU entitled *Matrix Analysis and Applications*. (Students interested in applying to an REU can contact Prof. Gordon Woodward in the math department at UNL.) Here is how Jennifer Raschko recalls her experience last summer:

Last summer I had a great experience as a participant in the REU program at the University of Colorado-Boulder, conducted by Dr. James Curry. The purpose of the NSF-sponsored program is to give undergraduates a chance to do research and encourage them to go to graduate school. Ten students from the Rocky Mountain region were chosen to conduct research on the geometry of iterative root-finding methods.

The first few weeks were spent learning to use the SUN computers, learning UNIX and the vi editor, LaTeX and the IDL graphics program. We studied various numerical techniques for solving systems of nonlinear equations, and we read and discussed the book *Chaos* by James Gleick. We also enjoyed activities such as weekly hikes.

Jennifer Raschko

After we had some background, we chose research projects. I chose to study one of Traub's multipoint iteration functions applied to systems of conic sections. We adapted an advanced FORTRAN program to fit our own research, and spent many hours generating and studying the vivid color pictures it produced. The pictures provided insight into the geometry of a method by depicting convergence patterns and rates of convergence when each point in the plane was taken as an initial guess for the method applied to a system of equations. Many of our pictures contained fractals; examples of such pictures can be found in *Chaos*.

Twice a week we met to discuss our findings. We presented our results, answered questions, and gave one another advice. We also covered several chapters of *Fractals Everywhere* by Michael Barnsley. The program was a great learning experience. It was challenging and sometimes frustrating, but the atmosphere was very fun and supportive.

LIBRARY UPDATE

The department will replace *Zentralblatt für Mathematik und ihre Grenzgebiete* by several research journals. This will partially satisfy critical needs in a changing research world in which new journals are steadily being created but costs never go down. Acquiring library resources with very limited budgets is a constant problem. Cancelling journals and replacing them with others of comparable value is the only way we can obtain new journals. This has been a slow process and new journals may not appear on our shelves until 1991.

We also wish to express our thanks to Connie Schneider for a bequest to the library of books owned by Hubert Schneider, a faculty member in our department who died in an accident several years ago. We greatly appreciate this reminder of Prof. Schnieder's service to the department.

NSA GRANT

Earl Kramer is in the middle of a two-year National Security Agency (NSA) grant with Spyros Magliveras of Computer Science. The NSA has been supporting research in pure mathematics which in this case means work in finite geometries and block designs. This grant incorporates matching funds from the Center for Communication and Information Science. Professor Magliveras works on encryption schemes which use properties of finite groups and cooperates with Kramer in studying large knapsack types of problems.

HONORS PROGRAMS IN MATHEMATICS

The Honors Mathematics program is going strong again this year. Steve Dunbar is teaching the Honors Calculus 106H-107H sequence this year. As many of you recall, this sequence covers the usual three semesters of calculus in just two semesters by meeting five days a week in a small section. This year there are 32 students in the 106H-107H, making this one of the largest sections of Honors Calculus in several years. The students come from every corner of Nebraska and from all kinds of high schools. The sizes of the graduating classes of these top students ranged from 10 to over 500, but the students are all well-prepared for the fast pace and rigorous content of University calculus.

Two innovations have helped the calculus class as they speed through the material. One is a computer and special projection unit on a stand with wheels. The computer can then be wheeled right into the class room. The projection unit is used with an overhead projector to make what appears on the computer monitor visible to the whole class. Prof. Dunbar is using a terrific program called MicroCalc from the University of Michigan. This program does all of the graphing and lots of the tedious calculation that used to be done by hand on the chalkboard. It's been especially useful for polar coordinates, three-dimensional graphing and checking answers in class.

The other innovation is a workshop or question-and-answer session held twice a week. Since Honors Calculus goes by so fast, there isn't much time for questions in class. The Department of Mathematics hired Mark Mills, an Honors Calculus student in 1987-1988, and now a junior mathematics major to help with this question-and-answer session. The Honors Calculus students meet with Mark on Monday and Wednesday afternoons and work through the homework problems that "didn't come out with the answer in the back of the book!" The students like the extra time to go over problems, and Mark says he's learning a lot, too.

Steve Dunbar

This indicates just part of the department's greatly expanding undergraduate honors course offerings. Last Spring an honors 314H (applied linear algebra) and 208H (third semester calculus) were also offered. This Fall a second and third semester honors calculus were offered, in addition to the usual first semester honors calculus for students who have had no calculus in high school. Other honors classes included 221H (differential equations). The point of these courses is to provide special opportunities for enrichment for our undergraduates. This entails strictly limiting class sizes for these courses. Some of these courses have also had a calculator (HP-28S) or computer component. The department hopes that these courses will foster a greater sense of camaraderie among undergraduate math students, attracting more of them into mathematics.

