THE WRIGHT MESSAGE

DEPARTMENT of MATHEMATICS

2012-2013

Dear Department Alumni and Friends,

We are pleased to bring to you, our alumni and friends, this year's edition of the Department of Mathematics newsletter, The Wright Message. We hope you will find it interesting and fun to read. As always, we welcome your comments.

This edition is a mixed bag of good and not so good news. The state budget cuts of over twenty-four million dollars in recent years and a looming five million dollar shortfall resulted in the closure of the Malcolm Price Laboratory School and the University Museum and the elimination of fifty-eight academic programs. Two tracks in our Professional Science Master's program were cut and our search to fill two mathematics education positions was terminated. We obviously would have preferred none of these things had happened, but, comparatively speaking, we were spared the worst of it. Our hope is that we will regain the positions we lost and, if that happens, our students will be largely unaffected by the events of this past year. We will keep our fingers crossed.

On the bright side, our students, faculty, and staff are firing on all cylinders.

In the 2011-12 academic year, 55 mathematics majors, 17 mathematics minors, and 44 elementary education majors with a mathematics minor (K-8) graduated. At the graduate level, six students received the M.A. in Mathematics degree and four completed the Professional Science Master's degree. One of our students won the Purple and Old Gold Award and five students were honored with Departmental Awards for Outstanding Scholarship and Service. Additionally, three of our students participated in summer undergraduate research programs, one in the department and the other two in Research Experiences for Undergraduates (REUs) at Illinois State University and Lafayette College in Easton, PA.

Our faculty members continue to excel, not just in the classrooms but also in research, and the results show. Dr. Bin Liu received tenure and promotion to associate professor; Dr Jihwa Noh spent her Professional Development Assignment (PDA) in South Korea in fall 2011; Dr. Mark Ecker and Dr. Marius Somodi received four-week summer fellowships, and Dr. Min Lee and Dr. Shangzhen Luo received eight-week

summer fellowships in 2012. Drs. Min Lee, Shangzhen Luo, and Michael Prophet will be on PDA in spring 2013.

Though we are generally a reserved, humble lot, not given to tooting our own horn, we simply cannot contain ourselves this time. Two of our alumni, Karla Digmann and Dr. Suzanne Shontz, received presidential awards, Karla in June 2012 and Suzanne in July 2012 (see the alumni spotlight section inside). We congratulate Karla and Suzanne on achieving these significant milestones in their careers. We are proud that they credit their success in part to the excellent education they received at UNI.

As in the past, we reached our high water mark in the department's ongoing efforts to promote mathematics to the larger campus and the Cedar Valley community with the Hari Shankar Memorial Lecture. This year's lecture was given by the internationally renowned academic and Pulitzer prize winning author of the book *Gödel, Escher, Bach: an Eternal Golden Braid*, Professor Douglas Richard Hofstadter. The lecture was funded by the Hari Shankar Fund, the

Department of Mathematics, and the Senate Speakers Series Fund. You will find more details on the lecture on the inside pages of this newsletter.
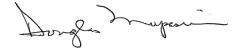
"When it rains, it pours". We have yet another retirement to report this year. After a tenure of service stretching all the way back to 1981, Dr. Larry Leutzinger retired at the end of spring 2012. We bid a warm farewell to Larry and wish him and his wife, Jacque, good health and much happiness as they embark on a new chapter in their lives.

Finally, we take this opportunity to remember our friend and colleague, Emeritus Professor Bonnie Litwiller, who died on January 27, 2012. Dr. Litwiller was a nationally renowned mathematics educator who cared deeply about her students and her profession. Her legacy will live on. By leaving a bequest of $1.5 million to the department to be used for mathematics education scholarships, Dr. Litwiller has made sure that in death, as in life, she will continue to touch the lives of students for many generations to come. Dr. Litwiller's collaborator, Emeritus Professor David Duncan, has generously agreed to write a memorial to Dr. Litwiller, which you will find inside the pages of this newsletter. Dr. Litwiller will be missed.
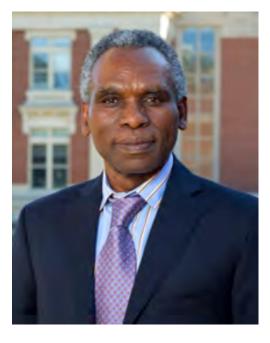
In the last edition of the Wright Message I expressed the hope that UNI's fiscal outlook would improve as the economy improved. As it turns out the economy, at least in Iowa, has indeed rebounded but, as I indicated in my earlier comments, the improvement has been slow to redound to our benefit. This means that our department, which even in the best of times depends heavily on the generous support of our alumni and friends, is in even greater need.

