Winter 2011

Math News

A publication of the Department of Mathematics at the University of Nebraska–Lincoln

VIEW FROM THE CHAIR

John Meakin

The year 2011 has been one of opportunities, challenges and successes for the Department of Mathematics and indeed for the University of Nebraska-Lincoln. In what seems destined to be one of the most significant events in the history of the university, UNL became one of the 12 members of the Big Ten (as opposed to one of the 10 remaining members of the Big 12).

This move is much more than a change in athletic conference for the university. UNL joins an elite group of institutions with a seat on the Committee on Institutional Cooperation, the academic arm of the Big Ten. Our university and our department enjoy a new set of colleagues, opportunities, and expectations. There is a great deal of energy, optimism and confidence on campus, and expectations of growth and additional success throughout the university are evident. Our department and indeed the

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Curto wins noted Sloan Research Fellowship

Carina Curto, assistant professor of mathematics, has been selected for a Sloan Research Fellowship for her research in the field of mathematical neuroscience. This two-year fellowship awards Curto $50,000 to put toward her research.

"I was thrilled to receive the news," Curto said. "This award will benefit my research significantly, especially because of its flexible nature. I greatly appreciate all those who supported me in my nomination, as well as my close collaborators."

The Alfred P. Sloan Foundation, which announced its newest recipients on Feb. 15, 2011, awards 118 Sloan Research Fellowships each year, bringing total grants in the program to $5.9 million annually. The fellowships seek to stimulate fundamental research by early-career scientists and scholars of outstand-

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A tribute to Meakin's leadership

As this edition's View from the Chair addresses, John Meakin, after eight years of serving as Department Chair, will be handing over the reins as chair to Judy Walker. In honor of his dedicated service, we wish to highlight some of the contributions Meakin has made to the department and thank him for a job well done.

Much like the mark of a good pilot is an uneventful flight, the mark of a good department chair is when faculty members remain oblivious to the work that it entails. The most important aspect of the job is to ensure that faculty members feel encouraged and well supported, enabling them to perform at their very best.

Professor of Mathematics David Pitts, who came to UNL in 1986, said, "Administration is a huge job. John takes care of that, and it insulates the rest of us. While the work is a burden on the chair, done effectively it helps the entire department."

As a result, much of the work is behind the scenes, making Meakin's hard-working and selfless nature among his greatest attributes as chair. This became apparent almost im-

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INSIDE:

Department News

Leavitt's work builds foundation for exciting new area of research

The Winter 2010 Math News contained an article describing the outstanding contributions and accomplishments of UNL's Commutative Algebra group. But don't get the wrong impression — UNL's non-Commutative Algebra community is having quite a worldwide impact too.

Here's some mathematical background. If you think back to your Intro to Modern Algebra Math 310 course, most likely all of the rings you saw as basic examples have what's known as the "Invariant Basis Number" property. This means that if you have a finitely generated free module M over R (the moral equivalent of a finite dimensional vector space over R), then any two bases for M must have the same number of elements. Thinking back even further, you probably saw a proof of this fact in your introduction to linear algebra course, in the case that R is the field $\mathbb{R}$ of real numbers. More formally, the Invariant Basis Number property for a ring R means that for every pair of positive integers m and n, if the free left R-modules ${}_RR^m$ and ${}_RR^n$ are isomorphic, then $m = n$. It is not too hard to show that not only does this IBN property hold for fields, it actually holds for all commutative rings, all (finite-sized) matrix rings over fields, and most, if not all, of the rings you saw in Math 310.

In 1962, UNL Professor William G. Leavitt wrote an article for the prestigious journal *Transactions of the American Mathematical Society*, in which he showed that there is a plethora of rings which do NOT have IBN. Specifically, Bill proved this:

Theorem. For any pair of positive integers m, n with $m < n$ and any field K there exists a K-algebra $L_K(m, n)$ with the following properties: for each positive integer $i < m$, and each positive integer $j \neq i$, the free left R-modules ${}_RR^i$ and ${}_RR^j$ are not isomorphic; on the other hand, for each positive integer $i \geq m$, the free left modules ${}_RR^i$ and ${}_RR^j$ are isomorphic precisely when $i \equiv j \pmod{n-m}$.

In 1962, UNL Professor William G. Leavitt wrote an article for the prestigious journal Transactions of the American Mathematical Society, in which he showed that there is a plethora of rings which do not have the "Invariant Basis Number" property. In the past seven years, his work has received much attention, and these algebras are now called Leavitt path algebras in honor of his foundational work in the area.

COURTESY PHOTO

Less formally, what Professor Leavitt's Theorem shows is that, in the context of isomorphisms between free modules, *anything that can happen, does happen*.

Over the next three-plus decades this interesting work received somewhat modest attention in the mathematics community. But in the past seven years, the attention level surrounding these algebras has risen from modest to intense. Here's why: In 2004 a handful of algebraists came up with a construction which associates with any finite directed graph E and field K a K-algebra, denoted $L_K(E)$, whose definition is based on the configuration of vertices and edges in E. As it turns out, if you start with the directed graph R_n having one vertex and $n \geq 2$ loops based at that vertex, then $L_K(R_n)$ is precisely the algebra $L_K(1,n)$ that Bill Leavitt constructed and investigated back in the 1960s.

These newfangled algebras are called *Leavitt path algebras* in honor of Bill Leavitt's foundational work in the area. (Yes, the L in $L_K(E)$ stands for 'Leavitt'.) Many mathematicians throughout the world have been focused on these $L_K(E)$ algebras for the past seven years. Interest in them comes not only from the noncommutative algebra community, but from the operator algebra community as well, because there is an intimate connection between Leavitt path algebras with coefficients in the complex numbers $K = \mathbb{C}$, and analytic structures called *graph C^*-algebras*.

During April 2011 a pair of talks were delivered at UNL in which some of the current happenings in the field of Leavitt path algebras were discussed. How nice it was that Bill Leavitt, at age 95 and still going strong, could attend.

Professor Emeritus Leavitt's impact on mathematics research will endure well into the future.

— Gene Abrams, University of Colorado-Colorado Springs

CHAIR *From Page 1*

whole university has been engaged in an examination of all aspects of its mission, from curricular issues to research expectations to the role that we all play in society and in our discipline.

The department is also in the midst of a change in leadership. The current semester (Fall 2011) will be my last semester as department chair: Professor Judy Walker will assume this position effective January 1, 2012. Judy has had a huge impact on our department through her comprehensive view of research, teaching and educational outreach throughout her tenure on our faculty, and the department is excited about working with her as she takes on this important new role.

Judy Walker

The past year has seen additional growth in the national profile of the department. In January we hosted the 13th annual Nebraska Conference for Undergraduate Women in Mathematics, with more than 250 undergraduate women participating. In February we celebrated the announcements that Professor Carina Curto was selected as an Alfred P. Sloan Research Fellow for 2011 and senior undergraduate math major Zach Norwood was selected as UNL's first recipient of a Gates Scholarship to Cambridge University. In April we hosted the KUMUNU commutative algebra conference and the Rowlee Lecture by David Eisenbud, and in October we were pleased to host two more major conferences, the Fall Central Sectional Meeting of the American Mathematical Society, including the 2011 Erdos Lecture by Emmanuel Candes, and the Enacting Standards for Mathematical Practices Conference in mathematics education honoring the many contributions of Jim Lewis to the profession. These events are featured in this edition of Math News.

The year also marked challenges for the department with the retirement of three of our senior faculty – Ira Papick, Roger Wiegand and Sylvia Wiegand – and the pending retirement in January 2012 of two additional senior faculty (Lynn Erbe and Dave Skoug).