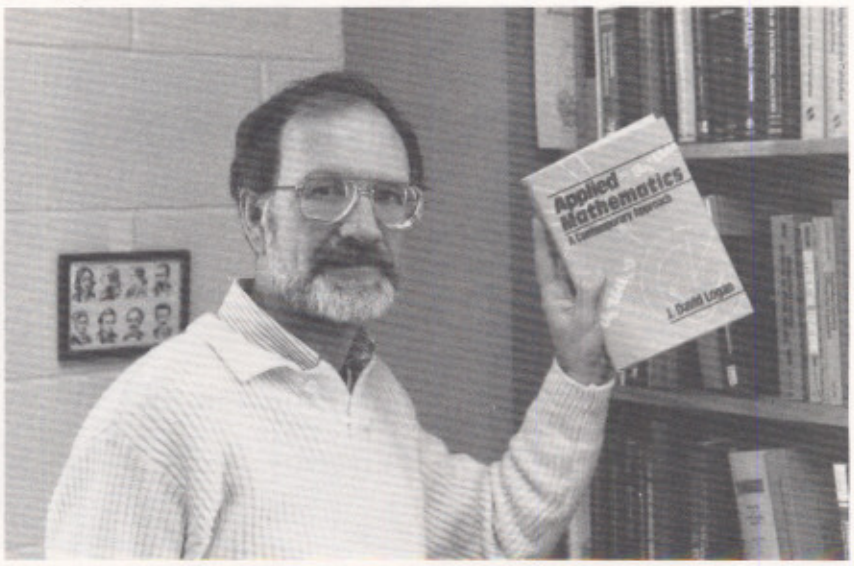
NEW LOGAN BOOK

"Writing an advanced mathematics book is a long, arduous process that seldom pays off for the author in terms of financial reward versus time invested," says Professor David Logan, whose second book, entitled *Applied Mathematics: A Contemporary Approach*, was just published by Wiley-Interscience.

"I believe that most individuals who write advanced level books do so because they feel they have a new or better way of presenting the material. In my own case I felt that most of the books on applied mathematics at the graduate level were a bit old-fashioned, covering topics that are centuries old. I didn't feel that they communicated the excitement of current research in applied mathematics." Logan's book, which attempts to make some of the modern developments in applied mathematics accessible to beginning graduate students, has been adopted at several universities across the country, including places like Cornell, and the Universities of Michigan, Colorado, and Maryland.

Logan's first book, a research monograph on Lie groups and the calculus of variations, appeared in 1977 and just this year went out of print. "I am pleased that the book stayed in print so long," Logan said. "The publisher was faced with either going to a second printing or deleting the title, and they chose the latter." Logan remarked that the first printing of an advanced mathematics book can be up to two or three thousand copies, and about one thousand of these end up as library sales. He said that authors receive about ten to fifteen percent royalties on the purchase price of a book. "Authors of successful college algebra or calculus books can become wealthy because elementary books have a large market and the possibility of thousands of adoptions each year." Logan said that he is not currently interested in writing for that broader audience.

Professor Logan came to UNL in 1981 after spending seven years at Kansas State University. He did his post-doc at the University of Arizona after receiving his Ph.D. in 1970 at Ohio State. He is also on the consulting staff at Los Alamos National Laboratory. His areas of research are nonlinear partial differential equations with applications to problems in wave propagation and chemically reactive fluid flows.



Logan and new book

THE GRADUATE PROGRAM IN MATHEMATICS

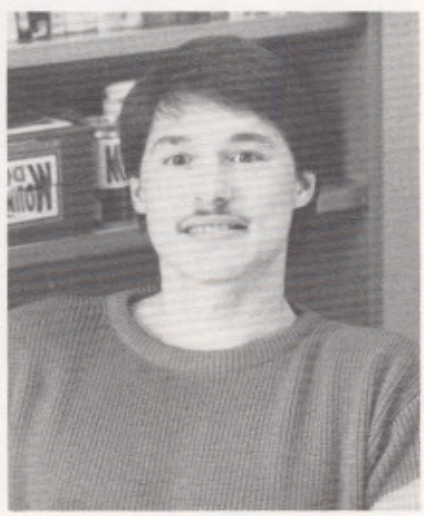
The competition among graduate schools for good students is extremely strong, and this year the department began a recruitment program which included visitations by our faculty to area colleges. With the prediction that there will be a shortage of mathematicians near the turn of the century, we hope to see the number of good applicants in our department increase. Already, a recent issue of the Chronicle for Higher Education reported that admission applications in all areas have risen at some universities up to twenty-five percent. This increase is caused by the recent reports that the current college faculty is aging and there will be a great need for replacement faculty in the next ten years.

Last year our department and the Graduate School made extra funds available to support graduate students and award exceptional performance. We instituted two new awards, a $500 award to the best first-year student, and a $700 award to the student who writes the best Masters/Qualifying Exam. Last year Darren Holley was voted the best first-year student, with honorable mention to Tim Huffman and Pat Nebel. Troy Riggs was found to have written the best qualifying exam, with honorable mention to Aihua Li. In addition, Vice Chancellor John Yost provided us with several $2000 fellowship stipends for new and current students.

Our graduate students come from all parts of the globe. The countries or geographical regions represented are:

U. S.	40
China	9
Turkey	3
India	3
Middle East	3
Korea	2
Japan	2
Malaysia	2
Yugoslavia	1

Many of the US students come from the midwest; in particular, the Dakotas, Nebraska, and Minnesota are well-represented. Of our sixty-five active graduate students, about fifty are supported on teaching assistantships in the department. The remainder are supported either by their home government or by their own personal funds. International students whose native language is not English must pass the Test of Spoken English before being awarded a teaching assistantship and put in a classroom to teach. Most of the graduate teaching assistants teach either four sections of calculus recitation or one class of algebra or trigonometry. The success of the undergraduate program depends heavily upon having a good group of graduate students to help in the teaching mission of the department.



Troy Riggs

Every year the department awards about eleven Masters Degrees. The number of doctoral degrees is now on the increase. Last year we awarded several Ph.D. degrees, and this year the number will be even more. With the prediction of a large number of retirements in our profession over the next few years, coupled with the increased demand for mathematical scientists in our society, the outlook for our graduate students in mathematics and statistics is very promising.

ALUMNI NEWS

Johnny Henderson got his Ph.D. in mathematics at the University of Nebraska-Lincoln in 1981. His advisor was Lloyd Jackson.

