



# MATHEMATICS & STATISTICS

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

<http://www.math.unl.edu>

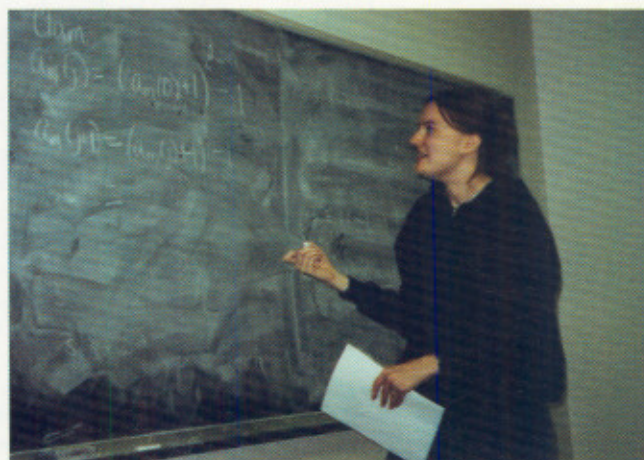
## Jackie Anderson wins Alice T. Schafer Prize

We are extremely happy to report that Jaclyn (Kohles) Anderson, a senior mathematics major at UNL, has been announced as the 2001 recipient of the Alice T. Schafer Prize. The prize, which is awarded by the Association for Women in Mathematics (AWM), is given to one undergraduate woman in the U.S. for excellence in mathematics. Jackie, who was a runner-up for the award last year, will receive the prize in a ceremony at the Joint Meeting of the AMS and MAA in New Orleans in January.

Jackie has had an extraordinary four years in our department. She first came to our attention in 1995 when, as a junior at Ralston High School, she finished ninth in the PROBE II competition at Math Day. The following year she won the Probe II competition and the accompanying full scholarship to UNL. She spent the fall semester of 1998 at Penn State in the MASS program (a comprehensive semester in mathematics for talented undergraduate students) and the following spring in Hungary for the Budapest Semester in Mathematics. She also did an REU (Research Experience

for Undergraduates) during the summer of 1998 at Carlton College. The last year and a half Jackie has been busy taking many of our upper-level undergraduate and graduate courses (some of which are intended for second and third-year graduate students). She is currently doing an honors research project on integer programming under the direction of Professor Roger Wiegand. She also received word that her research paper, "Partitions which are simultaneously  $t_1$ - and  $t_2$ -core," has been accepted for publication in *Discrete Mathematics*.

Jackie, who plans to continue her studies in mathematics in graduate school next year (she's not yet sure where), has also worked as a teaching assistant in honors calculus at UNL and has been a leading mem-



Jackie discusses a problem in preparation for the Putnam Exam.

ber of our Putnam Exam team. We are obviously very proud to have her in our department and are delighted that AWM has chosen to honor her with this prize. Congratulations, Jackie! Many thanks are due to Professor Gordon Woodward for doing much of the work in nominating Jackie for this award.

## David Jaffe visits top genetics institute



David Jaffe in a laboratory at the Whitehead Institute.

Professor David Jaffe's research has led him to the study of mice and men — or at least their DNA. In 1999, David became interested in the mathematical and computational issues underlying the ongoing and highly-publicized endeavor to map the genomes of human beings and other living organisms. David nurtured his understanding of the basic issues in this vast field by teaching a popular course in bioinformatics at UNL during the Spring 2000 semester. His hard work culminated in his acceptance as a long-term visitor at the highly prestigious Whitehead Institute for Biomedical Research/ MIT Center for Genome Research. David took leave from the department in the Fall of 2000 to embark on what could be a five-year stint (a grant application to the NIH is pending) at what is arguably the world's most important genome center.

Jaffe continued page 4

## Inside

- Math Day
- Faculty News
- Math Competitions
- Student/Alumni Awards
- Conferences

... and much more!



## Graham Leuschke named NSF Postdoctoral Fellow

For the second time in four years, a Math.-Stat. Ph.D. has received an NSF Postdoctoral Fellowship. Dr. Graham Leuschke, who received his Ph.D. last August from UNL and wrote his thesis in commutative algebra under the direction of Roger Wiegand, is spending the three-year tenure of the fellowship at the University of Kansas. He is working with Craig Huneke, probably the world's top commutative algebraist. NSF Postdoctoral Fellowships are extremely prestigious, with only about 30 awarded per year in the mathematical sciences (exactly 30 this year). The other universities whose Ph.D. recipients received these awards this year were Arizona, Berkeley, Brown, Chicago, Colorado, Cornell, Harvard, Michigan, MIT, NYU, Princeton, Stanford and Washington — pretty elite company! Furthermore, Graham received a summer fellowship from the Clay Institute's Liffort Program, designed to give the nation's top young scholars a jump start on their careers. As mentioned above, Graham is the second UNL Math.-Stat. Ph.D. in recent years to receive an NSF Postdoctoral Fellowship. The first was Jennifer Mueller (Ph.D. 1997), who wrote her thesis on differential equations under the supervision of Prof. Tom Shores. She spent her postdoc at RPI in Troy, New York.



Graham Leuschke

## Department hosts research conferences

From August 5 to 9, 1999, the University of Nebraska was the host to an NSF-CBMS Conference in control theory. Each year the National Science Foundation funds approximately five of these conferences, each featuring a distinguished lecturer who delivers ten lectures on a topic of important current research. The lecturer then prepares an expository monograph, which is widely distributed by either the AMS or SIAM. For our NSF-CBMS conference, the lecturer was Professor Irena Lasiecka of the University of Virginia, and the organizer was Professor Richard Rebarber from our department. The title of Dr. Lasiecka's series of lectures was "Mathematical Control Theory of Coupled Systems of Partial Differential Equations". There were 40 participants at the conference, and 23 of them gave half-hour lectures related to Dr. Lasiecka's talks.

After the conference, the department held a "Workshop on Control of Distributed Parameter Systems," sponsored by the Discrete, Experimental and Applied Mathematics Initiative (DEAM) at UNL. We had 14 participants and 11 half-hour lectures during the workshop, which covered a wider range of topics than the conference.

The Department was also host to another conference. An "International Conference on Geometric and Combinatorial Methods in Group Theory and Semigroup Theory" was held at UNL during May 15-19, 2000. This conference was organized by Professors Susan Hermiller and John Meakin of the Department of Mathematics and Statistics, and Professor Mark Sapir of Vanderbilt University (and formerly of our department), with funding from the National Science Foundation and DEAM. The conference had approximately 80 participants from widely spread universities in North America and Europe, as well as participants from Australia, South America, and Asia. The program consisted of 19 plenary talks and 32 half-hour talks in two parallel sessions. The aim of the conference was to bring together researchers with interests in the interface between group and semigroup theory, and computation.



Jim Lewis

## Letter from the Chair

Dear friends,

We hope you enjoy reading the latest version of the Department's newsletter. We have much exciting news to share with you since our last newsletter eighteen months ago, but it will be difficult to top the picture on the cover of our last issue, which showed our own Judy Walker accepting the Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring, from President Clinton. But we will do our best! For starters, as this newsletter goes to press we have received some exciting news from the University of Nebraska Foundation about the creation of a new endowed chair for our Department. With a very generous gift Dale M. Jensen has established the Dale M. Jensen Chair in Mathematics and Statistics, and a match from the Donald and Mildred Othmer estate will supplement the gift's income creating the equivalent of \$1 million endowment. This is indeed great news and we look forward to sharing more details about this endowed chair and the gift that made it possible in our next newsletter.

I am also pleased to announce that, with the help of the University of Nebraska Foundation, we have launched the Mathematics and Statistics Enhancement Fund Drive. Our goal is to build an endowment to fund several initiatives which would greatly enhance the academic stature and visibility of the Department. These initiatives include the establishment of another named professorship which would help the Department retain and honor a deserving faculty member, a named postdoctoral position (or positions) which would attract outstanding young researchers to our department to work with our senior faculty, and one or more named graduate fellowships to help attract the very best students to our graduate program. To kick start the fund drive, Professor Mel Thornton and his wife Rosemary, and my wife Doris and I have made combined donations of \$40,000 to this fund. To support our drive, we have already received a \$5,000 donation from two faculty and a \$5,000 donation from an alumni. Our three-year goal for the Enhancement Fund Drive is to raise \$500,000. We hope you will consider making a donation to help us towards that goal.

The present newsletter highlights many of the people and programs that make our Department such an enjoyable and exciting place to work and learn. Many of our students, faculty and staff have won university, state and national awards in recognition of their outstanding scholarship and service. For example, Jaclyn Kohles Anderson just received an award recognizing her as the outstanding woman math major in the U.S. While we are very proud of all these achievements, we feel that the honors represent merely the tip of the proverbial iceberg, the most visible elements to those outside the Department and the University which serve to underscore what we believe to be a culture of excellence in our Department. I hope you will agree.

We are always eager to know the whereabouts and doings of our alumni and friends, so if you have any news you'd like to share with us or have comments about this newsletter, please email me at [jlewis@math.unl.edu](mailto:jlewis@math.unl.edu).

Sincerely,

Jim Lewis



## All Girls/All Math Summer Camp

Twenty-nine high school girls from seven states studied advanced mathematics this summer in two week-long All Girls/All Math camps. The girls spent six hours per day in classes on Chaos and Codes.