In other changes in Fall 2011, Jamie Radcliffe took over from John Orr as vice chair of the department, and Allan Donsig becomes vice chair in Spring 2012. Also, Susan Hermiller took over as graduate committee chair in Fall 2011 after Judy Walker.

While UNL has not experienced the kinds of draconian budget cuts that have occurred at many colleges and universities across the country in the past few years, the budget remained constrained and there were very few authorizations for faculty hiring in the university in 2011. Opportunities to appoint new faculty in the department are expected for the coming year, however, as the university's budget situation improves. This will be needed if the department is to maintain the momentum it has established in the past several years, and if it is to take advantage of the opportunities afforded by its rising profile and the university's move into the Big Ten.

It has been a real privilege to serve as department chair, working with a talented group of faculty, staff and students, and I am grateful for the support of the administration and friends and alumni of the department.

Continuing support from our friends and alumni is of crucial importance to the department. This support has a huge impact on the department's ability to carry out its mission. Just in the past year, generous donations have enabled us to provide many scholarships and awards to both graduate and undergraduate students, to honor and support outstanding faculty and postdoctoral scholars, to strengthen many aspects of our extensive educational outreach program, and most recently, with funds established by the late Mr. Howard Rowlee, to stabilize funding for an annual series of major public lectures by internationally prominent mathematicians.

Enjoy this newsletter, and please maintain contact with us and take advantage of opportunities to support the department in the years ahead.

MEAKIN *From Page 1*

mediately, when, shortly after he began his term as chair in 2003, Meakin was faced with the task of relocating the department from the eighth and ninth floors of Oldfather Hall to newly renovated Avery Hall, across the walkway to the west. Organizing such a feat is rather unglamorous and hardly seems like noteworthy work for a mathematician, yet its smooth coordination was incredibly important to the uninterrupted work of the department. Meakin forged ahead without complaint and the leadership he provided quickly set the tone for the next eight years.

One of the most notable areas of growth experienced by the department under Meakin's leadership is the graduate program. With encouragement and support from Meakin, the department was awarded federal funds for grants such as Mentoring through Critical Transition Points (MCTP), which supports IMMERSE and other programs (see http://www.math.unl.edu/programs/mctp/), and the continuation of GAANN (Graduate Assistance in Areas of National Need) grants from the U.S. Department of Education.

These programs have fundamentally altered the graduate program at UNL by contributing to a significant increase in the number and quality of applicants for graduate education and by bringing both national and international attention to the department. In 2004, there were 94 applications for acceptance into the mathematics graduate program; though this was already a respectable number, it steadily increased to reach 178 in the spring of 2011. The increase in the number of Ph.D.s (from just two and three in 2004 and 2005 to 10 and 11 in 2009 and 2010) awarded by the department during Meakin's tenure is also indicative of this growth, and shows

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LINDSAY AUGUSTYN/UNL CSMCE

New Teacher Network secondary teachers Katherine Norman (left) and Kelly Gomez Johnson speak with mathematics graduate teaching assistant Tom Clark in June 2011 in a geometry course. NTN is a component of the $9.2 million NebraskaMATH grant.

Enhancing math education

Department, CSMCE place priority on teaching issues in Nebraska

Across the nation, the University of Nebraska–Lincoln and its Department of Mathematics are known for their cooperative efforts between mathematicians and mathematics educators to improve mathematics education.

The department has taken the stance that issues related to mathematics education, whether it's the education of K-12 students, undergraduates or graduate students, are important for mathematicians to consider. There is a strong correlation between the mathematical education of students today and the availability of mathematics capable of advancing the field in the future. Despite this correlation, mathematics departments that value contributions to mathematics education are more the exception than the rule at research institutions.

The Mathematics Department's commitment to teaching and educational issues has not gone unnoticed. In 1998, the department was the recipient of two important awards: the University of Nebraska's university-wide (a four-campus system) Department Teaching Award, and the Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring, administered by the National Science Foundation. These and other awards were followed by a series of NSF grants, now totaling more than $20 million, for work partnering the Department of Mathematics, the Department of Teaching, Learning and Teacher Education, and K-12 schools in Nebraska.

LINDSAY AUGUSTYN/UNL CSMCE

Professor of Mathematics David Pitts (right) discusses a textbook with the Noyce Master Teaching Fellows in June 2011. NebraskaNOYCE is a six-year, $3 million grant from the NSF, supporting leadership development of teachers.

Also of note, the March 2011 issue of "Notices," the monthly periodical published by the American Mathematical Society, focused on issues related to mathematics education, and two of the seven related articles were authored or co-authored by faculty from UNL's math department.

Much of the effort from the department focuses on bridging UNL and K-12 schools through resources and grants coordinated by the Center for Science, Mathematics and Computer Education (CSMCE). Although the groundwork for a "center" was first laid in the late 1980s, the work of the center gained momentum in 1991, when mathematics professors Don Miller, Jim Lewis and Mel Thornton received a $4.47 million mathematics and science Statewide Systemic

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Initiative grant, which they were able to increase to $10 million by 1993. In 1995, the university continued to fund the CSMCE's efforts to bridge K-12 schools and the university into the next decade through Programs of Excellence initiatives Math and Science Teachers for the 21st Century (2002) and NU-Teach (2009).

Now, with support from UNL's Colleges of Arts and Sciences, Education and Human Sciences, and Agricultural Sciences and Natural Resources, the mission of the CSMCE is to support UNL faculty engaged in educational activities focused on improving the teaching and learning of science, technology, engineering and mathematics (STEM) at both the K-12 and collegiate level. The CSMCE supports a broad range of activities from outreach programs for K-12 students to professional development opportunities for graduate students.

Lewis, Aaron Douglas Professor of Mathematics, is the director of the CSMCE and has been the principal investigator for the prestigious NSF-funded grants Math Matters; the Math and Science Partnership programs Math in the Middle and Nebraska-MATH; and NebraskaNOYCE, part of the Robert Noyce Teacher Scholarship Program.

Lewis was honored on Oct. 22, 2011, at the Enacting Standards for Mathematical Practices (ESMP) Conference (see sidebar) at UNL, for his 40-year career contributing to mathematics and mathematics education.

"Jim's work has had an extraordinary impact on the lives of a very large number of students, teachers, professional mathematicians, mathematics teacher educators and many of the leaders in the profession at the national level," said UNL Department of Mathematics Chair John Meakin. "His work matters and he has had, and continues to have, a profound impact on mathematics education at all levels at UNL and on the national stage."

The department and CSMCE's NSF grants funding teacher education have worked to improve student achievement in mathematics across the

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HOLLIE SWANSON/UNL CSMCE

(From left) Plenary speakers Bill McCallum, Matt Larson and Sybilla Beckmann sit on the panel during the Enacting Standards for Mathematical Practices Conference Oct. 21-22.

UNL hosts national conference on current math education issues

Prominent leaders in mathematics education gathered in Lincoln on Oct. 21-22, 2011, to discuss one of the important issues in mathematics education in America today: the Common Core State Standards.

Released in 2010, the Common Core is a set of curriculum standards covering English, language arts and mathematics, based on what all American students need to know to successfully enter college or the workplace.

The Council of Chief State School Officers and the National Governors Association Center for Best Practices (NGA Center) led the Common Core State Standards Initiative (CCSS), working with a wide range of educators, content experts, researchers, national organizations, and community groups.

Their purpose is to provide a consistent, clear understanding of what students are expected to learn, no matter where they live, and are designed to be much more rigorous and relevant to the real world than current standards. Nebraska is not among the 45 states that have adopted them.