At Auburn University since 1984, Johnny won teaching awards in 1982 and 1984 while at the University of Missouri at Rolla. He has given at least twelve invited addresses and many other talks and is the author of nearly forty research papers. His promotion to Full Professor at the start of the 1990-1991 academic year comes as no surprise to us

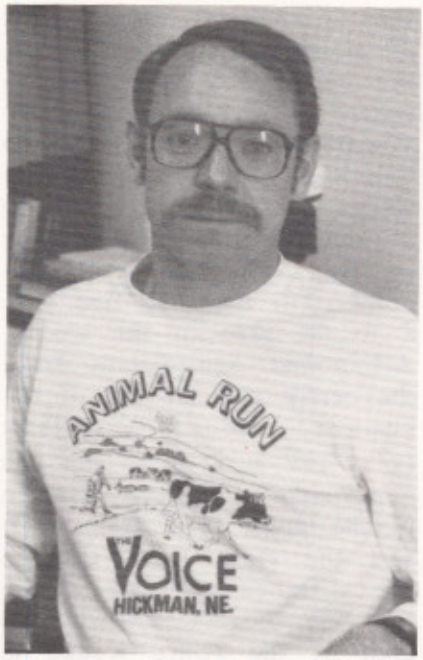
here at UNL. He is doing a truly outstanding job.

Brian Coomes, a Ph.D. recipient under Gary Meisters in 1988, returned to UNL to give a colloquium in March. Last year a visitor at the Mathematics Institute at the University of Minnesota, and presently an Assistant Professor at the University of Miami in Florida, Brian already has three papers accepted for publication and has submitted a fourth.

Alumni Brad Carlin and Caroline Tuttle Carlin are in the news again. Brad finished his Ph.D. in Statistics at the University of Connecticut in 1989 and is now a visiting Associate Professor of Statistics at Carnegie-Mellon University in Pittsburgh. Caroline has passed all of her actuary exams and is working for an actuarial consulting firm in Pittsburgh. Their address is 143 W. Swissvale Avenue, Pittsburgh, PA 15218.

Tim Peil will receive his Ph.D. in May 1990. The title of his dissertation is *Criteria for Disconjugacy and Disfocality for an n^{th} order Linear Difference Equation*, directed by Prof. Allan Peterson. Tim already has two papers from his dissertation accepted for publication and is about to submit a third. Tim, the department's nominee for the 1990 Graduate Teaching Assistant Award, has accepted an Assistant Professorship at Moorhead State College in Moorhead, Minnesota.

Ed Woerner will receive his Ph.D. in mathematics at the end of this Summer. The



Ed Woerner

title of his dissertation is *Similarity Solutions to the Detonation Problem*, directed by Prof. David Logan. Ed and David already have a paper in print entitled *Sensitivity of self-similar ZND waves in condensed media.*

Tim Fosnaugh expects to graduate this year. His dissertation concerns problems in multiple objective optimization. His thesis advisors are Jerry Dauer and Jerry Johnson. Tim has accepted a job for next year at Emporia State University in Emporia, Kansas. Emporia State University will be hiring again next year and they have told Tim that they will consider Tim's wife, Linda, who is also a Math-Stat graduate student, for a job in 1991.

Gerald Diaz finished his Ph.D. in December of 1989. The title of his dissertation is *Applications of Cone Theory to Boundary Value Problems*. His thesis advisor was Allan Peterson. Jerry has already had a paper from his thesis accepted for publication and is writing another paper now. Jerry was on leave from the Air Force Academy while pursuing his Ph.D. here at UNL. He returned to the Air Force Academy in August of 1989 and is presently teaching there.

Bart Goddard finished his Ph.D. in December 1989. The title of his dissertation is *A Finite Dirichlet Series Related to Newman Polynomials*. His thesis advisor is Walter Mientka. Bart is

Bart Goddard and Jerry Diaz

about to submit a paper from his dissertation for publication. In August Bart will start a faculty position at Rose-Hulman Institute of Technology, in Terre Haute, Indiana.

Yuanzhang Li expects to receive his Ph.D. in August of 1990. The title of his dissertation is *Robust Bayes Analysis*, under the direction of Lal Saxena. Li came to UNL in August of 1985 and earned his M.S. degree in December of 1986. Li is already the coauthor of a book and four research papers and is writing a paper with former UNL statistician Das Peddada.

Another Ph.D. student expecting to finish in August of 1990 is Bao-Ping Jia. His dissertation is concerned with splitting evaluations and prime ideals. His advisor is Roger Wiegand. Jia already has a paper from his dissertation, entitled *Splitting of rank-one valuations*, accepted for publication in the journal *Communications in Algebra* and he is about to submit a second paper from his thesis.

SOLUTION TO PROBLEM, P. 12:

Assume that the square is placed in a coordinate system with the center at the point (0,0) and the corners at the points (1,1), (1,-1), (-1,1), and (-1,-1). Our goal is to find the ratio of the area nearer the center than any edge to the area of the entire square. Draw segments connecting the center of the square with each of its four corners, dividing the square into four triangular wedges. For all points in the top wedge, the nearest edge of the square is the top edge. By symmetry, it suffices to consider only this top wedge, i.e. to find the ratio of the area of those points in this wedge nearer the point (0,0) than the line $y = 1$ to the area of the wedge. All points equi-distant from the center and the top of the square must satisfy $(x^2+y^2)^{1/2} = 1 - y$; the left hand side gives the distance of the point (x,y) from (0,0) and the right hand side is the distance of (x,y) from the line $y = 1$. Clearly the area of the entire wedge is 1, and the area of the region in the wedge nearer the center is twice the area to the right of $x = 0$ between the curves $y = (1 - x^2)/2$ and $y = x$, which is given by

$$2\int_0^{\sqrt{2}-1} \left(\frac{1}{2} - \frac{x^2}{2} - x\right) dx.$$

The probability is thus

$$\frac{4\sqrt{2}-5}{3}.$$

π μ ε NEWS

The UNL chapter of Pi Mu Epsilon ($\pi\mu\varepsilon$) Mathematics Honorary Society sponsored a variety of events this year, including a student-faculty picnic, a freshman scholarship exam awarding $200 and $100 scholarships to the top two scorers, and cash awards to the highest scoring UNL participant in the Putnam Mathematics Contest. Regular meetings are also held. The April meeting was highlighted by a delightful talk, "Tiling Plane Polygonal Regions With Parallelograms", given by Prof. Dale Mesner.