Recent graduates Dr. Rikki Wagstrom (UNL Ph.D. 1999, now at Calvin College) and Dr. Stephanie Fitchett (UNL Ph.D. 1997, now at Florida Atlantic University — Honors College) joined Professors Judy Walker and Wendy Hines to provide instruction for these courses. Individual help in the classroom was provided by current Math-Stat graduate students Theresa Strei and Patricia Nelson, who also stayed with the girls in a residence hall on campus. In addition, the girls were treated to presentations on the “fun” side of math, such as the mathematics of music, flying, and shopping on the internet. Presenters included former Math-Stat graduate student Mark Petersen and Professor John Orr, Vice Chair of the Department.

Each camp also hosted an accomplished mathematician guest speaker; Amy Grimes from the National Security Agency and Dr. Rachel Kuske from the Center for Industrial Mathematics at the University of Minnesota each gave an interactive talk on a topic related to their areas of work.

The rest of the girls’ time was spent on evening activities and a little bit of studying. The most adventurous evening activity was flying small planes through the Young Eagles program. Volunteer pilots with the Experimental Aircraft Association flew the girls in their planes and showed them how to work the controls. The girls then applied this knowledge by flying the planes themselves with the pilots’ assistance. More nights of fun came during cookouts with the guest speakers.

A second event sponsored by All Girls/All Math this summer

was a two-day workshop called “It’s a Math Thing...”, which was attended by twenty-two girls in grades 9-12 at the end of July. Participants spent time in problem sessions with Math-Stat graduate students Edna Chan and Theresa Strei, and in area sessions hosted by Professors Mark Brittenham (“How to Build Rectangles out of Squares”), Glenn Ledder (“How Many Ping-Pong Balls Does it Take to Fill a Room?”), and Judy Walker (“Intelligent Numbers”). In addition, Professor Wendy Hines told the stories of two early women who made major contributions in mathematics. An evening banquet and career panel featured guests Carey Noel from Goodyear, Carol Farnham from Farnham Communications, Sandra Scofield from the UNL Center for Science, Math and Computer Education, and Dr. Lisa Orlandi-Korner from the UNL Math Department. Panelists addressed questions about their careers, including histories, influences, and obstacles to their success.

All Girls/All Math events are organized by Professors Judy Walker and Wendy Hines, undergraduate student Sadie Meyer, and lecturer Lucinda Zmarzly (UNL BS 1995, UNL MS 1998). Specifics about the program in 2001 will be available in early spring. People who would like more information can contact Lucinda or Sadie at (402) 472-8965, e-mail [sumcamp@math.unl.edu](mailto:sumcamp@math.unl.edu), or go to our website [www.math.unl.edu/~sumcamp/](http://www.math.unl.edu/~sumcamp/).



The 2000 All Girls/All Math Summer Camp.

## Judy Walker wins teaching awards

In the spring of 2000, Professor Judy Walker was one of five faculty members of the College of Arts and Sciences to win the University Distinguished Teaching Award. This award is given each year to up to six faculty members in the entire college and honors the most effective teachers in the university. Impressively, Judy is the 17th professor in our department to win this award in its history and is one of 15 current faculty to be so honored.

As if this were not enough, later in the semester the department was thrilled to learn that Judy was also awarded the highly prestigious Scholarly Teaching Award. This award is given to only one faculty member on the entire campus and thus represents a truly remarkable honor. The award honors Judy for her leadership in curriculum and pedagogical development and was given in part based on glowing letters of recommendation written by former students of Judy's classes.

In recognition of her awards, Chancellor James Moeser visited Judy's class one day in late Spring, delivered a short speech, and distributed delicious cookies to everyone in attendance. (Amusingly, the class in which the ceremony occurred was a graduate level course in number theory, and thus there were only seven students to eat the many cookies that arrived.) Judy was also recognized during the Honors Convocation in April of 2000, during which she was presented with a plaque in front of the thousands in attendance.

Readers of this and previous newsletters will also know Judy as the co-director of the highly successful All Girls/All Math summer program for high school girls, the chair of the organizing committee for the Nebraska Conference for Undergraduate Women in Mathematics, and the faculty member who, on behalf of the entire department, received the Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring — an award presented by President Clinton himself.

Proving that teaching and research go hand in hand, Judy capped off a semester to remember by learning that she had been awarded a three-year grant from the National Science Foundation to support her research in algebraic coding theory. Way to go Judy!



## Third Annual Regional Workshop

The third annual Regional Workshop in the Mathematical Sciences was held on October 27-28, 2000. The workshop, whose purpose is to foster research connections in mathematics, statistics and computer science among UNL and neighboring institutions, has grown in popularity each year. This year, we had over 170 participants representing 20 institutions in Nebraska, Kansas, North Dakota, South Dakota, Minnesota and Colorado. There were also four schools which had at least 10 participants: Concordia University in Seward, NE, Concordia College in Moorhead, MN, Dakota State in Madison, SD, and Wayne State in Wayne, NE. In addition, there was heavy participation from the UNL departments of Biometry, Computer Science and Engineering, and Mathematics and Statistics, as well as from the Gallup Research Center and the UNL Survey Research and Methodology Program.

The workshop began on Friday afternoon with six plenary talks: "Convex Analysis," by Prof. Allan Donsig of Mathematics and Statistics; "A Decade of Delays: Adven-

*Workshop continued on page 14*



Participants of the Commutative Algebra and Algebraic Geometry special session of the Regional Workshop.

*Jaffe continued from front page*

Many believe biology and bioinformatics will be the most important areas of scientific investigation in the 21st century, and we are thrilled to have a member of our department engaged in the front lines of current research in this field. "A lot of people don't understand that there's been a revolution in biology," says David. "Suddenly, it's possible to obtain massive amounts of data at once. In the old days, you worked for years to understand one protein. Now you can get information about 10,000 proteins, all at once. Ditto for DNA. It's parallel experimentation, big time. And what it means, on a practical level, is that the whole process of scientific discovery — including curing diseases — is tremendously speeded up."

Part of David's time at the Whitehead Institute will be spent getting up to speed (quickly) on the fields of molecular biology and biochemistry. In fact, he will take numerous advanced courses and seminars in these areas. However, David views his background in pure mathematics (he began his mathematical life as an algebraic geometer and then evolved into a coding theorist) as a crucial ingredient in his future success in bioinformatics. As David puts it: "For people trained to study abstract mathematical structures, this field [bioinformatics] is incredibly seductive. Suddenly one has the opportunity to turn the abstract knowledge into knowledge

about life itself. You see, the cell is this unbelievably intricate thing, like an intricate mathematical object. It's really wonderful."

David's work thus far has focused on "whole genome shotgun assembly" (WGS), an approach to gene sequencing in which millions of relatively short pieces of DNA (modeled as strings involving the letters A, C, T, and G) are obtained at random from an organism's genome. The challenge is then to piece together these strings by searching for patterns common to different pieces. One thing that makes the assembly process extremely difficult is that certain sequences are repeated often in the genome, and thus can trick one into joining strings that actually do not belong together. If this already sounds like a computational nightmare, keep in mind that roughly one percent of all the letters are wrong due to experimental error! Such a dizzyingly complex and ill-defined computational problem is particularly well-suited to the mathematical mind, and David has already made contributions toward this field by introducing new ideas that greatly speed up the process of WGS. One of the next goals of David's current research team is to vastly improve the efficiency of the WGS approach and use the new techniques to assemble the mouse genome.

While at the Whitehead Institute, David will work with some of the most outstand-

ing researchers in genomics, most notably Eric Lander. Lander is frequently mentioned as one of the leading figures in the field of bioinformatics, both by scientists and in the popular media. Indeed, on one occasion, David's meeting with Lander was interrupted to schedule an interview with ABC news. (David has not yet appeared on national television — we are waiting patiently, David.)

By visiting the Whitehead Institute, David is taking a courageous lead in establishing connections between mathematics and the rapidly developing science of bioinformatics. The University of Nebraska views bioinformatics as an important field in which it wants to become a major player. It is, however, a research field that will require the commitment of significant resources in terms of hiring top-notch researchers and laboratory space. "Go back in time to the days when computers were a new thing," says David. "You'd want to build a center of excellence in computing, right? Well, now we've got a field, which is just as important scientifically, which is going to deeply affect our lives, and which is an economic gold mine."

While we miss his presence in the department, we are excited and pleased to have David as one of the pioneering mathematicians in the emerging field of bioinformatics.



# Math Day enters its second decade

Math Day had its 10th anniversary last year on November 11, 1999. Lori Mueller, our Math Day Administrator, suggested we do something special to celebrate the occasion. So we moved the opening ceremonies from Kimball Hall to the Lied Center, thanks to the help of Chancellor Moeser. In addition we hosted 7 of the 9 previous winners of Math Day: Eric Smith (1990, Omaha Westside), Daniel Hanish (1991, Omaha North), Igor Pavlovsky (1993, Lincoln Northeast), Madan Ramakrishnan (1995, Omaha North), Jaclyn (Kohles) Anderson (1996, Ralston), Nick Benes (1997, Pius X), and Ben Haskell (1998, Omaha North). Eric received his BS and Masters degrees from UNL with a major in mathematics and is teaching at Westside High School in Omaha; Daniel is a physics graduate student at Johns Hopkins; Igor is in graduate school in mathematics at MIT; Madan will receive his B.S. from MIT this winter; Jaclyn graduated from our department this past December; Nick is at the University of Dallas; and Ben is currently at Princeton. These celebrities acted in our opening skit, moderated Math Bowl rounds during the day and played two "Alumni Bowl" rounds right before the championship rounds. They're still mighty quick! It was our biggest Math Day ever with 1,434 students from 103 Nebraska schools taking PROBE I. Seventeen schools were first-timers. This is quite an increase from our first Math Day of 560 students from 68 schools.