The Common Core Standards in Mathematics also incorporate what is referred to as Standards for Mathematical Practice. This portion of the standards focuses on the processes and proficiencies that mathematics teachers of all levels should seek to instill in their students. For example, "make sense of problems and persevere in solving them" and "reason abstractly and quantitatively" comprise the first two practices of the list of eight. For more information about the Common Core, visit http://www.corestandards.org.

The Enacting Standards for Mathematical Practices Conference hosted by UNL addressed issues surrounding these practices and the ways in which they can be enacted in teacher education and in K-12 classrooms. Bill McCallum, professor of mathematics of the Institute for Mathematics Education at the University of Arizona, who served as the lead author for the CCSS, was a plenary speaker at the conference.

"The conference brought mathematicians, education researchers, and teachers together for a well-balanced series of talks by local and national experts," McCallum said. "It was a wonderful conference: thought-provoking, great talks, lots of time for interaction, and lots of energy. It was the best meeting I've been to in a long time."

A total of 135 people representing 18 states attended the conference. Slides and handouts from the conference presentations, along with videos of the plenary sessions, can be found on the website: http://scimath.unl.edu/conferences.

For many who attended the conference, the highlight was a banquet honoring UNL's Jim Lewis, who has dedicated much of his 40-year career to improving math education. Teachers, educators and alumni alike thanked Lewis for his contributions.

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state of Nebraska. Some of the more prominent grants include:

• **Math in the Middle Institute Partnership, 2004:** Five-year, $5 million grant (with two $900,000 supplements) that was a partnership among educators at UNL, Lincoln Public Schools (LPS), Omaha Public Schools (OPS), and Nebraska's rural Educational Service Units (ESU), offered a two-year graduate program focused on improving middle-school student achievement in math and developing intellectual teacher-leaders who would affect change within their schools, districts and ESUs. In all, 170 teachers participated in the institute with 157 of them earning master's degrees.

LINDSAY AUGUSTYN/UNL CSMCE

Kristie Pfabe, UNL math department alum and professor of mathematics at Nebraska Wesleyan University, instructs a Math in the Middle course for Omaha Public Schools teachers in June 2010.

• **NebraskaMATH, 2009:** Five-year, $9.2 million NSF Targeted Math-Science Partnership to support a partnership among UNL, LPS, OPS, Grand Island Public Schools, Papillion-La Vista Public Schools and Nebraska's ESUs. The partnership works to educate and support students and teachers at critical junctures, continuing the goal of improving achievement in mathematics for all students. Department alums Michelle Homp and Wendy Smith are NebraskaMATH's program manager and research coordinator, respectively.

• **NebraskaNOYCE, 2010:** Six-year, $3 million Robert Noyce NSF grant supporting the Master Teaching Fellowship and the Teaching Fellowship. The Master Teaching Fellowships support the leadership development of 24 outstanding master teachers in high-need Nebraska schools, and the Teaching Fellowship provides talented STEM majors and professionals with an opportunity to become secondary mathematics teachers in high-need Nebraska schools.

• **Developing a Coherent Picture of Mathematics Teaching and Learning, 2011:** Three-year, $1.2 million NSF Research, Evaluation and Technical Assistance (RETA) grant to study the development of statistical models for analyzing relationships between mathematics teaching and learning and for interpreting student and teacher data in statistically productive and meaningful ways.

For more information about these and other grants, visit http://sci-math.unl.edu.

While these grant-funded programs go a long way to improve mathematics education in Nebraska, the Nebraska Math and Science Summer Institutes (NMSSI) is the CSMCE's effort to expand opportunities for mathematics teachers at all grade levels using local dollars.

"While we are pleased with success we've had in obtaining grants, teaching is the largest profession in the nation so there is still more work to be done," Lewis said. "In order to continue supporting mathematics teachers in Nebraska we are seeking corporate and private donations to help cover the costs of quality professional development and graduate education."

In Summer 2011, the NMSSI offered one- or two-weeklong courses for mathematics teachers in nine locations around the state. Teachers enjoyed reduced tuition from UNL and additional fellowships were available to cover the remaining tuition. In Summer 2012, the NMSSI courses will expand to 10 locations in Nebraska and will continue to offer financial assistance.

The CSMCE also coordinates outreach efforts through the mathematics department, including All Girls / All Math, IMMERSE and the Nebraska Conference for Undergraduate Women in Mathematics, programs outlined in the previous edition of Math News.

Since 2004, 13 faculty members and 47 graduate students from the UNL Department of Mathematics have taught or assisted with a course through Math in the Middle, NebraskaMATH, NebraskaNOYCE and the NMSSI. Nine faculty members from neighboring institutions have also served on instructional teams. Their support has been instrumental in the level of success achieved by these grants.

But the collaboration has been mutually beneficial. Graduate students have found the experience of teaching teachers to be very valuable. Many want to participate on an instructional team for a summer course for teachers and report that their experience was viewed by potential employers as a real plus.

For some, the experience has shaped the path of their careers. Christina Eubanks-Turner, who earned her Ph.D. from the math department in 2008, credits her opportunities to work with K-12 schools and teachers here at UNL with her current success in her position as Assistant Professor of Mathematics at the University of Louisiana–Lafayette.

Christina Eubanks-Turner

"The experiences I had as a graduate student have been invaluable to my career. In graduate school, when I found out about the work being done with the public schools it motivated me to work hard to successfully complete the requirements for the Ph.D. program. I knew I could one day start similar effective programs in the communities I so deeply care about," Eubanks-Turner said. "Since becoming an assistant professor in 2008, I have been a principal investigator on six externally funded education and outreach grants that focus on mentoring of undergraduates and professional development for teachers."

Faculty members also value the experience working with K-12 teachers. Mathematics Professor David Pitts, who taught the Noyce Master Teaching Fellows in the summer of 2011, said, "Teaching the Noyce fellows was my first chance to experience working with in-service teachers. I came away humbled by the experience and hopeful that they will affect real change in the schools in which they work."

CONFERENCE RECAPS

The algebra community who attended the 2011 Fall Central Sectional Meeting of the American Mathematical Society pose on the UNL campus during the Oct. 14-15 meeting.

441 attend AMS Meeting

The Math Department had the honor of hosting the 2011 Fall Central Sectional Meeting of the American Mathematical Society (AMS) on Oct. 14-15, 2011. This is only the third AMS meeting held at UNL; the previous meeting was in 2005, and the one before that was held in 1987.

This year's conference was well attended, with 441 official registrants coming from across the country and internationally. Of these 441 attendees, 324 gave talks. The talks were divided by discipline into 20 sessions, 11 of which had an organizer or co-organizer currently on the Math Department faculty with one further session organized by faculty at other institutions who were formerly graduate students of the Math Department and a poster session organized by two current Math Department grad students.

In addition there were three talks by internationally prominent mathematicians: Lewis P. Bowen of Texas A & M spoke on "Entropy theory for actions of sofic groups"; Alina Cojocaru of the University of Illinois-Chicago spoke on "Questions about the reductions modulo primes of an elliptic curve"; and Michael Zieve of the University of Michigan spoke on "The happy marriage between arithmetic geometry and dynamical systems."

A special highlight of the meeting was the 2011 Erdos Memorial Lecture, given by Emmanuel Candes of Stanford University, titled "Recovering the unseen: Some recent advances in low-rank matrix reconstruction." An enjoyable wine and cheese reception followed Professor Candes's stimulating talk.