A special activity engaged in by the chapter was travelling to the summer meetings in Boulder, CO where the national Pi Mu Epsilon organization celebrated its 75th anniversary. Two UNL undergraduates, Mark Boardman and Darren Frey, gave talks at a special student session. Darren's talk was recognized as one of the ten best student talks. In addition to pursuing mathematical knowledge, time was taken to hike in Rocky Mountain National Park.

This year's officers are Dave Holliday, President; Amy Lee, Vice President; Jeff Lewis, Treasurer; Lori Higby and Christy Brown (taking over after Lori's December graduation), secretary. Faculty advisor was Sylvia Wiegand, co-advisor, Chris Tiahrt.

TEACHING AWARDS

The UNL Parents Association and UNL Teaching Council are co-sponsors of the "Recognition Award for Contributions to Students", made to UNL faculty.

The Department is very proud to report that thirteen Math-Stat faculty received this award this year. Herewith follow the names of this year's honorees:

Jim Campbell
R. Rao Chivukula

Leo Chouinard
Steven R. Dunbar
Brian Harbourne
Jim Lewis
Donald W. Miller
Tim Peil
M. Rammaha
Richard Rebarber
David L. Skoug
Melvin Thornton
Gordon S. Woodward

JUMP: A STATEWIDE PROGRAM IN NEBRASKA

In 1988 an experimental Junior Mathematics testing Program, JUMP, was pilot tested in 21 Nebraska high schools, under the direction of Professor Donald Miller. JUMP was based on a similar program in Ohio, whose objective was to address the issue of remediation at the college level. Quoting from a report to the Ohio Board of Regents, "It was hoped that if high school juniors were informed about their mathematical skills, and if they understood the negative consequences of needing remedial mathematics courses in college, then they would schedule appropriate college preparatory mathematics courses in their senior year."

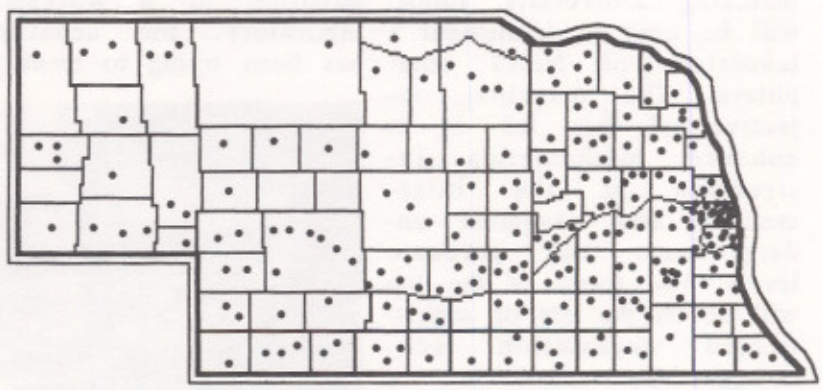
As the Ohio program grew, a significant impact upon mathematics placement at Ohio State University was observed. After seven years of using the test, it was found that the percentage of entering freshmen at O.S.U. whose first college math course was at a remedial level had decreased from 42% to 25%.

JUMP was begun in Nebraska as a cooperative effort of the UNL Department of Mathematics & Statistics, the Nebraska Department of Education, and the American Mathematics Competitions (which has its headquarters at UNL and is directed by Professor Walter Mientka). Because of clear evidence that the JUMP testing program was having a strong positive effect on enrollment in the twelfth grade math classes of participating schools, a decision was made to expand JUMP to a statewide program. Senator Sandra Scofield of Chadron agreed to introduce a bill in the Nebraska Legislature to fund the program at a level which would make it available at no cost to every public and private high school in the state. In May of 1989 the bill was enacted and signed into law.

JUMP has shown remarkable growth during its three years of existence. The number of participating schools tripled in 1989 (from 21 to 68) and tripled again this year, reaching 230 of the 379 high schools in Nebraska. Mapped below are the 89 of 93 counties represented.

Two versions of the JUMP test are available to schools. Test A, covering Algebra I and II and Geometry, is taken by about 80% of the students. The remainder take Test B, which covers Algebra II, Trigonometry and Pre-Calculus. Students who take the JUMP test are asked to indicate their post-high school plans: a four-year college or university, a two-year community or technical college, the armed services, no post-high school plans, or undecided. The computer-generated letter sent to each student responds to three factors: the specific test taken (A or B), the student's test score, and the student's post-high school educational plans.

Professor Miller reports that by 1991 students taking the JUMP test will be asked which college or university (if within Nebraska) they expect to attend, and which major they expect to pursue.



JUMP Program, 1990

The response letter will indicate to the student which mathematics courses he or she will need to take to complete that major, and what the mathematics entrance requirements are at that institution.