Math Day 2000 was held on November 9th. It was a bit less hectic than the 10th anniversary. Once again, the Chancellor (this time, interim Chancellor Perlman) provided the funds for the Lied Center. We hosted 1,312 students from 99 schools, with 8 first-timers. Twenty-nine schools have attended all 11 Math Days. Morrill high school traveled the farthest, 450 miles. Last year - at their first Math Day - Morrill won the

Class C Bowl Tournament and came in a close 4th on the PROBE I competition. This year they came in second in the Bowl and again a close 4th on the PROBE I. To encourage schools from far away to come, we provide rooms in local hotels to schools traveling over 150 miles. Eight of the PROBE scholarship winners (those finishing in the top 10) had previously finished in the top 10 in the PROBE competition. The winner this year is Robert Lefferts, from the Lincoln "Zoo School". Folks around here might recognize his name: his Dad is a professor of music at UNL. Ryan Haase of Lincoln East came in 2nd overall for the second year in a row.

As part of our continuing efforts to get mathematical career information to the high schools, we invited Dr. Gary Schwendiman, former Dean of the Business College and current senior partner with Schwendiman Associates, to talk to the teachers at the Teachers Forum, which was held while the students were taking the PROBE I exam. He talked about mathematical careers in the area of finance. Financial engineering is a

hot new area that uses some fairly sophisticated techniques from operations research.

Chancellor Perlman was at the award ceremony to present plaques to the top schools and individuals. Dr. Don Clifton, Chairman of the Gallup International Education and Research Center, attended the last few rounds of the bowl competitions and was there to personally award \$34,000 in Gallup Math Day Scholarships to the top ten individual finishers in the PROBE competition. Last year Gallup established a permanent fund for these scholarships, thus ending our ten-year search for a permanent sponsor. In prior years we had agreements from our own Eastman funds, the College of Arts and Sciences, the College of Engineering, and the Vice Chancellor for Student Affairs to fund the scholarships. While we are certainly very appreciative of their support, it is a great relief to have an endowment that permanently funds the scholarships. Gallup also provided us with many volunteers during Math Day.

Thursday, November 8, 2001 is the date for our next Math Day.



Pictured above, from left to right, are the top finishers in the 2000 Probe competition: Jonathan Potter - 10th place, Chris Holley - 9th place, Nate Sorensen - 8th place (not pictured), Matthew Drake - 7th place (not pictured), Tristan Skrdla-Markwell - 5th place (tie), Rebecca Harbison - 5th place (tie), Don Clifton, former CEO, The Gallup Organization, Nick Bowman - 4th place, Andrew Morten - 3rd place, student accepting for Ryan Haase - 2nd place, Robert Lefferts - 1st place.



## David Pitts promoted to full professor



David Pitts

The Department's newest full professor is David Pitts. His duties as full professor in the Department of Mathematics and Statistics

began with the Fall 1999 term. David received his doctoral degree in 1986 at the University of California at Berkeley with a specialization in operator algebras, was hired by UNL in 1986, spent 1988–1991 on leave at UCLA with an NSF Postdoctoral Fellowship, and received tenure at UNL in 1993. An active researcher, David has attended, organized and spoken at many conferences and authored or coauthored 17 research papers. He has also been deeply involved in teaching and service activities. David supervised the Masters thesis of Lucinda Zmarzly (currently a lecturer in our department) and was a leader in the development of our revised calculus curriculum. David also was the principal organizer for the Department's Centennial Celebration in 1998. Appointed for the first time to the Departmental Executive Committee in 1993 and then again in 1997, his current Executive Committee appointment runs until Spring 2002. Last spring he finished a term on the College Grading Appeals Committee, just in time to start his duties as Academic Program Review (APR) Coordinator for the department. The APR is a massive but very important task during which all aspects of departmental activities will be examined, first internally and then by a review team comprised of prominent faculty from our peer institutions.

## Division of Statistics undergoes changes



Partha Lahiri

This past fall the Division of Statistics began a process of becoming a more autonomous unit within the Department of Mathematics and Statistics. Professor Partha Lahiri has been named the Director of the Division of Statistics. Although the plan is for the Division to remain a part of the Department of Mathematics and Statistics, several changes are in the works, including the establishment of a separate budget for salaries of faculty and graduate teaching assistants. Eventually, a separate graduate program in Statistics (tentatively called the "Institute of Statistics and Survey Methodology") may be created. The Director of the Division of Statistics will also be responsible for many of the tasks (such as hiring recommendations and evaluation of faculty) that heretofore fell to the Chair of the Department of Mathematics and Statistics.

The motivation for these changes is to provide the Division with greater flexibility to strengthen the Statistics program and enhance its reputation worldwide. Thanks to the efforts of Partha and considerable support from Jim Lewis, Dean Linda Pratt, and Vice-Chancellor Richard Edwards, the process of making the Division one of the premier research centers on survey sampling is well underway. All three of our current tenured or tenure-track faculty in Statistics have very active research programs in survey sampling. In addition, the Division has been authorized to hire two new faculty members at the full professor level this year, with a commitment from administration to make another hire at the assistant professor level two years from now.

Partha has been instrumental in the efforts to get UNL to join the prestigious Joint Program in Survey Methodology, a consortium funded by 12 federal agencies and consisting of the University of Maryland, the University of Michigan, and the Westat Corporation. The Gallup Organization also continues to be very supportive of our Statistics program. Gallup has selected Partha as a Senior Research Scientist and has committed research support to him for the next five years. Furthermore, the Division continues to have a close association with UNL's Gallup Research Center as well as the Graduate Program in Survey Methodology.

## John Orr develops testing software

Over the past four years, the department has been making use of the Internet and software developed at UNL to give students exams, quizzes, and homework over the Web. This year publisher John Wiley & Sons is marketing the software, called eGrade, nationally and internationally.

EGrade, which was developed by Mathematics and Statistics Professor John L. Orr, is a program which handles assigning questions to students, which they work over the Web. Each student gets an individualized assignment, which the computer grades. Because the assignments are available over the Internet, students can work assignments at all hours of the day and night, and indeed 10 p.m. to midnight is the busiest time for the server.

Professor Orr began the eGrade project in 1996 in order to find a way to set a challenging exam in Calculus (Math 106) which had very high standards but which almost all of the students would pass (eventually!). The solution was to let students work many different versions of the exam, for practice or as retakes. Some students pass the exam the first time, others need a lot of retakes, but eventually most meet the challenge. Since computers assign and grade these exams, called Gateway Exams, the department can handle an exam like this without committing huge resources to grading the tests by hand.

At UNL eGrade has been taken up by a number of departments outside of Mathematics and Statistics, so that last academic year more than 7,400 UNL students (over 30% of our undergraduate enrollment) used the software to work an assignment. Students using the software tend to be in large freshman- or sophomore-level classes like Calculus, Introductory Psychology, or American History, where the web enables them to get immediate feedback on homework and quizzes in a way that would otherwise be impossible.

Outside UNL, over 28 schools have been using eGrade or one of the earlier versions of the same software, also marketed by John Wiley.



## Professor Mel Thornton retires

Prof. Mel Thornton retired from the department at the end of the 1999-2000 academic year. He had been a member of the faculty since 1969.

Mel first came to UNL in 1953 as an undergraduate on a Naval ROTC scholarship. He graduated in 1957 with majors in mathematics and physics. After spending three years on active duty in the US Navy, he entered graduate school at the University of Illinois where he earned his doctorate in Algebraic Topology in 1965. From 1965 through 1969 he was on the faculty at the University of Wisconsin-Madison. In 1969, Mel and his wife Rosemary (whom he had met as a senior at UNL) moved back to Lincoln where Mel joined the faculty of UNL.

During his 30 years on our faculty, Mel's research interests were in topology, semigroups and mathematics education. He was one of the founders of the ADAPT program and was co-director of the Nebraska Math Scholars program, the Western Math Scholars program and the Nebraska Math and Science Initiative. During his tenure Mel won two campus-wide teaching awards, was recognized as the CASE Professor of the Year for 1994 and was a charter member of UNL's Academy of Distinguished Teachers.

Rosemary also retired last spring. She had taught in the Lincoln Public Schools for 26 years. Most recently she was a science specialist at Fredstrom Elementary School.

Just before retiring, Mel and Rosemary purchased 120 acres of virgin prairie and pine-oak woods close to the Niobrara River in north-central Nebraska. That Sandhills location reflects their interest in canoeing and nature. An experienced builder was hired to construct the shell of a three-level log home. Mel and Rosemary now are focused on interior construction, design, plumbing and electrical work with a lot of advice from the good folks at building supply stores. Mel says they are aiming for a look of rustic elegance and currently have all the rustic they need. They are now working on the elegance. With children in New York, Dallas, Seattle and Denver, Mel and Rosemary are also spending a lot of time traveling.

The Department hosted a conference last spring to celebrate excellence in the teaching of mathematics and to recognize Mel's contributions. The conference, which was held June 9 and 10 at the Embassy Suites Hotel, featured speakers Deborah Ball of Michigan State and Ann E. Watkins, president-elect of the MAA. Conference sessions focused on teacher preparation, assessment and the impact of standards.