One very enjoyable aspect of the meeting was the opportunity to meet up with the many people who came to the conference who have ties to the Department. Here is a (probably incomplete!) list of the current and former UNL faculty, post-docs, grad students and long-term visitors who either organized sessions or spoke at the meeting. The list also includes a few people who were not speakers but who have ties to the Department and came to take in talks or just to say hello:

Ahrendt, Chris; Ananthnarayan, H.; Anderson, Douglas; Atici, Ferhan; Avalos, George; Avery, Rich; Axvig, Nathan; Baeth, Nicholas; Berger, Heidi Feller; Bociu, Lorena; Brittenham, Mark; Celikbas, Ela; Celikbas, Olgur; Cooper, Susan; Christensen, Lars Winther; Curto, Carina; Dahal, Rajendra; Davis, Jennifer Everson; Denkert, Annika; Donsig, Allan; Duncan, Benton; Erbe, Lynn; Eubanks-Turner, Christina; Geisbauer, Joe; Gibbons, Courtney; Goodrich, Christopher; Grilliette, Will; Harbourne, Brian; Harmsen, Betty Jean; Hartke, Stephen; Hermiller, Susan; Higgins, Raegan; Henriques, Ines; Holay, Sandeep; Hummel, Livia Miller; Hummel, Ned; Itskov, Vladimir; Janssen, Mike; Johnson, Brian; Jia, Bao-Ping; Karr, Ryan; Kattchee, Karl; Kelley, Christine; Kilibarda, Vesna; Langdon, Jennifer; Leuschke, Graham; Li, Aihua; Lynch, Laura; McCune, David; McDonnell, Lori; Meakin, John; Milan, David; Moore, Frank; Morrison, Katherine; Peterson, Allan; Pitts, David; Radcliffe, Jamie; Radu, Petronela; Rahmati,Hamid; Rammaha, Mohammad; Sabalka, Lucas; Saccon, Silvia; Sapir, Mark; Sather-Wagstaff, Sean; Seceleanu, Alexandra; Sega, Liana; Sunic, Zoran; Takahashi, Ryo; Toundykov, Daniel; Veliz-Cuba, Alan; and Walker, Judy.

Credit for the meeting's success is thanks to the efforts of many faculty and graduate students and staff throughout the Department, but perhaps no one more than the Department's conference coordinator Marilyn Johnson, who assisted local liaison and faculty member Brian Harbourne in making arrangements for the meeting.

–Brian Harbourne

KUMUNU opens with Eisenbud lecture

KUMUNU is an annual gathering named for three hotbeds of commutative algebra – the universities of Kansas, Missouri and Nebraska.

Supported in part by the National Science Foundation, it began at KU in 1999 and moved to NU in 2005. The format consists of six to eight 45-minute expository talks on commutative algebra and related topics, such as representation theory and algebraic geometry. The roster of speakers typically consists of a balance of established spokespeople and talented youngsters, as well as a mix of regional and national experts.

This year's KUMUNU, organized by Research Assistant Professor Susan Cooper (now an assistant professor at Central Michigan University) and Professor Brian Harbourne, was held April 1-2, 2011. The speakers were Olgur Celikbas (Missouri), Calin Chindris (Missouri), David Eisenbud (Berkeley), Claudia Miller (Syracuse), Hal Schenck (Illinois), Sandra Spiroff (Mississippi), Mark Walker (Nebraska) and Roya Beheshti Zavareh (Washington University). An important KUMUNU tradition is the Saturday evening reception and dinner (held this year at the Wiegands' home), which allows participants to meet and establish mathematical connections in an informal setting.

On April 1, Eisenbud gave the 15th Annual Rowlee Lecture, providing a splendid opening for the KUMUNU conference. Many KUMUNU participants arrived in time to hear Eisenbud, a leading researcher in commutative algebra and algebraic geometry, and author of several widely used books on these subjects. He chose the title "Plato's Cave: Some things we know and some things we don't know about shadows on the wall." The name comes from a fictional dialog, described in Book VII

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Meakin's commitment to graduate education.

While the list of accolades and accomplishments for Meakin is vast, among those mentioned most frequently by faculty members are:

• **Department faculty.** Eleven new faculty members were hired while he was chair, including Carina Curto, a 2011 Sloan Research Fellowship award winner (see Page 1). Other strategic hires have enabled the department to assemble a world-class research group at UNL, particularly in the area of commutative algebra. There is heavy demand from students to gain admission to the graduate program in this area and a constant stream of top research visitors and postdocs attracted by UNL's research environment.

• **The growth of the postdoctoral program.** In 2001, the department obtained administrative approval to create a postdoctoral program to fully support three positions per year by seeking state funds. From 2003 to present, 11 individuals have served in these postdoctoral positions. In 2005, under Meakin's direction, the department was able to use private funds through the University Foundation to convert two of these positions into permanent, named postdoctoral positions: the Edith T. Hitz and Marilyn M. Hitz research assistant professors in mathematics.

• **Support for the mathematics undergraduate program.** The department is heavily committed to mentoring undergraduate research projects and to interacting with undergraduates. The department's MCTP grant has supported 11 undergraduate mentees and RUTE has supported 17 and 12 in 2011. Since 2001, 38 undergraduate research projects have been supported by UCARE, and math majors have had 33 REU experiences (14 at UNL and 19 away) and 14 internship experiences away from UNL. Moreover, approximately half of the Goldwater scholarships awarded in Nebraska, and around 80 percent of those at UNL in all areas of science and engineering, have been awarded to undergraduate mathematics majors at UNL. Six undergraduate math majors have won coveted NSF graduate fellowships and seven more have received honorable mention (one last year).

'John continued the upward trajectory of the department's success and national profile.'
- David Pitts

But the department's faculty members are not the only ones who have observed Meakin's successes as chair. Under Meakin's tenure, the UNL Department of Mathematics was the recipient of the prestigious AMS Award for an Exemplary Program or Achievement in a Mathematics Department in 2009. The award highlighted a broad spectrum of features for which the department was commended, including contributions to graduate education, undergraduate research, women in mathematics, the mathematical education of teachers and outreach. Since only four departments have ever received this award, it is a true testament to the leadership that Meakin has provided.

Being the humble leader that he is, Meakin is quick to give credit for the department's successes to other faculty members and often points out that the department already was experiencing much success when he became chair in 2003. However, as Gordon Woodward, Professor of Mathematics and chair of undergraduate mathematics education, said, "Continuing a strong department is no small matter. John was able to find support to help us continue to do our jobs, to do them better, and then to do even more."

Pitts concurred: "John continued the upward trajectory of the department's success and national profile."

"John has been a fantastic chair," Judy Walker said. "I am grateful both for the shape John has left the department in and for the advice John has given me thus far (and, I hope, will continue to give me) as I take over the reins."

The growth and success of the department since 2003 can be, whether in large part or small, attributed to him. Thank you, John Meakin, for a job that has been indeed well done.

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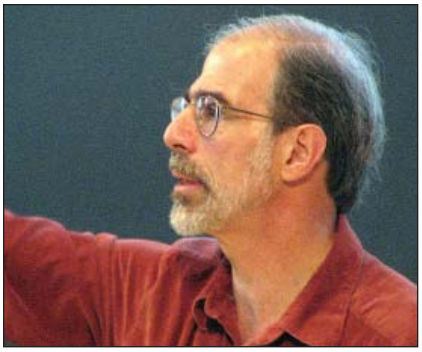
of Plato's *The Republic*, between Socrates and Plato's brother Glaucon. In the parable, prisoners are chained so that they can face in only one direction, toward a blank wall illuminated by a huge fire behind the prisoners. As events take place between the fire and the prisoners' backs, they see only the shadows and eventually accept the shadows as reality. Eisenbud's lecture asked how much of a higher-dimensional object can be reconstructed from its projection onto lower dimensions. Such questions are important not only in geometry but also in data analysis and elsewhere.