COMPUTER NEWS IN THE DEPARTMENT

These are exciting times for mathematical instruction at UNL. Recently, the department was notified that the National Science Foundation would fund a proposal submitted by several faculty members under the direction of Professor Thomas Shores. Funding of the project, entitled *Implementation of an Advanced Laboratory for Mathematics Experimentation*, for $50,000 presents the department with a unique opportunity to be at the cutting edge of mathematical pedagogy. These funds, together with matching University funds, will be used to implement a laboratory of NeXT computers. The principal objective of this lab is to enhance mathematics instruction at the intermediate and advanced undergraduate and graduate levels. The focus of the lab will be on the use of sophisticated workstation technology by students in mathematics classes. Experience with this technology will better prepare our students for careers in mathematics, engineering and the sciences.

At the same time, a lab of 10 to 20 NeXT networked computers is also a superb research facility for faculty. The department is committed to making the fullest use of this facility. Therefore, the department will also promote usage of the lab by faculty as a valuable resource for scholarly activity.

Ultimately, we hope to have a lab of 30 machines. Such a laboratory would comfortably accomodate most advanced undergraduate classes. In the next year we hope to explore ways in which a computer laboratory experience can enrich our students. We also hope to find additional sources of funds to expand the mathematics workstation laboratory.

In addition to the acquisition of a workstation laboratory, the department has been trying to meet the computer needs of its faculty in their scholarly activity. Electronic mail, computerized grade books and mathematical desktop publishing have become necessities for many of our faculty. Also, some faculty are finding that sophisticated computer algebra software such as *Mathematica* are advancing their research. As of this year, over 25 of our faculty have a computer in their office. Moreover, our departmental computer room has been moved to a larger room and we have added several machines (including a NeXT workstation and a portable computer on a cart for classroom demonstrations) to the computer room. These facilities are available to faculty and graduate students. Demand for computer services grew steadily last year. The Computer Advisory Committee has become very busy in the past few years!

Tom Shores at NeXT workstation

STAT NEWS

Professor Dong Ho Park recently visited the University of Tennessee at Knoxville and Wright State University at Dayton where he was invited to give some talks on his recent research in Statistics. Professor Park reports that he will be on a sabbatical leave for the 1990-91 academic year in the Department of Mathematics at Pohang Institute of Science and Technology in Korea.

This year Professor Kun-Liang Lu joined the Math-Stat faculty as a visiting assistant professor of Statistics. Recently, Professor Lu accepted a job offer from UNL and starting next fall he will be on a tenure-track line in our department.

Recently, Professor Jian-Jian Ren, a new Ph.D. recipient from the University of North Carolina at Chapel Hill, has accepted an offer to join the Math-Stat faculty at UNL next fall as an assistant professor of Statistics.

On the other hand, Professor Das Peddada, who joined the faculty in 1985 as an assistant professor of Statistics, left UNL this year after accepting a job offer from the University of Virginia at Charlottesville.

OUR NEW FACULTY

This year Steve Cohn joined the Math-Stat faculty at UNL. Professor Cohn is from New York. After he earned his B.A. in Mathematics from the University of Chicago, Steve returned to New York City where he worked on and completed his Ph.D. at the Courant Institute of Mathematical Sciences of New York University. Professor Cohn's research interests primarily lie in classical applied mathematics and particularly in the applied analysis of fluid dynamics and electromagnetism.

This fall Professor Glenn Ledder also joined the faculty at UNL. Glenn was born and raised in Aurora, Colorado. In 1977, he earned a B.S. in Ceramic Engineering from Iowa State University. Glenn worked in various jobs before enrolling at Rensselaer Polytechnic Institute (RPI) where he earned his M.S. in Mathe-

Steve Cohn and Glenn Ledder

David Jaffe and Tom Marley

matics in 1986. After a year on the faculty of Union College at Schenectady-New York, he returned to RPI to work on his Ph.D. which he completed in January 1990. Professor Ledder's research areas are mathematical modeling, partial differential equations, asymptotic methods, and fluid mechanics. Glenn, his wife Susan and his children Louis and Becky, enjoy several hobbies that include singing, camping, canoeing and stained glass.

This year is also the first for Professor David Jaffe as a Math-Stat faculty member. Professor Jaffe received his Ph.D. in 1987 from the University of California at Berkeley. He spent the last two years at Purdue University as Research Assistant Professor. Professor Jaffe's mathematical research area is algebraic geometry, which concerns the geometry of sets defined by polynomial equations in n-dimensional space.

Professor Tom Marley is also in his first year as a faculty member in our department. A native of Omaha, Tom Marley attended Creighton University, where in 1984 he received his B.S. in Mathematics. He conducted his graduate studies in the Department of Mathematics at Purdue University where he received his masters and doctorate degrees. Tom's research interests lie in the field of commutative algebra. Much of his work involves the study of the vector space dimensions of modules consisting of homogeneous polynomials in one or more variables. Recreational sports, especially basketball and tennis, are his main hobbies.

FACULTY GRANTS

Professor Richard Rebarber currently holds a two-year grant from the Air Force Office of Scientific Research (AFOSR), for the amount of $30,462. The general research area of Professor Rebarber is Control Theory. He has been working on some mathematical problems that arise in stabilization of vibrating structures. A portion of the grant has been used to bring in visitors to the department. Last semester Professor John Lagnese of Georgetown University visited and gave a Colloquium and Professor George Weiss of Virginia Polytechnic visited to give a seminar and to work on a paper with Professor Rebarber.

Professors Roger and Sylvia Wiegand have received a grant in the amount of $20,000 from the National Science Foundation. The purpose of the grant is to provide partial funding for a series of workshops in commutative algebra. The workshops will be held at various institutions in the Midwest/Great Plains region during the next three years. Participating institutions will provide support for the workshops either by hosting a workshop or by assisting their faculty and graduate students with travel to the workshops.