Mel Thornton

## Jerry Johnson publishes book on Feynman Integrals

Math.-Stat. Professor Jerry Johnson, together with Michel Lapidus of the University of California-Riverside, has published a new book on Feynman integrals. The book, *The Feynman Integral and Feynman's Operational Calculus*, was published this year by Oxford University Press. The aim of the book, says Jerry, is to make accessible to mathematicians, physicists and other scientists interested in quantum theory, the beautiful and closely related but mathematically difficult subjects of Feynman integration and Feynman operational calculus. The subject originated in 1948 with the heuristic work of the physicist Richard Feynman on what is known as the Feynman path integral. The Johnson-Lapidus book is at present the most comprehensive mathematical treatment of these two closely related subjects. Much of the material covered in this 771-page book was previously available only in the research literature. However the book also contains many new results. The earlier joint research work of Johnson and Professor David Skoug, also of our department, was among the major influences in the development of this book.

## Judy Walker publishes book on coding theory

A new book by Professor Judy Walker, *Codes and Curves*, has just been published. The book is an expanded version of the lectures she gave in the spring of 1999 at the IAS/PCMI Mentoring Program at the Institute of Advanced Study in Princeton, New Jersey. The lectures, intended for the 13 undergraduate students in the program, were in fact attended by approximately 75 people, including graduate students, postdocs, researchers from the Institute for Defense Analysis, and some IAS members. The book is quite popular: the American Mathematical Society brought extra copies to sell at the Los Angeles meeting in August (MAA MathFest/AMS MathChallenges), but it still sold out within the first couple of days of the week-long meeting. Because of the book's popularity, Judy was asked to give a 90-minute lecture on algebraic geometry codes at the MAA Short Course on Coding Theory in conjunction with MathFest.

## Bill Leavitt continues prolific research career



Bill Leavitt

With the publication of his forthcoming paper, "On beta classes," William Leavitt, Professor Emeritus of Mathematics and Statistics, will have published at least one research paper in each of the last eight decades. This amazing achievement highlights an outstanding research career which continues even 14 years after Bill's retirement. The article, which is co-authored with Halina France-Jackson of Vista University in Port Elizabeth, South Africa, will appear in *Acta Mathematica Hungarica* sometime in 2001. Bill, who grew up in Nebraska and went to high school in David City, received his B.S. and M.S. degrees in mathematics from UNL. His master thesis led to his first publication, "Planetary orbits in relativity theory," which appeared in the *American Mathematical Monthly* in 1939. He went on to earn his Ph.D. in mathematics from the University of Wisconsin-Madison, in 1947, specializing in

noncommutative ring theory. He returned to UNL first as an instructor in 1947, then as an assistant professor in 1948. He served as a member of our faculty for nearly 40 years, including as Chair of the department from 1954-1959 and 1960-1964. He has written 65 research papers, eight of which have been written since his retirement in 1986. Bill continues to be a familiar face around the department, attending algebra seminars and departmental colloquia on Thursdays and appearing frequently at departmental social functions. He continues to attend research conferences as well. Last summer he gave a talk on his "Beta classes" paper at the International Conference on Rings in Innsbruck, Austria. Thanks, Bill, for your eight decades of contributions to mathematics. We look forward to your continuing to be an important part of the intellectual life of our department in the years ahead.



## Pi Mu Epsilon

Pi Mu Epsilon is an honorary society founded in 1914 to promote scholarly activity in mathematics among undergraduate students. The UNL chapter, Nebraska Alpha, was founded in 1928, the first in Nebraska and the fifteenth chapter (out of more than 260 current chapters) in the entire nation. The charter members of the Nebraska chapter include A.L. Candy, who received the first Ph.D. in Mathematics from UNL in 1898.

The current officers of the UNL chapter of Pi Mu Epsilon (or PME, as it is affectionately known) were elected during the annual Spring Picnic, held in April of 2000. They are Lucas Sabalka, President; Jackie Anderson, Vice President; Ellen Veomett, Secretary; and Tyler Pannier, Treasurer. Professors Allan Donsig and John Orr are the faculty advisors.

During the past year and a half, PME has thrived with the addition of many new members and an impressive slate of activities. In the Fall of 1999, Spring of 2000, and Fall of 2000, the honor society initiated 11, 12 and 18 new members, respectively, and currently claims well over 50 members in all. The Fall 2000 initiates are Elizabeth A. Beer, Shauna L. Bose, Paul R. Demmel, Mark D. Dietz, Amy L. Dostal, Kristine M. Hull, Audrey L. Kai, Scott T. Krull, Autumn F. Merriman-Honerkamp, Eric M. Parkening, Tiffany B. Peterson, Michael S. Primrose, Jonathan B. Protzman, Christine A. Riggelman, Kimberly A. Ryland, Rachel L. Spiry, Amanda C. Stahlnecker, and David A. Walker.

In the Fall of 1999, PME sponsored three different mathematics talks: "Math and music" by Mark Petersen, "Math and the Internet" by Prof. John Orr, and "Pythagorean triples" by Prof. Larry Brown of Purdue University. In February of 2000, PME held its second annual "REU information session", which explains Research Experience for Undergraduates (REU) programs, as well as Study Abroad programs. Part of the information session involved PME members talking about their own experiences in these programs. At the end of the summer, three members of PME spoke at the PME/MAA Summer Meeting, held at UCLA in conjunction with the Mathematical Challenges of the 21st Century conference. Dorea Claassen spoke on "The Bandwidth of a Random Graph" in an MAA session, while Dzuang Nguyen spoke on "An Adaptation of the Improved Euler's Method for 2-Dimensional Hamiltonian Systems" and Michelle Swenson spoke on "Pricing the American Call Option" in PME sessions. In the fall of



The Math Mayhem Challenge winners: (front row, left to right) Libby Beer, Gerard Gjonej, Josh Bader; (back row) Jackie Anderson, Michael Menousek, Sandeep Pisharody.

2000, PME organized a bowling night in conjunction with the Undergraduate Women in Mathematics Network.

On November 18 of 2000, PME sponsored the True/False Math Mayhem Challenge, the first occurrence in what is hoped will become a yearly event. During the competition, contestants are posed a sequence of extremely difficult True/False mathematical questions and given 10 minutes to decide upon the correct answer. After two misses, a contestant is eliminated from the competition. Twenty-five students participated. For the 2000 Challenge, the winner was Jackie Anderson, who survived 12 rounds with no mistakes and won a \$100 prize. Josh Bader and Michael Menousek tied for the second prize. Additionally, Libby Beer, Gerard Gjonej and Sandeep Pisharody received prizes for finishing first in their respective classes. PME thanks the Math Dept. for providing prize money, Lucas Sabalka (president of the society) for organizing the competition and Professors Allan Donsig, Jamie Radcliff, and Mark Walker for writing the True/False questions used during the competition. The following are the first two questions of the contest. Try your hand at them.

**QUESTION 1.** Barry Bonds has a higher batting average than Mark McGwire in the first half of the season, and also a higher batting average than Mark McGwire in the second half of the season. **TRUE or FALSE** Mark McGwire might have a better batting average for the season than Barry Bonds.

**ANSWER: TRUE;** Barry Bonds could be 1 for 1 in the first half of the season and 30 for 100 after, while Mark McGwire could be 90 for 100 in the first half and 29 for 100 after.

**QUESTION 2. TRUE or FALSE:** Both of the numbers  $2^{2001} + 1$  and  $2^{2001} - 1$  are prime.

**ANSWER: FALSE;** the first number is divisible by 3.

## Visiting Scholars

As in the past, the Department of Mathematics and Statistics has benefited from the presence of a number of short and long-term visitors. Visiting researchers play a very important role in the intellectual life of the department, not only through their individual collaborations with our faculty, but through their seminar or colloquia presentations, and by just being around, poking their heads in people's doors and asking stimulating questions. During the period 1999-2001, we were pleased to host the following visitors:

**Byoung Soo Kim**, Yonsei University, Seoul, is working with David Skoug and Gerald Johnson from Feb. 2000 through Feb. 2001.

**Saibel Chattopadhyay**, Indian Institute of Management, Calcutta, is working with Partha Lahiri in Statistics for the academic year 2000-2001.

**Sugata Sen Roy**, Calcutta University, is also working with Partha for the 2000-2001 academic year.

**Mark Johnson**, University of Arkansas, Fayetteville, is on a post-doctoral fellowship and is working with the commutative algebraists for the academic year 2000-2001.

**Maria Tjani**, University of Arkansas, Fayetteville, is working with the operator algebraists for the present academic year also.

There have also been a number of scholars who visited our department for one or more weeks. These include:

**Steve Power** (Lancaster University, UK) and **Justin Peters** (Iowa State) visited the operator theorists over the past year.

**Brian Defacio** (U. of Missouri-Columbia) and **Yaoshang Yu** (U. of Kansas) visited Gerald Johnson in the Spring of 2000. Yaoshang Yu's visit was supported by a Big 12 Fellowship.

**Bilar Kaymacalan** (University of Ankara, Turkey) visited the differential/difference equations group during March and April of 2000.

**Hal Schenck**, an NSF Mathematical Sciences Postdoctoral Research Fellow (Harvard) was hosted by Brian Harbourne for about a week in April-May, 2000.