The Rowlee Lecture Series (http://www.math.unl.edu/events/rowlee) is made possible by a generous donation from the estate of the late Howard Rowlee, long-time friend of the Department. The lectures were established to promote public understanding of mathematical research and to stimulate the environment for mathematics research at UNL.



COURTESY PHOTO

David Eisenbud, University of California, Berkeley, gave the 15th Annual Rowlee Lecture on April 1, 2011.

The 15 Rowlee lecturers, representing a diverse cross-section of the mathematical sciences, are among the nation's most distinguished scientists. Eisenbud has served as President of the American Mathematical Society and Director of the Mathematical Sciences Research Institute. He has had 27 Ph.D. students, many of whom are also top researchers. His 78 mathematical descendants include five UNL Ph.D.s.

– Roger and Sylvia Wiegand

Grant provides math scholarships

While mathematics is often an entry point for students pursuing careers in STEM disciplines, it also can be a bottleneck that causes otherwise talented students to change their career paths. This is especially true of financially disadvantaged students.

The new Nebraska Math Scholars grant from the National Science Foundation aims to help alleviate this difficulty.

Led by Professor Richard Rebarber, the UNL Department of Mathematics was awarded the five-year, $600,000 grant in July 2011 to provide scholarships to financially disadvantaged students who major in mathematics at UNL.

"It can be quite challenging to be a mathematics major, and we're hoping that these scholarships can help clear a few roadblocks" said Rebarber, the principal investigator for the grant.

LINDSAY AUGUSTYN/UNL CSMCE

(From left) Nebraska Math Scholars PI Professor Richard Rebarber, scholarship recipient Jesse Epperson and graduate student mentor Brittney Hinds

Co-PIs on the grant are Assistant Professor of Mathematics Carina Curto, Associate Professor of Mathematics Stephen Hartke, UNL Director of Admissions Amber Hunter, and Professor of Mathematics Gordon Woodward.

The program goals of Nebraska Math Scholars are to:

• Recruit financially disadvantaged students who might not be able to attend college, or commit fully to their academics, without a scholarship;

• Increase the number of mathematics students in groups that are historically underrepresented in mathematics;

• Create a supportive academic and social community for Nebraska Math Scholars; and

• Provide challenging educational opportunities and enhanced mentoring to help the scholars succeed, thereby increasing retention.

See REBARBER *on Page 11*

RETIREMENTS

Lynn Erbe will retire at the end of the 2011 calendar year (effective January, 2012). Lynn is a graduate of our department, having obtained his Ph.D. under the direction of Lloyd Jackson in 1968. He spent a large part of his very distinguished career in mathematics at the University of Alberta where he was a member of the faculty from 1968 to 1996. He served as chair of the mathematics department at Alberta from 1987-1990. He was an Alexander von Humboldt Fellow at the University of Wurtzburg in 1974-75 and 1981-82, and he was awarded an honorary Doctor of Science degree from Concordia College in Minnesota in 1993. After a visiting position at Kuwait University, he joined the faculty in our department in 1997. Lynn retires as one of the most prolific research workers in the history of our department; to date he has published well over 200 research papers in the general area of ordinary differential equations and related fields. Since he joined our faculty, he has collaborated with Allan Peterson to build one of the foremost research centers in the country in the emerging field of dynamic equations on time scales: in this capacity he has had a major impact on the research and graduate programs in our department. Eleven of his Ph.D. students have graduated so far (seven of them at UNL – Jennifer Langdon, Bobbi Buckholz, Jacob Weiss, Heidi Feller, Reagan Higgins, Raj Dahal, and Chris Arendt), and he is currently advising six other Ph.D. students, one of whom will graduate this year: he will continue his research and his work in advising graduate students after his retirement.

Ira Papick retired at the end of the 2010-11 academic year. Ira obtained his Ph.D. from Rutgers in 1975. He held a position at Adelphi University from 1975 to 1978, at which time he moved to the University of Missouri. He was a member of the faculty at Missouri from 1978 to 2008, when he joined our faculty at Nebraska. Ira has had a distinguished career in mathematics with research interests in both commutative and homological algebra and mathematics education; he has published well over 50 papers to date and has been very active in editorial, refereeing and reviewing work and in presenting his work at a large number of professional conferences in his fields of interest. Ira has been extremely active in obtaining external funding to support

See RETIREMENTS *on Page 10*

RETIREMENTS *From Page 9*

his work in the mathematics education of teachers, both at Missouri and at Nebraska: he is co-PI on two large grants at Nebraska – the NebraskaMATH grant and the NebraskaNOYCE grant - and on several large grants at Missouri. In addition to the major impact that he has had through his research and grant activity, Ira is widely recognized as an outstanding teacher; he was named a Curator's Teaching Professor at the University of Missouri before he joined our faculty.

Dave Skoug will retire at the end of the 2011 calendar year (effective January 2012) after a long and distinguished career in mathematics at UNL. He has been a member of our department since 1966, when he joined the faculty after graduating with his Ph.D. from the University of Minnesota. He has had a major impact on the intellectual life of our department, and served as chair of the department from 1975 to 1983. Dave has published extensively, with around 90 published research papers to date in the general area of integration in function spaces, particularly Wiener and Feynman integrals. This is an area in which he is internationally known, with particularly close connections to many mathematicians in Korea working in this area. Dave has supervised three PhD students in this area (Robert Ewan, Tim Huffman, and Ian Pierce). In addition to his research and major service contributions to the department, Dave is widely recognized as one of the best teachers in our department. He has influenced the lives of thousands of students through his dedicated classroom teaching and advising; his teaching has been recognized by a Chancellor's distinguished teaching award, by an MAA sectional distinguished teaching award, and by recognition awards for contributions to students on 13 different occasions.

He has been very active as a member of the board of directors of the Rocky Mountain Mathematics Consortium and in the MAA, serving as sectional governor from 1984 to 1987.

Roger Wiegand retired as Willa Cather Professor of Mathematics in August 2011. He obtained his Ph.D. at the University of Washington in 1967 and was on the faculty at the University of Wisconsin from 1967 to 1972. He moved to Nebraska and joined the faculty in our department in 1972. He has held visiting positions at Purdue, Connecticut, and Wisconsin and was a general member at MSRI in 2003. Roger has had a profound impact on the development of the research and graduate program at UNL. He has published more than 75 highly influential research papers in commutative algebra and related fields to date, and his research has received near continuous support from NSF and NSA since 1968. He is prominent in his field, and has been in very heavy demand as an invited speaker, having given well over 100 invited lectures at prestigious conferences and colloquia in many parts of the world. He has been highly influential in building our commutative algebra group at UNL into one of the most prominent groups in the field worldwide. Roger has advised 16 graduate students who have completed their degrees so far (Thomas Fischer, Bette Midgarden, Bill Krauter, Bao Ping Jia, Nuri Cimen, Kurt Herzinger, Dave Jorgensen, Darren Holley, Graham Leuschke, Karl Kattchee, Ryan Karr, Nick Baeth, Andrew Crabbe, Olgur Celikbas, Silvia Saccon and Micah Leamer), and two more students are currently working under his direction. His has been a strong voice in support of graduate education in our department through his service as graduate committee chair for many years and as leader of our department's participation in the Carnegie Initiative on the Doctorate. He was recognized for his work with the university's excellence in graduate education award in 2001. He has served as PI on a series of GAANN grants to support graduate students in our department. He has also been very influential at the national level, through his editorial, refereeing and reviewing work, in the organization of many research conferences in his field, and in service on several committees of the American Mathematical Society.