The first Midwest/Great Plains Workshop in Commutative Algebra was held at UNL, November 2-4, 1989 under the joint direction of Professors Roger and Sylvia Wiegand. The other 35 participants came from Colorado, Illinois, Indiana, Iowa, Kansas, Louisiana, Nebraska, North Dakota, South Carolina, and Texas.

The workshop's main speakers were: William Heinzer of Purdue University, who spoke on "Birational algebra"; Graham Evans of the University of Illinois, speaking on "Betti Numbers of finite length modules"; and Gennady Lyubeznik, University of Chicago, on "Étale cohomology". There were also shorter talks by Hara Charalambous, University of Illinois, Satya Mandal, University of Kansas, and Judy Sally of Northwestern University. In addition the schedule included a computer algebra demonstration, a problem session, and time for informal discussions. The informal discussion periods permitted many of the mathematicians to begin collaborating on outstanding open problems.

The *Proceedings of the Workshop* (which contains most of the talks and the problems) are available for five dollars; contact Professors Roger or Sylvia Wiegand.

Professor Gary Meisters is currently funded by a three-year grant from the Polish Academy of Sciences (PAN) jointly with the National Science Foundation Eastern European Cooperative Science Program. The grant is to be used for travel expenses of both Professor Gary Meisters and Professor

Czeslaw Olech. Professor Meisters will visit Professor Olech in Warsaw, Poland once yearly for the next three years and Professor Olech will visit Professor Meisters at UNL once yearly for the next three years. This travel program will help both Professors to continue to work on their joint research projects in differential equations and global mapping problems.

Professor Mohammad Rammaha has received a two-year grant from the Office of Naval Research (ONR) for the amount of $23,000. The main research area of Professor Rammaha is hyperbolic partial differential equations. A portion of the grant has been used to provide summer support for Professor Rammaha to conduct research on the formation of singularities in nonlinear waves.

Mohammad Rammaha

Professor Mel Thornton has received a grant from the Dwight D. Eisenhower Mathematics and Science Improvement funds to conduct a Nebraska Conference to Improve Mathematics and Science Education. Federal funding, through the Nebraska Coordinating Commission for Postsecondary Education, provides $35,000 of the conference budget. UNL and other sources provide $32,000. The conference is aimed at all mathematics and science teachers in Nebraska: elementary, secondary and college level. It will be a forum for 400 to 500 teachers to meet and learn about recent projects, innovations and resources relevant to their teaching. The conference will include 35 small sections, presentations, and workshops designed to offer many opportunities for communication among the teachers. There will be three general sessions featuring nationally known speakers. The conference will be held Friday afternoon and Saturday, August 24-25, 1990 at the Cornhusker conference center in Lincoln. Many participants will be supported by lodging in the Cornhusker Hotel and meals during the conference. This is a joint endeavor by the University of Nebraska-Lincoln, the Nebraska Coordinating Commission for Postsecondary Education and the Nebraska Department of Education. Cooperating institutions include Chadron and Kearney State Colleges, Wayne State College, Nebraska Wesleyan, Lincoln Public Schools and Omaha Public Schools. Mel Thornton, the conference director, is assisted in planning and holding the conference by a steering committee of 24 leaders in mathematics and science education in Nebraska.

WIEGAND HONORED

We are excited to announce that Sylvia Wiegand has been asked to give an invited one hour address at a regional meeting of the American Mathematical Society. The meeting will take place over October 25-26, 1991, in Fargo, North Dakota.

Sylvia Wiegand

MIENTKA TO MOVE

Associate Chancellor Goebel has authorized Walter Mientka to move his American Mathematics Competitions to the front half of the old Recreation Offices at 1740 Vine and has

provided $25-30,000 for renovation. Hopefully more funds will be forthcoming in the next fiscal year to pay for further renovations. At any rate, it is great news that after years of working without adequate space, Walter will have adequate space for the AMC to grow and prosper at UNL.

HERZINGER HONORED

We are pleased to announce Kurt Herzinger, one of our undergraduate math majors, is a 1990 Chancellor Scholar. Kurt's home town is right here in Lincoln. He graduated from Lincoln East High School in 1986.

THE 1989 PUTNAM EXAM

Seventeen UNL students participated in the fiftieth Annual Putnam Exam Mathematics Competition held last December.

The Putnam exam is a nationwide competition in mathematics for undergraduates which consists of an exam administered in two parts. For each session, students are allotted three hours to individually answer six very challenging questions from a variety of mathematical areas. One of the easier questions that was asked is the following:

A dart, thrown at random, hits a square target. Assuming that any two parts of the target of equal area are equally likely to be hit, find the probability that the point hit is nearer to the center than to any edge. (Solution on page 6.)

Among UNL participants, the top score belonged to Christopher Heckman, and the second highest, to Tom Snodgrass. They will receive $75 and $50 prizes sponsored by the Math department. Other UNL participants were Kosei Tsukada, Jennifer Raschko, Giles Schildt, Kevin Wright, Kurt Herzinger, Mark Mills, Michael Lewis, Kok Lim Law, Michael Nielson, Masatoshi Nishio, Lee Rezac, Wei Wu Tan, Christy Brown, Catherine Drake, and Boaz Salik. The local team was organized and coached by UNL Math department professors Earl Kramer and Chris Tiahrt.

In addition to the actual competition, many of the participants also attended two sessions devoted to developing techniques useful on the exam and studying questions from previous exams. It appears that most participants found the competition both challenging and interesting.