**Sarah Rees** (University of Newcastle, UK) was hosted by Susan Hermiller for about one week during the Spring of 2000.

**N. Verma**, Professor Emerita at the Tata Institute in India, worked with Brian Harbourne in September, 2000, and spoke in the algebra seminar.



## Mel Hochster gives 2000 Rowlee lecture

On April 27, 2000, the fourth annual Howard Rowlee lecture was given by Professor Melvin Hochster of the University of Michigan. Professor Hochster gave his talk, "Why prime numbers are useful", at the City Campus Union auditorium. He is widely regarded as the top researcher in the world in commutative algebra, is a member of the National Academy of Sciences, and was a recipient of the prestigious Cole Prize, an international award given every five years for distinguished work in algebra. (In fact, this prize was awarded primarily for his work on "big Cohen-Macaulay modules," which he presented in a week-long lecture series at UNL in 1974.)

The Rowlee Lecture Series was started in 1997 after Howard Rowlee, a Lincoln resident and friend of the department, made a generous donation to the University of Nebraska Foundation to support research in mathematics. Each spring the department seeks to bring to campus an internationally acclaimed scholar in the mathematical sciences to give an expository talk to a general audience about his or her field of mathematics. In previous years, the lectures have been given by Professor Efim Zelmanov of Yale University and winner of the Fields Medal, Professor Avner Friedman of the University of Minnesota, and Professor Bradley Efron of Stanford University. This year's lecture will be given by Professor Vaughan Jones of the University of California at Berkeley on April 20, 2001. Professor Jones is a recipient of the Fields Medal (the most prestigious prize in mathematics) and a member of the National Academy of Sciences. He has done pioneering work in many branches of mathematics, including knot theory and operator algebras. Details of the lecture and related activities can be found on the department's web site: <http://www.math.unl.edu>.

Each year the department has also sponsored a research conference in conjunction with the Rowlee Lecture. This past year the Centennial Celebration of Commutative Algebra was held during the two days following Professor Hochster's talk. Here, the word "centennial" has a double meaning: the birth of commutative algebra and the nascence of graduate education at UNL both occurred around 1900. By all measures CCCA was a huge success. There were eight plenary lectures of 50 minutes each, interspersed with sixteen 20-minute talks in several parallel sessions. The plenary speakers represented many of the top researchers in commutative algebra. In addition to Professor Hochster, the plenary speakers were Luchezar Avramov (Purdue), Dale Cutkosky (Missouri), Craig Huneke (Kansas), Paul Roberts (Utah), Christel Rotthaus (Michigan State), Hema Srinivasan (Missouri), and Irena Swanson (New Mexico State). The conference attracted over 60 participants from all over the United States and Europe. In addition to support from the Department of Mathematics and Statistics, funding for the conference came from the Discrete, Experimental and Applied Mathematics Initiative of the College of Arts and Sciences, the UNL Research Council, and the Centennial Celebration of Graduate Education, Research and Creative Activity fund.



Mel Hochster (left) with Howard Rowlee.

## Department fields Putnam team

The Putnam Team for UNL continued its tradition of success by placing 40th among all universities in the United States and Canada competing in the 1999 William Lowell Putnam Mathematical Competition. The Putnam competition is a six-hour exam held on the first Saturday in December each year and consists of twelve notoriously difficult problems in mathematics. The top scorers among UNL students for the 1999 exam were Gerard Gjonej (21.9 points), Fei Peng (21.9 points), Jaclyn (Kohles) Anderson (20 points), and Gopi Shah (20 points). Gerard and Fei placed in the top 10% among the more than 2,000 students taking the exam — this is especially impressive given that they were both freshmen at the time of the exam!

The results from the 2000 Putnam exam are not available yet, but given that three out of the top four scorers from the 1999 squad returned for 2000, we are optimistic for another successful year. Those participating in the 2000 competition engaged in weekly practice sessions in which students displayed their ingenuity in problem solving while enjoying pizza and soda.

Try your hand at the following problem from the 1999 Putnam exam:

### PUTNAM Problem

Let  $p(x)$  be a polynomial that is non-negative for all  $x$ . Prove that, for some  $k$ , there are polynomials

$$f_1(x), \dots, f_k(x)$$

such that

$$p(x) = \sum_{j=1}^k (f_j(x))^2.$$

See page 15 for the solution.



## Department adds three new faculty members

Since 1999 three new tenure-track faculty have joined our department: Professors George Avalos, Mark Brittenham and Trent Buskirk.

**George Avalos** grew up in San Antonio, earned his B.S. and M.S. degrees in Mathematics at the University of Houston, and obtained his Ph.D. in Applied Mathematics from the University of Virginia in 1995. During 1995-96 he was a Postdoctoral Fellow at the Institute for Mathematics and Its Applications at the University of Minnesota. From 1996-2000 he held the position of Assistant



George Avalos

Professor of Mathematics at Texas Tech University. In addition, he was a summer visitor at the School of Engineering at the University of Exeter (U.K.) in 1997 and 1998. He joined our department in August, 2000. Among the honors he has received is the 1995 Society for Industrial and Applied Mathematics Student Paper Prize for his paper, "The Optimal Control of a Problem in Structural Acoustics". His research interests include applied functional and numerical analysis, as well as control theory for partial differential equations.

**Mark Brittenham** grew up in Poughkeepsie, New York and received his B.S. degree in Mathematics at SUNY at Stony Brook (with highest honors), his M.S. degree in Mathematics from Cornell



Mark Brittenham

University and his Ph.D. in Mathematics from Cornell University in 1990. He then spent a year at the Institute for Advanced Study in Princeton, before spending four years as a postdoc at the University of Texas. He has held faculty positions at New Mexico State University, Vassar College,

the University of North Texas, and has most recently been a visiting professor here in our department. Mark's research focuses on low-dimensional topology, and in particular, the theory of knots. A visit to his office will find the walls and shelves lined with models and puzzles of a geometric flavor.

**Trent Buskirk** was born and raised in Jacksonville, Florida. He received his B.S. degree in Mathematics at Presbyterian College in Clinton, South Carolina and his M.S. in Mathematics at the University of South Alabama in Mobile. He then decided to pursue graduate work in statistics and received his Ph.D. in Statistics from Arizona State University in 1999 under advisor Sharon Lohr. He joined our department in August of 1999. He was chosen the Mortar Board Professor of the Month for February 2000. This year he has a Gallup Professorship. His research interests include nonparametric function estimation, statistical graphics, survey sampling, and statistics education.



Trent Buskirk

## Undergraduate news

We have many outstanding undergraduate majors in our department, some of whom are gaining national recognition.

Senior Jaclyn (Kohles) Anderson (Ralston High School) will receive the Alice T. Schafer Prize given by the Association for Women in Mathematics. (See story on page 1.) This prize is given to a single undergraduate woman in the U.S. for excellence in mathematics. Last year, she was given honorable mention for the same award. Jackie is truly a gifted mathematician whose career we will track with interest.

Dual Math.-Stat. and Computer Science majors Lucas Sabalka, Josh Brown, and Yixin Guo have recently won the regional ACM undergraduate programming competition. This is their second regional championship. The win allows them to advance to the

international competition held this spring in Vancouver, BC, with all expenses paid by the ACM. Lucas just started the 1st Annual True/False Math Mayhem contest this fall at UNL. Cash prizes are given out to the top two scores overall and to the first-place finishers in the freshmen, sophomore, junior, and senior divisions. (See related article on Pi Mu Epsilon's activities on page 8.)

The National Science Foundation has several programs to encourage undergraduates to pursue research careers in the sciences. The Summer Research Experience for Undergraduates (REU's) is one such program. Selection is competitive. In mathematics there are only 28 REU sites, each of which accepts around 6-10 students. NSF allows REU funds to be attached to individual faculty research grants to support one or two undergraduates. Last summer we had five students accepted into REU programs and three more students who received REU support from some of our own faculty's research grants. UNL also has a new program to support undergraduate research, the UCARE program. It is supported by the money UNL gets from the exclusive Pepsi contract on campus (a small consolation for Coke-lovers). Here is a list of the students who participated in REU or UCARE programs: Dorea Claassen (REU at E. Tenn. St.), Gerard Gjonej (summer internship with Microsoft Inc., and UCARE under Mark Walker), Liz Jump (summer internship in computer software), Jaclyn Anderson (REU under Roger Wiegand), David Milan (REU at Texas A&M), Michelle Swenson (REU at Colorado School of Mines), Hoai-Nam Tran (REU at Tennessee.), Ellen Veomett (REU at Oregon St.), Brian Wickman (REU at UNL in Computer Science), Deb Zadina (REU at UNL under Richard Rebarber). Many students are now looking over the REU sites for this summer. Hopefully we can be even more successful than last year.

Two of our May graduates wrote a thesis as part of their graduation with distinction: Mustafa Bashir and Hao Pham. Mustafa's thesis will be submitted to a journal for publication.

Gopi Shah and Mustafa Bashir were our Year 2000 Student Leader Alumni Award recipients. Both graduated in May. Gopi is now an actuary with Towers Perrin and Mustafa just started medical school. Lucas Sabalka and Brian Wickman both attended the intensive math program, MASS, at Penn. St. We just found out that Ellen Veomett will be go-



ing to Hungary in January to participate in the Budapest Semesters program. This is a competitive mathematical immersion program with a cultural attachment.