Sylvia Wiegand retired as of August 2011. She obtained her Ph.D. in 1972 at the University of Wisconsin and accepted a position in our department that year. She has held visiting positions at Wisconsin, Purdue, Michigan State and Connecticut. She served as a visiting scientist at the National Science Foundation during the 2002-03 year. Sylvia is internationally known for her research work in commutative algebra and she has published more than 50 research papers in this field to date. Her research has been supported by grants from NSF and NSA and she has advised five Ph.D. students who have completed their degrees under her direction so far (Aihua Li, Serpil Saydam, Meral Arnavut, Melissa Lucas, and Christina Eubanks-Turner); she is currently advising one more Ph.D. student. Sylvia has been one of the most visible members of our faculty at the national level. She is in demand as an invited speaker at a large number of professional conferences in her field, and is nationally recognized for her work to encourage women to pursue careers in mathematics and science. She served as President of the Association for Women in Mathematics from 1997 to 1999 and has been heavily engaged in national professional service work through committees of the AMS, MAA, and AWM. She has been honored for her work on campus with many awards, including the Chancellor's Commission on the Status of Women Award in 2000.

Postdoctoral faculty

Alexandra Seceleanu

Postdoctoral fellow Alexandra Seceleanu was born and raised in Brasov, Romania. Before beginning her one-year appointment at UNL this fall, she received her bachelor's degree in mathematics and computer science from the University of Bucharest, Romania in 2005, and her Ph.D. from the University of Illinois at Urbana-Champaign in August 2011. Her research interest fit in the broad framework of commutative algebra and algebraic geometry. The methods she uses pertain to homological algebra, whereas the nature of the problems are often grounded in geometry. Alexandra is very happy to be at UNL, the thriving center (not only geographically) of commutative algebra in the U.S.

FACULTY PROMOTIONS & AWARDS

2011: Carina Curto, Alfred P. Sloan Research Fellowship; **Jim Lewis**, College of Arts & Sciences Academic Star; **Stephen Hartke**, awarded tenure and promotion to Associate Professor; **Jamie Radcliffe**, awarded Full Professor

CURTO *From Page 1*

ing promise. Twenty fellowships are allocated in the field of mathematics.

"Dr. Curto is an extraordinarily talented mathematician with a strong command of the literature in theoretical neuroscience and brilliant insights into completely new ways of applying a wide variety of mathematical ideas to problems in neuroscience and developing the mathematics needed to consider such problems," said John Meakin, professor and chair of the UNL Department of Mathematics, who nominated Curto for the award. "I am extremely pleased that she was named a Sloan Research Fellow, as this is an extraordinarily competitive award, involving nominations for many of the very best scholars of her generation from the United States and Canada."

'Dr. Curto's work has the potential to make a transformational impact on the field of theoretical neuroscience.'
- John Meakin

Originally from Iowa City, Iowa, Curto joined the UNL faculty in 2009 after earning her bachelor's degree from Harvard University and her Ph.D. from Duke University. She held postdoctoral positions at Rutgers University and New York University. Her research, funded by a three-year National Science Foundation grant, uses mathematics to improve understanding of how the brain works, especially at the level of information processing in neural circuits. Many neurological disorders such as autism, Parkinson's disease and schizophrenia are believed to arise from malfunctions in neural circuitry.

Curto said she has not yet decided how she will use the fellowship funds, but she said it would be related to her current research.

Once chosen, Sloan Research Fellows are free to pursue whatever lines of inquiry are the most compelling, and their Sloan funds can be applied to a wide variety of uses.

"Dr. Curto's work has the potential to make a transformational impact on the field of theoretical neuroscience," Meakin said. "She has been able to apply algebraic, geometric and topological methods to solve problems in neuroscience that appeared to be quite intractable, and her work is developing a mathematical framework for understanding the relationship between stimulus space structure and neural activity. She is rapidly establishing herself as one of the leading figures in this field, worldwide."

Past recipients of Sloan Research Fellowships have gone on to win 38 Nobel prizes, 14 Fields Medals in mathematics and eight John Bates Clark awards in economics. Established in 1955 to provide support and recognition to scientists, the fellowship program has supported more than 4,200 early-career researchers.

The Alfred P. Sloan Foundation, founded in 1934, makes grants to support original research and broad-based education related to science, technology and economic performance and seeks proposals for original projects led by outstanding individuals or teams.

- Lindsay Augustyn

REBARBER *From Page 9*

Nine scholarships were awarded for the 2011-2012 academic year. The students range from freshmen to seniors, hailing from Minnesota to Kansas. The program awards:

• 16 three-year scholarships, which target incoming students entering UNL as a result of program recruitment strategies;

• six two-year scholarships, which target qualified students who are already at UNL; and

• 10 one-year scholarships, which target advanced math majors within one or two years of graduation.

"The scholarship from Nebraska Math Scholars has enabled me to make connections with similarly motivated students and faculty, explore the career options available to me through mathematics, and understand what it means to be a Husker. As a freshman and one of the youngest Scholars, I have been able to learn the ropes of this university, so to speak, from the older students in the program," said Jesse Epperson, a scholarship recipient from Omaha.

The broader impact of Nebraska Math Scholars expects to increase the pipeline of talented students, especially in financially disadvantaged and underrepresented demographics, applying to graduate school or pursuing other careers in mathematics and other STEM disciplines and facilitate the development of a diverse mathematics and STEM community at UNL.

Alumni News

Math gives Rolle 'a bit of an edge'

Banking lawyer finds background of solving complex problems useful when negotiating deals

Everywhere she looks, Marty Traudt Rolle sees formulas.

As partner at an international law firm in London, Rolle finds her mathematics degree from the University of Nebraska-Lincoln gives her an advantage in negotiations.

"One of my associates said when I'm negotiating deals that I tend to turn things into formulas. If someone is making payments, or we are creating a profit sharing, or in using financial terms, it's obvious to me that the situation lends itself to a formula," Rolle said. "I get a bit of a negotiating edge because the other lawyers see the formulas and they say, 'Yes, that looks right,' but they don't always run the numbers to see if it actually works the way they expected. We *do* run the numbers."

Rolle, a 1974 alumna of UNL, went on to law school at the University of Colorado in Boulder and now, as a banking lawyer at Bryan Cave, represents lenders and borrowers in cross-border transactions and loans that have exceeded $15 billion in the aggregate. These loans are secured by a variety of collateral in more than 20 countries.

With more than 30 years of experience in complex financings, including project financings, asset-backed securitizations, repos, synthetic leases, cross-border financings, energy projects and vendor financings, she has advised clients in a broad range of industries, including sports and entertainment, film and media, oil and gas, mining, energy, real estate, railroad and telecommunications industries.

"Almost everything we do at Bryan Cave in London is cross-border. I do transactions involving three, four, five different countries, and I'm trying to make each piece fit together and dealing with each country's laws. Sometimes things have to be done in a certain order, and you have to have done all of these things in advance to get all of the pieces to come together. It's like a big puzzle, and I have to make sure I ask all of the right questions to make sure I can identify the problems. It's never boring," Rolle said.

Marty Rolle

Her mathematics background has served her well in her law career.

"It actually crops up in multiple ways, both in the way you approach the problem and sitting down with complex materials and working through them in an organized, logical fashion," Rolle said. "One of my law professors from Colorado said that he thought students with a mathematical background did disproportionately well at law school because of their logical minds."

COURTESY PHOTO

Rolle was the U.K. lead for the negotiations by the Anschutz Entertainment Group in the $500 million construction financing for The O2 Arena in London.

Rolle was one of the few female math majors at UNL in the early 1970s, but she said the environment was "not intimidating." Rolle was a Nebraska Career Scholar in Mathematics, which recognized undergraduate mathematics students who had the potential to go on to graduate school.