LAHIRI TO DC

Professor Partha Lahiri plans to spend ten months in 1990-91 at the US Bureau of Labor Statistics and the US Bureau of the Census in Washington, D.C. as a Senior Research Fellow. The Fellowship Program is jointly sponsored by the American Statistical Association, the National Science Foundation, the US Bureau of Labor Statistics and the US Bureau of Census. Counting the population accurately for small geographical areas is a challenging problem to the Bureau of the Census. Census undercount has a serious effect on both political representation and fund allocation. In the Census Bureau, Professor

Putnam Participants

Lahiri will conduct research to determine efficient methods of estimating the undercount. In the Bureau of Labor statistics, Professor Lahiri will be developing methods of estimating unemployment rates, consumer price indexes, and other related problems.

MATH-STAT B-BALL

The Eulers, the departmental faculty/graduate student basketball team, concluded another sucessful season this March. The team had a 3-2 record through the regular season and won one tournament game before losing to Psychology on a last second shot in the tournament's second round.

This season the team was organized and coached by graduate student Mark Seaman. Other participants were faculty Tom Marley, Chris Tiahrt, visiting professor Peter Horak, and graduate students Bill Wolesensky, Paul Hinrichs, Bob Ruyle, Tim Huffman, Dan Evenson, Erfan Pirbhai, Tim Piel, and Doug Anderson.

VISITING FACULTY

This year we have two visitors from Korea sponsored by Professors Jerry Johnson and Dave Skoug. Both of them received their Ph.D. degrees in Mathematics from Yonsei University in Seoul under the direction of Professor Kun Soo Chang who received his Ph.D. degree from our department in 1979. Dr. Jae Moon Ahn is a Professor at Kon-Kuk University in Seoul, Korea. His wife Jae Sook and sons Seung Ho and Jun Ho are also visiting Lincoln. Jae Moon's 12 month visit to UNL is being funded by the Yon-Am Cultural Foundation of Korea and his home University. Dr. Kun Sik Ryu is an Associate Professor at Han Nam University in Daejon, Korea. His wife Kim Hyun Soon and daughters Hyung Won, Sun Ahn and Jin Hyun are also in Lincoln. His 12 month visit to UNL is being funded by the Korean Science and Engineering Foundation and his home University. While here at UNL, Professors Ahn and Ryu are attending several classes, working on various research problems involving integration in function space and the Feynman integral, as well as presenting several lectures in a seminar on the product integral.

Also, visiting from Slovak Technical University, Bratislava, Czechoslovakia, is Professor Peter Horak. A combinatorialist doing research in graph theory, Horak has been active in the combinatorics seminar this year at UNL. He has given colloquia both here and in Vancouver, he spoke at the Mathematical Association of America Sectional meeting held in Omaha, and presented a paper at a conference in Florida. At UNL he interacts frequently with graduate students and faculty, especially Professors Kramer of Math-Stat, and Magliveras and Stinson of Computer Science.

EMERITUS FACULTY FELLOWSHIP FUND

To establish the means to provide better support for our graduate students and to honor the long-time service provided by our retired faculty members, Chair Jim Lewis has founded the Emeritus Faculty Fellowship Fund. The Fund, which will reward promising students with an increased stipend, has reached $3457 with donations by 18 current faculty members, including a contribution by Professor Dale Mesner in honor of "our valued friend and colleague Hubert H. Schneider, who by-passed the emeritus rank."

The Emeritus Fund is administered by the Nebraska Foundation. Donors to the Foundation can earmark contributions to the Department of Mathematics and Statistics generally, to be used at the discretion of the Department where most needed, or to the Emeritus Fund specifically.

EASTMAN FUND

Significant new support is available to undergraduate math students due to a bequest of $1.5 million to the Nebraska Foundation by the late Dean and Floreen Eastman. The Eastmans were longtime supporters of the University, trustees of the NU Foundation and members of the President's and Chancellor's Clubs. Mrs.

Eastman was also a math teacher here in Lincoln, and later in Seattle. The first Eastman awards to math students will be made later this Spring.

KAPKE TO VET SCI

We are sorry to report that Joyce Kapke, a longtime secretary in the Department of Mathematics and

Joyce Kapke

Statistics, has taken a new position in the Veterinary Science Department. Her last day here was April 12, 1990. Joyce has been with us for five years and we all miss her. We wish her the best in her new job.

YEAR IN ALGEBRA

Math-Stat Chair Jim Lewis is encouraging the development of special emphasis years in research. A *Special Year In Commutative Algebra* was the first such, and we look forward to more in the years to come.

The emphasis in commutative algebra this year entailed visits to UNL by a large number of scientists of world-class stature in commutative algebra and related areas. Typically, such a scholar will visit UNL for several days and during the visit will give a colloquium suitable for a broad audience, followed by a more technical talk in seminar. These visits are an important means for faculty and graduate students to establish and maintain contacts with the larger mathematical community.

A problem that future *Years of Emphasis in Mathematical Science at UNL* may face is scarcity of funds; the department has no endowed fund to provide support. The visits by the scholars listed above, which were so important to the success of this first *Special Emphasis Year*, to a significant degree depended on the generous support of the UNL Research Council.

STATE MATH COALITION

Nebraska is one of the first states to receive funding, under a grant prepared by UNL Professor Don Miller who will serve as director, from the Mathematical Sciences Education Board (MSEB) to create a state mathematics coalition of educators, business people and policy makers. Leaders from these areas (including: teachers at all levels, administrators and members of professional societies; leaders from business and industry; and parents and representatives from government, school boards, and special advocacy groups), as members of the coalition, will work to revitalize mathematics education.

Support for these coalitions was made possible by major grants from the Exxon Education Foundation and the Carnegie Corporation.