Here are some other notable undergraduate activities: we have several students who will be competing for NSF graduate student fellowship, three more applying for Goldwater scholarships, six who are now writing theses, and at least fifteen students preparing for the annual Putnam competition.

## Barb and Kathy join department staff

The new millenium has brought with it two new members to the department support staff. They are Kathy Schoonover, who



Kathy Schoonover

joined the office staff in February of 2000, and Barb Rolfes, who was hired as the administrative assistant for the Division of Statistics (a new position) last October. Kathy assists the Graduate Chair in the running of the graduate program. She also handles

purchase orders, assists faculty with travel arrangements, and helps coordinate conferences, seminars, and colloquia. She worked in the UNL Department of Actuarial Sciences for 10 years before joining our department.

Barb's duties are to assist the director of the Division of Statistics in the day-to-day business of running the Division, which is in the process of becoming a more autonomous academic unit. She has previously worked at UNL in the State Museum and in the Department of Mechanical Engineering.



Barb Rolfes

We welcome both Kathy and Barb to our department. We are very fortunate to have a truly outstanding and dedicated support staff who play an important part in our department's mission, and Kathy and Barb are two valuable additions to that staff.

## APPLAUSE for Lori and Mavis!

This year the College of Arts and Sciences initiated the Applause Awards to recognize outstanding staff members in the College. These awards are presented to staff members in recognition for their innovative ideas, outstanding performance, or service above and beyond the call of duty. Awardees, in addition to being recognized for their outstanding service, are given a cash award of \$200 and are listed on the college's website. In June, our very own Mavis Hettenbaugh and Lori Mueller both won Applause Awards. The award announcement began, "It is



Lori Mueller

unprecedented that two staff persons from a department are honored with successive Applause Awards". Mavis Hettenbaugh is the department's business officer and the chair's administrative assistant. An excerpt from her nomination letter reads: "It is an understatement to say that the faculty, staff and students in mathematics and statistics depend upon Mavis Hettenbaugh. She runs the department office, she is responsible for all department PAFs, she is the department's business officer, the chair's administrative assistant, and she is never too busy to stop and help a student or faculty member who has a problem. For 12 years everyone in Mathematics and Statistics has known they can count on Mavis. She arrives at 7:00 a.m. and often works into the evening. Mavis can also be found at work on many Sundays because she is dedicated to meeting the needs of the department." Mavis is an expert on how the

university works and how to get things done. In recent years faculty and staff outside the department have also benefited from Mavis' knowledge of the university and how to get tasks accomplished.

Lori Mueller is a member of the office staff. Much of her time is spent on the day-to-day operations related to the undergraduate program. Her normal duties include supervising the student workers, handling department telephone calls and visitors, helping direct students who come to the department office, and managing undergraduate instruction supplies. Lori does all the logistical support and arrangements for our annual Math Day, which brings about 1,200 high school students from 100 high schools across the state to campus on a single day. (This is a monumental task, and she pulls it off without a hitch.) She also helps to coordinate all of the information about Math Placement Exam results for students, together with all of the requests for entrance into closed course sections, and helps to make sure hundreds of students are in the right classes. She also does design work and desktop publishing for posters and brochures to support department programs and conferences. Her nomination letter reads "The office has run very well since Lori arrived. For most people (students, faculty, staff) visiting our department, Lori is the first face they see. And Lori has enough expertise that for many people, she's the *only* person they need to deal with."

Lori is also currently working towards a degree in business administration, and as this newsletter goes to print, we have just received word that Lori has won a *second* Applause Award.

The faculty know that when they need help, they can always count on Mavis and Lori. They are always there, willing and able to help, no matter how busy they are. (Their cheerfulness is even extended to those of us who procrastinate until the last minute!) Congratulations to Mavis and Lori!



Mavis Hettenbaugh



## Recent Ph.D. Graduates

In 1999 the following eight students received their Ph.D.s from our department.

**Daryl Bell** (advisor: Bo Deng) is a Research Assistant Professor in the Environmental Remote Sensing Laboratory in the Department of Electrical Engineering at UNL. The title of his thesis was *The Uniform Bifurcation of n' Front Traveling Waves in the Singularly Perturbed FitzHugh-Nagumo Equations*.

**Tim Deis** (advisor: John Meakin) is an Assistant Professor at the University of Wisconsin, Platteville (yes, a Minnesota Viking fan living in Packerland). His thesis was titled *Equations in Free Inverse Monoids*.

**Paul Gierke** (advisor: Tom Shores) is a senior analyst at ALPHATECH, a systems engineering and software development firm which is a spinoff from MIT and based in Boston. The title of his thesis was *Discrete Approximations of Differential Operators by Sinc Method*.

**Lance Nielsen** (advisor: Jerry Johnson) is an Assistant Professor at Creighton University in Omaha. The title of his thesis was *Stability Properties of Feynman's Operational Calculus*.

**Tim Pollis** (advisor: Jamie Radcliffe) is an Actuary for Towers-Perrin in Boston. In January 2001 he will be transferring to their office in the Minneapolis-St. Paul area (leaving the Red Sox for the Twins?). The title of his thesis was *Notes on Hamilton Paths and 2-Factors in Self-Complementary Graphs*.

**Krista Taylor** (advisor: Bo Deng) is an Assistant Professor at Shawnee State University in Portsmouth, Ohio. The title of her thesis was *Chaotic Attractors in One-Dimension Generated by a Singular Sil'nikov Orbit*.

**Rikki Wagstrom** (advisor: Steve Cohn) is an Assistant Professor at Calvin College in Grand Rapids, Michigan. Her thesis was titled *Well-Posedness of a Nonlinear, Nonlocal Problem Arising in Ion Transport*.

**Shu-Mei Wan** (advisor: Partha Lahiri) is an Assistant Professor at the Lunghwa Institute of Technology in Kueishan Taoyuan, Taiwan. Her thesis was titled *Jackknife Method in Small Area Estimation and Related Problems*.

During the period from January through August of 2000 the following five students received their Ph.D.s from our department.

**Iyad Abu-Jeib** (advisor: Tom Shores) is currently an Instructor in the Department of Computer Science and Engineering at UNL. The title of his thesis was *Frames in Hilbert Space and Matrices of Special Structure*.

**Mike Ira** (advisor: Earl Kramer) is an Assistant Professor at the University of Wisconsin, Platteville (an avid Green Bay Packer fan working on converting Tim Deis). The title of his thesis was *Steiner Trigraphical Designs and Block-Size Bounds*.

**Lisa Johnson** (advisor: Jerry Johnson) is an Assistant Professor at the University of St. Thomas in St. Paul, Minnesota. Her thesis was titled *The Effect of Time Changes on Feynman's Operational Calculus as Made Rigorous by Wiener and Feynman Integrals*.

**Graham Leuschke** (advisor: Roger Wiegand) is at the University of Kansas on an NSF postdoctoral fellowship - a very prestigious position for a new Ph.D. (see a related article elsewhere in this newsletter). The title of his thesis was *Finite Cohen-Macaulay Type*.

**Jane Meza** (advisor: Partha Lahiri) is an Assistant Professor in the Department of Preventive and Societal Medicine at the University of Nebraska Medical Center in Omaha. The title of her thesis was *Resampling Methods in Small Area Estimation*.

The following three students received their Ph.D.s from our department in December of 2000.

**Keith Agre** (advisor: Mohammad Rammaha) is currently teaching at Nebraska Wesleyan University in Lincoln. The title of his thesis was *Initial Boundary Value Problems for Nonlinear Wave Equations*.

**Elvan Akin** (advisor: Al Peterson) will be an Assistant Professor at Kocaeli University in Turkey. The title of her thesis was *Boundary Value Problems, Oscillation Theory, and the Cauchy Functions for Dynamic Equations on a Measure Chain*.

**Theresa Strei** (advisor: Mohammad Rammaha) is currently traveling and plans to run the Boston Marathon in April. Shortly thereafter she will start work at the National Security Agency in Maryland. The title of her thesis was *Global Regularity for Nonlinear Wave Equations*.

## Here and there with alumni

**Klaus Schmitt** (Ph.D., 1967) is a Professor of Mathematics at the University of Utah. This past spring, Professor Schmitt received the 2000 UNL College of Arts and Sciences Alumni Achievement Award for his outstanding professional accomplishments. He has published over 127 research articles, written two graduate-level textbooks, and is on the editorial board of several research journals. In addition, Professor Schmitt has been the Ph.D. supervisor for 12 students and been continually funded by federal research grants from 1967-1997, with the exception of two years while he served as Department Chair. Since 1990, he has given invited lectures at various universities in Mexico, Canada, England, Germany, Poland, Belgium, Greece, Vietnam, Taiwan, Korea, Chile and the U.S.

**Kim Gattis** (B.S., 1978) is president of the Association of State Supervisors for Mathematics. She is also a mathematics education program consultant for the Kansas State Board of Education.

**Scott Annin** (B.S., 1995) is pursuing a Ph.D. in noncommutative ring theory at the University of California-Berkeley. His advisor is Professor T.Y. Lam.

**Robert Jajcay** (Ph.D., 1995) is in his fifth year on the mathematics faculty at Indiana State University and has recently received an early promotion to the rank of Associate Professor. Robert recently received the "Educational Excellence Award" from ISU.

**Melissa Berta** (M.S., 1996) is teaching mathematics part-time at a community college in southern California. Her two children, Joey, a sixth-grader, and seven-year-old Lisa, keep Melissa very busy as well. Joey plays the flute and Lisa is into gymnastics; both are avid soccer players too.