"I have very fond memories of being an undergraduate at Nebraska. Being a math major made me feel special. I felt I was working to achieve something," Rolle said.

She was friends with fellow Career Scholar Joe Mahaffy, now a professor of mathematics at San Diego State University, whom she originally met at Lincoln Southeast High School.

"She was a very cheerful person, bringing lots of energy to the Career Scholar office on the ninth floor of Oldfather Hall. Oldfather provided us with a friendly place to meet and work, with excellent contact with other faculty. I know we both felt the respect of the faculty helped us mature to our goals that have brought us to where we are today. Sylvia Wiegand provided a good role model for her," Mahaffy said.

Before making the move to London 12 years ago, Rolle lived in Denver for 20 years and was a partner at Holme Roberts & Owen. When the firm had an opening in London, Rolle volunteered to relocate. In 2002 while with Holme Roberts & Owen, Rolle was the United Kingdom lead for the negotiations by the Anschutz Entertainment Group in the $500 million multi-currency construction financing for the take over of The O2 Arena in London (formerly the Millennium Dome).

"It was fascinating to see how the government works over here," Rolle said. "They were threatening that if we didn't close the deal by a certain date in May, they would cancel all of the negotiations - and we closed on the last day possible. Since there wasn't any concert venue in London as sophisticated as the Staples Center in L.A., the local officials had trouble visualizing the type of arena we were describing, so we flew out to the Staples Center to show them what we were talking about. It was very challenging and a lot of work, but very exciting."

Rolle also has represented a corporate counterparty in the Enron bankruptcy that was party to interest rate

See ROLLE *on Page 13*

ROLLE *From Page 12*

COURTESY PHOTO

Marty Rolle and her husband, Alec, in Switzerland

swaps and power hedges with Enron, as well as a number of corporate counterparties on unwinding foreign exchange transactions in distressed circumstances. Rolle has been providing derivatives advice since the 1980s.

Rolle is a member of the Society of English and American Lawyers and attended the Women and Power: Leadership in a New World Executive Education at the Harvard Kennedy School in 2007. In 2009, she was recognized in The UK Legal 500 for her continued work in derivatives and structured products, and continues to be recognized in the UK Legal 500.

Rolle is married with two sons. Her oldest son is now a structural engineer, while her younger son will graduate from Swarthmore College in May - with a degree in mathematics. She has discovered with him that mathematics is a springboard to many different career paths.

"Math is an excellent background for many things. It takes a lot of discipline, and it's something that you have on your resume for life, showing you are someone who can tackle difficult issues, and you stick with it. It says a lot of things about you to employers," Rolle added. "I was just talking to an executive at a multinational consulting company, and he said they were desperate to hire more math majors."

For Rolle, her love for mathematics and her work have always been about a passion for putting the pieces together.

"Doing math is sort of like putting together a puzzle, and the deals I work on are like that too," Rolle said. "The work at Bryan Cave is exciting, challenging and complex. That's what keeps it interesting after all of these years."

– Lindsay Augustyn

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Class Notes

Find us on Facebook — UNL Department of Mathematics

Darren Holley (Ph.D. '97) is a mathematics teacher at Omaha North High School and has taught at the school for 29 years. In 2011, he won a $10,000 Alice Buffett Outstanding Teacher Award.

John Sweeney (BS '95) is a mathematics teacher at Geneva North High School in Geneva, Neb. John married Paige Lindstedt on July 16, 2011, at Tower Hall in Malcolm, Neb. Paige is a 1995 UNMC-Kearney College of Nursing graduate with a certification in Emergency Nursing and works at St. Elizabeth Regional Medical Center in Lincoln.

Read more Class Notes online and submit your news!

Student News

May graduate Norwood earns Gates Cambridge Scholarship

Zach Norwood of Papillion, Neb., a senior mathematics major who graduated in May 2011, became the first University of Nebraska–Lincoln student to win the Gates Cambridge Scholarship, and one of 30 in the United States in 2011.

Zach Norwood

The scholarship is for graduate study in any field at the University of Cambridge in England. The scholarship covers tuition, room, board, travel, and a student stipend.

Norwood traveled to England in mid-September. He will spend one year studying math at Cambridge. The coursework is designed to prepare students for research toward a Ph.D.

The Gates Cambridge scholarship was created in 2000 when the Bill and Melinda Gates Foundation donated $210 million to the University of Cambridge. The scholarship process identifies students who show leadership skills and want to better others' lives.

Norwood said he is excited to have the opportunity to study at Cambridge because it "is one of the best places in the world to study math," he said.

After he finishes studying at Cambridge, Norwood plans to attend graduate school, with the long-term goal of perhaps becoming a math professor at a research university.

UNL math professor Roger Wiegand said he is amazed by how quickly Norwood absorbs advanced material.

"He's one of the best students I've ever encountered," Wiegand said.

– University Communications

2010-11 UNDERGRADUATE PROGRAM AWARDS & FELLOWSHIPS

Chair's Prize
Awarded to the graduating senior with the strongest mathematics record
Zachary Norwood

Math majors who presented a thesis for A&S Degree with Distinction
Jonathan (Jay) Cummings (Christine Kelley, Highest Distinction)

Graduated with Honors from Honors Program: Kathryn DeJong (Allan Donsig, Distinction); Zachary Norwood; (Roger Wiegand, High Distinction); **Graduated with Honors (area of Honors Thesis):** Laura Badalucco (Biology); Justin Hicks (Raikes Senior Design); Ryan Hotovy (Physics); Tyler Lemburg (Math, Radcliffe); Calvin Luo (Computer Science)

Putnam Participants
(Mentors: Mikil Foss, Daniel Toundykov) Adam Azzam, Charles Beer, Sourabh Chakraborty, Kathryn DeJong, Alex Estes, Steve Emmel, Keler Marku, Corey Stone, John Stetson (team placed 127th)

UCARE Awards for Math Majors
Jonathan (Jay) Cummings (Math, Christine Kelley), Tyler Lemburg (Math, Jamie Radcliffe), Zachary Norwood (Math, Roger Wiegand), Michael Trogdon (Math, George Avalos)

Special Scholarships Awards (over $1,000 per year)
Note: 57 scholarships of $1,000 or more were awarded for 2011-12 academic year.

Dean H and Floreen G Eastman Memorial *(only available to Nebraska high school graduates)*
Jesse Epperson, Spencer Farley, Drenin Hingst, Joshua Mireles

Joel Stebbins Fund *(available to all)*
Susan Cooper and Karly Williams

Rennemann/Luebbers
(available to out of state students)
Emily Krumbach

Winchester Fund *(available to all)*
Nikolas Bravo

2010-11 GRADUATE PROGRAM AWARDS & FELLOWSHIPS

AAAS Mass Media Science & Engineering Fellowship
Melanie DeVries

UNL Outstanding Graduate Teaching Assistant Award
Courtney Gibbons
(Christopher Goodrich, honorable mention)

Maude Hammond Fling Fellowship
Christopher Goodrich

Grace Chisholm Young and William Henry Young Award
Derrick Stolee

Outstanding Teaching by a Graduate Student
Katie Morrison

Outstanding Qualifying Exam
James Carraher

Walter Mientka Teaching Award
Jason Hardin and Ashley Weatherwax

Outstanding First-Year Student Award
Nora Youngs

Emeritus Faculty Fellowship
Ben Nolting (Bill Leavitt Award), Joseph Geisbauer (Lloyd Jackson Award), Annika Denkert, Eric Eager