PROMOTIONS

We are happy to announce that Dong Ho Park has been promoted to Associate Professor in the Department of Mathematics and Statistics. Dong Ho received an M.S. degree in 1980 and a Ph.D. degree in 1982, both in statistics from Florida State University. He has been at UNL since 1983.

This year three Math-Stat faculty members, Steve Dunbar, Richard Rebarber and Brian Harbourne, were granted tenure in April. Steve was an undergraduate at UNL and received his Ph.D. from the University of Minnesota in 1981. He has been at UNL since 1985. Brian, a graduate of the University of Virginia, received his Ph.D. from M.I.T. in 1982 and has been at UNL since 1986. Richard, an Oberlin College undergraduate, received his Ph.D. from the University of Wisconsin in 1984 and has been at UNL since. Action on promotion in these cases is expected in June.

LETTER FROM THE CHAIR

Our goal in publishing the *Math-Stat News* is to keep our friends and alumni up to date with the activities of the Department of Mathematics and Statistics at UNL. We hope you have enjoyed reading about the department and that you share my pride in the accomplishments of our faculty and students. We also want to ask for your help.

It is a challenging time for our profession. Recent studies such as "Everybody Counts" and "A World Apart" have focused attention on the poor performance of our young people in mathematics and science when compared with students from other countries. Less visible but equally important is a growing national crisis in graduate education. Simply put, we are not producing a sufficient supply of Ph.D.'s in mathematics and statistics to meet the needs of our country. For the third consecutive year, the majority of Ph.D.'s awarded in mathematics in the U.S. were awarded to citizens of other countries. In the paragraphs that follow, I will try to describe our efforts to meet these problems and our needs in doing so, and I'll highlight our successes of the year just past.

Any report on departmental highlights for the year must begin with personnel decisions, since the vitality of our faculty is our most important asset. Last spring we hired four extremely talented young faculty members in Steve Cohn, David Jaffe, Glenn Ledder and Tom Marley, whom you can read more about elsewhere in this newsletter. Also last spring, Dong Ho Park was granted tenure and promotion to Associate Professor. This spring, three other faculty members, Steve Dunbar, Brian Harbourne and Rich Rebarber, are in the final stages of the year-long tenure and promotion process and we have been successful in hiring two new outstanding statisticians.

These young professors join a faculty which is dedicated not only to producing quality research, but also to ensuring Nebraska students a quality education, both in our classrooms here at UNL and in our work with the many dedicated high school teachers of this state to improve mathematics education at all levels. JUMP (see page 7) is the cornerstone of our precollege efforts but another new activity will shortly explode on the scene. Professor Don Miller's grant to plan a State Mathematics Coalition (page 14) will soon bring together the state's leaders in mathematics education with leaders from business, industry and government to set goals and to chart a path for mathematics education reform in Nebraska. Here at UNL we are making significant changes in our first year instructional program. One change, starting this fall, is that all new freshmen will take a placement exam in mathematics, which will be used to place students in math courses appropriate for their background. Within one more year another change will be a revamping of our precalculus offerings. The combined effect, we hope, will be a much higher success rate for our students in these courses. We also now provide our best math students with a choice of five honors courses. Based on high school preparation, students may begin college in an honors version of first, second or third semester calculus. After completing the calculus sequence, we have honors courses in both differential equations and matrix theory. Some of these honors classes will be enriched by use of our new NeXT Computer Laboratory, made possible by Professor Tom Shores' National Science Foundation (NSF) grant (page 8), but this innovative lab will benefit a wide range of students. We have been able to purchase twelve NeXT machines with the NSF grant and we hope in the near future to find funds for another six machines.

Perhaps the most exciting development for young mathematics majors is the endowment left to the department by Dean and Floreen Eastman. In their will the Eastmans left approximately $1,500,000 to establish a scholarship fund (page 13) for students majoring in mathematics. Nearly $35,000 will be available for scholarships next year and eventually the fund will provide over $75,000 in scholarship funds per year for mathematics majors. I am sure that many of our alumni who struggled to afford college will understand the impact this will have on our undergraduate program.

Graduate education remains an area of need. Both at UNL and nationally we will continue to find it difficult to attract young people to graduate school in mathematics if we cannot offer adequate stipends. As Chair, I am trying to improve graduate teaching assistant salaries as rapidly as possible but something more is needed. This past fall, the faculty in our department established the Emeritus Faculty Fellowship Fund at the NU Foundation. This fund was established to honor our retired faculty, Ed Halfar, Lloyd Jackson, Bill Leavitt and Dale Mesner, and to provide a fellowship fund for graduate students. To begin the fund, I asked the faculty to make contributions. I am pleased to report that $3500 has been contributed by our faculty. It is my hope that many of our alumni will join us with a contribution in memory of a former professor who they feel made a difference in their education. I am sure you will agree that the fund is dedicated to a worthwhile purpose.

Even as I solicit your support for the Emeritus Faculty Fellowship Fund, I hope that those of you who have contributed to our Math-Stat Fund at the NU Foundation in the past will continue to do so in the future and that others will decide to join them. Even though faculty salaries have improved significantly in the past two years, basic operational support has not. I have used your funds in the past year to support JUMP while it was still a pilot program, to help in the recruitment of new faculty, to support faculty travel, to bring mathematical visitors to campus, and to help with the purchase of new computer equipment, but these funds must continually be replenished.

I hope that you have enjoyed reading about the department. I want you to know that we appreciate your support and we enjoy hearing from you. Have a good year.

Jim Lewis

INSIDE MATH–STAT NEWS

University of Nebraska Lincoln

Department of Mathematics and Statistics
810 Oldfather Hall
Lincoln, NE 68588-0323

NON-PROFIT ORG.
U.S. POSTAGE
PAID
Lincoln, Nebr.
Permit No. 46