**Renee Cooper** (M.S., 1996) has accepted a full-time faculty position in the Mathematics Department at Arizona Western College in Yuma, AZ. Renee had taught part-time at AWC this past spring and summer. She began her new position in August.

**Stephanie Fitchett** (Ph.D., 1997) is in her second year on the faculty of Florida Atlantic University's Honors College in Jupiter, FL. Jupiter is in the recent political center of the universe: Palm Beach County,

*Alumni continued on page 17*



# Graduate Student Awards

Each year the department makes several cash awards to recognize outstanding achievements by graduate students. The awards mentioned here are for the 1999-2000 academic year. (The awards for 2000-2001 have not yet been announced.)

## Outstanding Qualifying Exam (\$700):

**Bill Wolesensky.** Bill is currently working on his Ph.D. under the direction of Professor David Logan.

## Outstanding First Year Student (\$500):

**Lois Goss.** Lois is currently in the Ph.D. program but has not yet chosen a field of specialization.

**Outstanding Teaching by a Graduate Student (\$500):** **Lisa Johnson and Theresa Strei.** Lisa received her Ph.D. in August under the direction of Professor Gerald Johnson and is now an Assistant Professor at the University of St. Thomas in St. Paul, MN. Theresa received her Ph.D. in December and has accepted a position at the National Security Agency. Her advisor was Mohammad Rammaha.

## Emeritus Faculty Fellowships (\$500):

**Elvan Akin, Justin James, and Bill Wolesensky.** Elvan received her Ph.D. in December. Her advisor was Professor Al Peterson. Justin is working on his Ph.D. in group and semigroup theory under the direction of John Meakin.

**Grace Chisholm Young and William Henry Young Award (\$600) :** **Patricia Nelson.** Patricia received her Ph.D. in com-

binatorics in December under the supervision of Jamie Radcliffe.

The money for these awards comes from a variety of sources. The Outstanding Qualifying Exam and Outstanding First Year Student Awards are funded by income from a donation made by Albert Candy many years ago. Candy received the first Ph.D. in mathematics from UNL in 1898 and was also Chair of our department from 1917 until 1934. The Outstanding Teaching by a Graduate Student Award comes from an Alumni Foundation Fund. In 1996 Professors Roger and Sylvia Wiegand established the Grace Chisholm Young and William Henry Young Award 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. The Emeritus Faculty Fellowship Fund was established in honor of the department's emeritus faculty. It is supported by contributions from current faculty and department friends Ernie and Kathy Haight.

Two graduate students from our department were also the recipients of College and Campus-wide awards:

## UNL Alumni Association GTA Award:

**Lisa Johnson.** This honor is given to a single graduate student at UNL for outstanding teaching. Lisa is the fifth graduate student from our department to receive this award in the past 12 years.

**UNL Alumni Association Graduate Research Assistant Award:** **Graham Leuschke.** This award honors a single gradu-

ate student at UNL for outstanding research. Graham is now an NSF Postdoctoral Fellow at the University of Kansas. (See related story on page 2.)

**College of Arts and Sciences GRA Award:** **Graham Leuschke.**



Bill Wolesensky and Lois Goss



Theresa Strei and Lisa Johnson



Patricia Nelson



Elvan Akin



Justin James



## Roger and Sylvia Wiegand win faculty awards

Professor Sylvia Wiegand was awarded the Chancellor's Award for Outstanding Contribution to the Status of Women this past spring. Until 1988 the only female faculty member of the Department of Mathematics and Statistics, Sylvia is a superb scholar who has received research funding from both the National Science Foundation and the National Security Agency. In 1991 she became the first member of our faculty to be given the honor of delivering an invited hour address at a meeting of the American Mathematical Society.

The Outstanding Contribution to the Status of Women Award recognizes her work, both locally and nationally, on behalf of women in mathematics. Sylvia has been



Roger and Sylvia Wiegand

a mentor to other women faculty, both in Mathematics and Statistics and in other departments on campus, and has organized several programs for women graduate students. The presentation noted that she was co-editor in 1980 of "Women in Science Careers Workshop Booklet" and recognized her recent two-year term as the National President of the Association for Women in Mathematics and her election to the Council of the American Mathematical Society. In her efforts to ensure that outstanding women mathematicians' contributions are recognized professionally, she has served as Chair of the AMS Policy Committee on Meetings and Conferences, as a member of the AMS Nominating Committee, and as co-chair of the "Task Force on the Climate for Women and Junior Faculty in the College of Engineering."

A second Wiegand in our Department also received recognition recently. Roger Wiegand, professor and current Graduate Committee Chair for the Department, received Honorable Mention in the spring of 1999 for the Graduate College's Excellence in Graduate Education Award. Roger, who has been on the faculty for 28 years, has built a strong record of accomplishment in research and distinguished service in our graduate program. He is the leading expert and most active and successful researcher in the representation theory of Cohen-Macaulay modules. His research has been funded by the National Science Foundation for 29 of the last 33 years and he is currently on his 17th NSF grant. He is an inspiring teacher who has now had nine Ph.D. students, with two more expected to finish within the year. One of his early students, Betty Midgarden who finished in 1978, has gone on to become the Provost of Moorhead State University, while his most recent student, Graham Leuschke, received a prestigious 3-year NSF Postdoctoral Fellowship which he is using at the University of Kansas. (See the article about Graham Leuschke on page 2.)

### Workshop continued from page 4

tures in Differential Delay Equations," by Prof. Ron Mathsen of North Dakota State University; "Trees and Symmetries," by Dr. Lisa Orlandi-Korner of Mathematics and Statistics; "Groups in Cryptology," by Prof. Spyros Magliveras of Computer Science and Engineering; "Numerical Semigroups and Commutative Algebra," by Professor Kurt Herzinger of The Air Force Academy; and "Survivor Analysis: An Introduction to TV Ratings and Random Sampling," by Professor Trent Buskirk of Mathematics and Statistics. On Friday evening, conference attendees were treated to a banquet held in the Regency Suite at the City Campus Union, followed by a panel discussion on "Opportunities in the Mathematical Sciences." The panelists were Steve Dunbar, director of the J.D. Edwards Honors Program at UNL and a professor in the Department of Mathematics and Statistics; Brenda Herzinger, who holds a Masters of Science in Mathematics from UNL and currently works for the Gallup Organization; Graham Leuschke, who received his Ph.D. in Mathematics from UNL this past summer and is an NSF postdoctoral fellow at the University of Kansas; John Reimnitz, who has an M.S. in Statistics from UNL and is also working for Gallup; Richard Sincovec, Chair of the Department of Computer Science and Engineering; and Judy Walker, professor in the Department of Mathematics and Statistics. Mathematics and Statistics

professor Roger Wiegand moderated the discussion. The banquet and panel discussion were followed by a gala party at the home of John and Glory Meakin.

On Saturday morning the workshop continued with talks in seven parallel sessions: *Analysis and Control Theory* (organized by Allan Donsig); *Combinatorics and Graph Theory* (Jamie Radcliffe); *Commutative Algebra and Algebraic Geometry* (Sylvia Wiegand); *Computer Science* (Byrav Ramamurthy); *Differential Equations and Applied Mathematics* (Glenn Ledder); *Groups and Semigroups* (Mark Brittenham); and *Statistics* (Taps Maiti).

Primary funding for the workshop was provided by DEAM ("Discrete, Experimental, and Applied Mathematics," a College of Arts and Sciences initiative) with additional support from the Department of Computer Science and Engineering, the J.D. Edwards Honors Program in Computer Science and Management, and the Department of Mathematics and Statistics. John Meakin, chief organizer of this year's workshop, said that while the workshop continues to grow in popularity, funding for future workshops is murky. "Funds from some of the sources for past workshops, particularly DEAM, will not be available next year," John said. "We are in the process of finding new sponsors so that we may continue to hold this highly successful workshop."



## Professor Mientka circles the globe as Director of IMO

The United States of America will host in July of 2001 the 42nd International Mathematical Olympiad (IMO) in Washington, D.C. Mathematics and Statistics Professor Walter Mientka recently accepted the position as the Executive Director of the Program.

The IMO is the premier international mathematics competition for high school students and it will bring to the USA more than 500 of the most talented high school age mathematicians from more than 80 countries. The American mathematics community will use this opportunity to promote the importance of mathematics for all students and to celebrate the accomplishments of our best and brightest students.

During the competition, students work individually over a two-day period on six challenging problems, presenting their solutions as essay-style proofs akin to those produced by research mathematicians. During the grading period (which extends over several days) the IMO students will be treated to American hospitality, visiting attractions in and around the Capital and experiencing American life and culture. At the closing awards ceremony, outstanding performances are honored by the awarding of gold, silver, and bronze medals to students scoring in the top half of the results.

As the host country, it is the responsibility of the USA, in addition to organizing the contest, to provide lodging, food, entertainment, and cultural activities for all the participants and team leaders during the approximately two weeks that they are in our country. For the participants, many of whom will become world leaders in math and science, the IMO provides a unique opportunity to build friendships with students from other countries, to exchange math-

ematical ideas, and to learn about other cultures, especially about the USA. For the American mathematics community, the IMO provides an opportunity to promote the importance of a strong mathematics education for all students—much like the Olympics are used to promote physical fitness for all—and to celebrate the outstanding achievements of our nation's young men and women in mathematics.