Chancellor's Doctoral Fellowship
Caitlyn Parmalee

Othmer Graduate Fellowship
Haydee Lindo

2010 Volterra Prize (Annual Ecological Society of America Meeting)
Ben Nolting

GAANN Trainees
Eric Eager, Courtney Gibbons, Kathryn Haymaker, Lisa Moats, Zach Roth, Ashley Sullivan, Ashley Weatherwax, Marcus Webb

MCTP Trainees
Advanced (Fall) - Laura Lynch, Zahava Wilstein; Advanced (Spring) - Katie Johnson, Katie Morrison; First-Year: Sarah Behrens, Lilith Ciccarelli

Degrees

Bachelor's degrees

2011: Austin Barnes, Charles Beer, Lauren Beitel, Casey Blaser, Anne Bradford, Shari Brockett, Suet (Shelly) Chan, Pao Cheah, Jonathan (Jay) Cummings, Kathryn DeJong, Justin Hicks, Derek Hollrah, Ryan Hotovy, Lingling Fan, Nicole Gaswick, Laila Gharzai, Tyler Lemburg, Wen Luo, Keler Marku, Benjamin McGill, Zachary Norwood, Brianna Pinquoch, Peter Schlette, Wei Seow, Nathanael Spaulding, Corey Stone, Daniel Wiechert, Jacob Williams, Brenton Willoughby

2010: Jessica Alley, Anas Bouzid, Eric Robbins, Heng Yik Seik, Wesley Botham, Wade Clement, John DeVol, William Echtenkamp, Caitlin Falcone, Amy Gehring, Amber Hansen, Eric Hoffman, Laura Janssen, Douglas Johnson, Hanieh Kamelian, Matthew James, Joseph Lach, Shirah Leedom, Amelia Martinez, Catherine May, Eric Norrgard, Frank Moonyoung Lee, Charles Lucas, Skye O'Hearn, Jonathan Olson, Patrick Olson, Grayson Path, Eric Price, Joshua Reed, Eric Robbins, Dennis Rogers, Andrew Ruhrdanz, Christopher Rummel, William Sanders, Jordan Schleif, Rachael Schultz, Aimee Schwab, Sarah Scofield, Andrew Severson, Autumn Shapland, Christie Shaw-Citta, Christopher Sheets, Jing Lit Soong, Christopher Starkey, Brian Stevens, Jeffrey Thomas, Mason Tye, Steven Trout, Andrew Wardyn, Dustin Walker, Robert Woodward

2009: Derek Augustine, James Carraher, Miranda Chrastil, April Christensen, Kyle Deterding, Jennifer Determan, Jordan Dudzinski, Matthew Duling, Andrew Hassing, Seth Hoffert, Kinsley Johnson, J. Travis Johnston, Robert Lindquist, Joshua Lindsteadt, Alan Mock, Charles Scherer, Kenneth Shum, Chase Taylor, Noah Weiss

2008: Robert Andersen, Stephen Anthony, Stephen Augustine, Ernesto Bartels, Julie Edeal, Joshua Epke, Brady Garvin, Julianne Harm, Scott Hottovy, Jeffrey Ifland, Imke Reimers, Lee Richert, Andrea Rohn, Kimberly Sanderman, Kyle Scheele, Amy Tentinger, Stephen Tetrault, Beth Ann Tidemann, James Wallace, Stephanie Walz, Aaron Wentzel, Jill Westcott, James Willcockson, Daniel Williams, Jaclyn Wray

2007: Kimberlee Blaha, Laurel Burk, Kristin Carney, Caleb Cassel, Christopher Corder, Jason Dinsmoor, Matthew Duling, Andrew Fiedler, Stephanie Gilbert, Shengije Guo, Victory Haines, Theang Ho, Phong Le, Christopher Meyerle, Daniel Morris, Adam Nordloh, Colin O'Keefe, Martin Perteet II, Yuliy Pisetsky, Reed Rawhouser, Danielle Rood, Edward Rubin, Sonja Schindler Kalkwarf, Gabriel Smith, Derrick Stolee, Kyle Strabala

Master's degrees

2011: Jay Beyer, Angela Blank, Danielle Buhrman, James Carraher, Katie Glacey, Kelly Gomez Johnson, Amy Gordon, Douglas Heltibridle, Lauren Keough, Kesha King, Kathleen Klein, Brian Kohlhaas, Kelly LaFleur, Sarah Larson, Susan Leavitt, Dianne Lee, Holly Liibbe, Eric Lockert, Katherine Norman, Anisah Nu'Man, Joseph Nuss, Pei Pei, Jennie Premer, Lauren Sipe, Meagan Stobel, Ashley Sullivan, Matthew Timm, Lynn West, Mary (Molly) Williams, Nora Youngs

2010: Tanya Archie, Pamela Arvie, Abigail Brackins, Amy Bystrom, Thomas Clark, Connie Colton, Patrick Derr, Melanie DeVries, Jonelle Dickmeyer, Jodie Emerson, Jason Hardin, Patty Hastings, Kathryn Haymaker, Mary Beth Kilnoski, Jessica Korth, Philip LaFleur, Phillip Landry, Jocelyn Masasi, Paula Jakopovic Millerd, Loretta Ohnemus, Sara Reynolds, Valerie Schovanec, Crystal Simpson, Kaelly Simpson, Lisa Vavra, Ashley Weatherwax, Andrew Wilkerson, Keri Witherell

2009: Manar Al-Suqaier, Teena Andersen, Chantelle Bicket, Katherine Bohac, Michael Bomar, Amanda Croll, Katherine Field Johnson, Jeremy Fries, Stephanie Fuehrer, Joseph Geisbauer, Courtney Gibbons, Michaela Goracke, Marlene Grayer, Nicholas Imholte, Michael Janssen, Scott Johnsen, Brian Johnson, Brian Kell, Michelle Looky, Sheila McCartney, Ryon Nilson, Ben Nolting, Marcia Ostmeyer, Margaret Pickering, Edith Ronhovde, Zach Roth, Lindsey Sample, Mary Schneider, Amy Solomon, Jessica Thompson, Michael Uhrig, Lexi Wichelt, Brandee Wilson, Xuan Ye, Anatoly Zlotnik

2008: Val Adams, Anna Anderson, Colin Anderson, Kathleen Ansaldi, Deborah Berg, JaLena Clement Slack, Kimberly Cotton, Sandy Dean, Anthony DeLegge, Justin DeVries, Jill Edgren, Monte Else, Alisa Favinger, Yanqiu Guo, Kacy Heiser, Cole Hilker, Julie Hoaglund, Michael Holm, Emy Jones, Emily Lashley, Diane Lunman, Mary McConnell, Katherine Morrison, Katie Pease, Jeremy Renfro, Amy Schutz, Bryce Schwanke, Tyler Seacrest, Michelle Sehnert, Marcia Smith, Aleksandra Stein, Derrick Stolee, Shelley Vlasin-Poore, Leah Wilcox

2007: Chris Ahrendt, Stacey Aldag, Nathan Axvig, Derek Boeckner, Patricia Buchanan, Jesse Burke, Lok Chow, Gary Eisenhauer, Kyle Fey, Shauna Green, Jessica Fricke, Susannah Go, Thomas Harrington, Firuz Kamalov, Chad Larson, Kristina Lund, Laura Lynch, Michael McCoy, David McCune, Lori McDonnell, Carmen Melliger, Maria Pierce, Emily Price, Daniel Schaben, Christina Sheets, Cindy Steinkruger, Shana Streeks Dick, Diane Swartzlander, Sarah Tekansik, Lindsey Thompson, Tina Thompson, Janet Timoney, Greg Vanderbeek

2011 Doctorates

DeVries, Justin *On the Rank of Multi-graded Differential Modules,* Srikanth Iyengar

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