The 41st IMO was held last July in Korea and Professor Mientka in his role as Secretary of the IMO Advisory Board (IMOAB) reviewed the IMO venue and attended the event itself. During the IMO sessions the following events took place.

The Latvian Mathematical Society presented Professor Mientka with the 50th Latvian anniversary medal in recognition for his outstanding work with the Olympiad movement in other countries. In addition arrangements were made for him to have a personal audience with Kim Dae Jung, President of South Korea. President Kim was recently awarded the Nobel Peace Prize for 2000 for his work for democracy and human rights in South Korea and in East Asia in general, and for peace and reconciliation with North Korea in particular. He greeted Professor Mientka with the words "Dr. Mientka, Professor of Mathematics at the University of Nebraska in Lincoln."

Professor Mientka, who has experience as a Leader of the USA IMO team, Secretary of the IMO Advisory Board, and over



**Pan African Mathematics Olympiads Symposium, November 2000**

*From left to right, Monsieur Habib Ben Gamra, Governor of Kairouan, Monsieur Ahmed Friaa, Minister of Communications, Professor S. Toure, President de la Société Mathématique de Côte d'Ivoire and Professor A. Kuku from Liberia, President d'Honneur de l'UMA, African Mathematical Union, and Professor Mientka.*

20 years as Executive Director of the American Mathematics Competitions, was recently called upon by the African Mathematics Union to address the First Symposium on Pan African Mathematics Olympiads on November 6, 2000. The symposium was held in Kairouan, Tunisia. Representatives from 18 African Countries were present at the Symposium. Objectives of the Symposium included promoting more participation in Pan African Mathematics Olympiads that would ultimately lead to more African countries to participate in the IMO.

### Solution to PUTNAM Problem *(See problem on page 9)*

Proceed by induction on the degree of  $p(x)$ . If  $\deg p(x) = 0$ , then  $p(x)$  is a non-negative constant  $c$  and thus a square.

Suppose  $\deg p(x) > 0$ . Since  $p(x) \geq 0$  and  $p(x)$  goes to infinity as  $x$  does, it follows that  $p(x)$  has a global minimum  $c \geq 0$  at a some point  $r$ . Thus, the polynomial  $p(x) - c$  has a multiple root at  $r$  so that  $p(x) - c = (x - r)^2 q(x)$ . Hence  $p(x) = (x - r)^2 q(x) + c$ . Observe that  $q(x) \geq 0$ , for all  $x$ , and thus by induction  $q(x)$  is a sum of squares. Hence so is  $p(x)$ .



## Women's Undergraduate Math Network

The Women's Undergraduate Math Network (WUMN) is an organization that began in the fall of 1999 with the intention of bringing together all women undergraduates interested in mathematics. The club was founded by undergraduate math majors Taryne Walk and Dorea Claassen along with faculty advisor Wendy Hines. With over 20 active members, WUMN has been an integral part of the departmental life. The club meets biweekly and sponsors various department events throughout the year. Last year, the club sponsored a talk by Sylvia Wiegand, who spoke about her mathematician grandmother, Grace Chisholm Young, as part of the University's celebration of Women's History Month. This semester, the club has sponsored such events as a Fall Undergraduate Picnic, a talk on knot theory, and, in conjunction with Pi Mu Epsilon, a Departmental Bowling Night. The club also sponsors an outreach program where

club members volunteer their time to tutor at Culler Middle School.

The department has benefited in many ways from the activities of the club. Its events increase interaction among the undergraduates themselves (of both genders) and also between undergraduates and faculty. A good way to get word out about department news (such as new course offerings or job opportunities) is to tell WUMN. The club also generates good publicity for the department by sponsoring talks and participating in campus events like Big Red Welcome. The members of WUMN have benefited greatly from the camaraderie they have developed. They encourage each other, help each other with



Women's Undergraduate Math Network bowlers (left to right) Megan Sheets, Michelle Swenson, Taryne Walk, and Dorea Claassen.

homework, and discuss career plans or graduate schools. They also have lots of fun. Hats off to the Women's Undergraduate Math Network!

## Nebraska Conference for Undergraduate Women in Mathematics

The Second Annual Nebraska Conference for Undergraduate Women in Mathematics was held February 11-13, 2000. The aim of the conference is to give undergraduate women the opportunity to discuss their research experiences and to meet other women who share their interest in the mathematical sciences. The conference attracted approximately 70 undergraduate participants from as far away as Ireland and Puerto Rico, and 35 of these participants gave talks about their own research. Invited addresses were given by Professors Suzanne Lenhart from the University of Tennessee and Karen Uhlenbeck from the University of Texas. Two panel discussions rounded out the program. The quality of the talks was extremely high, and the students raved about the experience.

The conference began as a celebration of the Department's 1998 Presidential Award For Excellence in Science, Mathematics, and Engineering Mentoring. Forty-three students descended on Lincoln for the first conference, which occurred March 5-7, 1999. In addition to plenary talks by Professors Sylvia Wiegand from UNL and Carolyn Gordon from Dartmouth College and a panel discussion on graduate school, 25 of the undergraduate participants gave talks about their own research.

The Third Annual Nebraska Conference for Undergraduate Women in Mathematics will be held February 2-4, 2001. Professors

Jennifer Key from Clemson University and Alice Silverberg from Ohio State University will give invited addresses, and Lloyd Douglas from the National Science Foundation will also be in attendance.

The current members of the organizing committee for this conference are faculty members Allan Donsig, Wendy Hines, Lisa Orlandi-Korner, Richard Rebarber, Judy Walker, and graduate students Julie Berg and

Jackie Anderson. Professor Susan Hermiller was also on the organizing committee for the 1999 conference.



Some of the participants of the 2000 Nebraska Conference for Undergraduate Women in Mathematics, including Professors Lisa Orlandi-Korner of UNL (front left), Cheryl Olsen of Shippensburg University of Pennsylvania (back, far left), Roger Wiegand of UNL (far back) and Suzanne Lenhart of the University of Tennessee (second from right).



## Department holds first Recognition Banquet



The Department held its First Annual Recognition Banquet on April 25, 2000 at the Wick Alumni Center to honor the achievements of students and faculty. Over 40 undergraduates, 20 graduate students, 28 faculty and staff, and two alumni were honored. The banquet was organized by department faculty members Allan Donsig and Mark Walker. Pictured in the photo above are some of the undergraduate honorees along with chief undergraduate advisor Gordon Woodward. From left to right: (1st row) Ned Hummel, Hao Pham, Kathy Lewis, Kim Vance, Gopi Shah; (2nd row) Mustafa Bashir, Brian Oppliger, Woodward, Matt Nabity.

### Alumni continued from page 12

FL. Stephanie reports that things were "a bit tense... conversation is ALL politics."

**Mark Petersen** (M.S., 2000) is pursuing a Ph.D. in climate modeling at the University of Colorado at Boulder. His research group is developing a regional climate model of the Arctic. Mark is in charge of creating a new multi-grid boundary layer program which will be the basis for an improved version of the model. He tells us that his courses in applied math and numerical analysis at UNL are serving him well, as topics such as partial differential equations and finite difference methods appear repeatedly in his atmospheric science courses. **Do you have information you'd like to share with us? Drop us a note or send an email to [tmalley@math.unl.edu](mailto:tmalley@math.unl.edu) or [jlewis@math.unl.edu](mailto:jlewis@math.unl.edu).**

## Graduate Student Seminar

"We have delicious UNL cookies!" is the cry that goes out every Wednesday at 3:30, attracting graduate students and even the occasional faculty member to the weekly Graduate Student Seminar (GSS). Thanks in no small part to the leadership of graduate student Jo Hoffacker, this year's seminar is more popular than ever. The GSS strives to have something of interest for everyone. Not only are there advanced graduate students giving talks about their research but also faculty talking about what got them interested in their areas. Topics such as climate modeling, data compression, and graded rings have been discussed. We even had Laurie Bellows from the Teaching and Learning Center speak about using student assessment to improve teaching. In the spring GSS hosts the annual "Job Hunt Seminar," which always gets rave reviews. A select panel gives tips on looking for jobs, what to look for in the job ads, and how the whole job hunt process works.

The Math and Statistics newsletter is published by the Department of Mathematics and Statistics, University of Nebraska-Lincoln. Story ideas, activities, and achievements can be submitted by sending an email to [tmalley@math.unl.edu](mailto:tmalley@math.unl.edu) or [jlewis@math.unl.edu](mailto:jlewis@math.unl.edu). The newsletter is available at the Mathematics and Statistics web site: <http://www.math.unl.edu>. Departmental links, information on the Math graduate program and department events are also available.

Tom Marley, Editor

Lori Anderson, Layout, Arts & Sciences Publications  
Mathematics and Statistics faculty and staff also contributed.



University of Nebraska-Lincoln  
An equal opportunity educator and employer  
with a comprehensive plan for diversity.



## Mathematics & Statistics

College of Arts & Sciences  
University of Nebraska-Lincoln  
810 Oldfather Hall  
Lincoln, NE 68588-0323



Non-profit  
U.S Postage  
PAID  
Permit 46  
Lincoln, NE

**Nebraska**  
UNIVERSITY OF NEBRASKA - LINCOLN

### **VISIT US ON THE WEB**

Check out the Department of Mathematics and Statistics  
web page on the Internet: <http://www.math.unl.edu>  
Here you can find a list of our current faculty, course  
offerings, departmental events, and more.