On behalf of the department, I wish to extend a heartfelt thanks to those of you who made contributions to our foundation accounts in the past year. All told, we received $1,106,258 between July 1, 2011 and June 30, 2012. Most of the money goes to fund scholarships, but some goes to accounts that cover other expenses (equipment, faculty and student travel, etc.). We are appealing for your help again this year. If you are able to, please use the enclosed form to direct your contribution to the appropriate account. Again, thank you for your support.

I hope this year has been good to you and that the coming year will be even better.

Douglas Mupasiri,
Professor and Head.

Department Head

After serving as Interim Department Head for two and a half years, Professor Douglas Mupasiri has been appointed Head of the UNI Department of Mathematics beginning on July 1, 2012.

Mupasiri joined the faculty of the UNI Department of Mathematics in 1993 as an Assistant Professor. He was promoted to the ranks of Associate Professor in 2003 and Professor in 2009. He was the coordinator of the UNI graduate program in pure mathematics for over 13 years and has taken leadership in increasing the number of underrepresented minorities in graduate programs in mathematics as part of the *Alliance for Graduate Education and the Professoriate* (AGEP) and *National Alliance for Doctoral Studies in the Mathematical Sciences* (NADSMS) programs funded by the National Science Foundation. His leadership experience will be a great asset to our department.

Around **Wright Hall**

Visitors

During the 2011-2012 academic year, the Mathematics Department hosted several visitors who collaborate with our faculty. Among them, Dr. Petre Ghenciu (University of Wisconsin-Stout), Professor Anant Godbole (East Tennessee State University), Professor Wolfgang Kliemann, (Iowa State University), Professor Philip Kutzko (University of Iowa), Jacob McCoy (FSA, MAAA, Principal Financial Group), Professor Dennis Schneider (Knox College), and Professor Jacek Wesolowski (Mathematical Institute, Warsaw University of Technology, Poland). All visitors gave colloquia that were attended by students and faculty.

UNI Students at **MUMS 2012**

Dr. Theron Hitchman and Dr. William Wood have facilitated the participation of several UNI students at the Midwest Undergraduate Research

Symposium (MUMS) organized in April 2012 at Simpson College. Among them, Duncan Wright gave a talk about the structure of the m-ary partition function, Jennifer Crumly presented a poster on a theorem of Conway and Gordon about links in embeddings of K6, and Jesse Moeller presented a poster on the bifurcation diagram of the quadratic family.

New Technology in **Wright Hall**

One of the classrooms in Wright Hall, WRT 119, used regularly for teaching classes in mathematics education, has received a nice technological upgrade: a MIMIO interactive whiteboard system. Among other features, the MIMIO system allows saving whiteboard notes and drawings on a computer for distribution to students in convenient formats and/or for being called up for multiple classes. With many schools already using MIMIO, this is a great addition for future teachers.

2012-2013 Tenure-Stream Faculty:

- Russell Campbell
- Mark Ecker
- Joel Haack
- Theron Hitchman
- Elizabeth Hughes
- Syed Kirmani
- Min Lee
- Bin Liu
- Shangzhen Luo
- Catherine Miller
- Douglas Mupasiri
- Glenn Nelson
- Jihwa Noh
- Vicki Oleson
- Olena Ostapyuk
- Michael Prophet
- Edward Rathmell
- Suzanne Riehl
- Karen Sabey
- Doug Shaw
- Marius Somodi
- Adrienne Stanley
- Olof Steinthorsdottir
- Brian Townsend
- Matthew Webb
- William Wood

New Faculty

Dr. Olena Ostapyuk

Olena Ostapyuk was born and raised in Kiev, Ukraine. She received her Bachelor's and Master's degrees in Applied Mathematics at the National Technical University of Ukraine in Kiev. She moved to USA in 2003 to work on her Ph.D. degree at Kansas State University. After completing her degree, she joined the UNI Mathematics Department as an Assistant Professor of Mathematics. Dr. Ostapyuk's research interests lie in the area of Complex Analysis, especially geometric approach to Complex Analysis. Her current research projects are about complex dynamics in the higher dimensional complex space. Besides teaching and working on her research, she likes surfing the internet, traveling, hiking, and spending time outdoors.

Dr. Karen Sabey

Karen Sabey received her Ed.D. from the University of Northern Iowa and is currently an Assistant Professor of Mathematics Education in the Mathematics Department of the same institution. Prior to this appointment, she was an adjunct instructor at Wartburg College and the University of Northern Iowa. Her K-12 teaching experiences included grades 7-12 mathematics and grades 3-8 computer science. Dr. Sabey's research primarily focuses on the mathematical understanding of preservice teachers. In her free time, Karen enjoys reading, sewing, traveling, and spending time with her family.

Dr. Olof Steinthorsdottir

Olof Bjorg Steinthorsdottir is originally from Iceland. She received her Ph.D. from the University of Wisconsin-Madison and is currently an Assistant Professor of Mathematics Education in the UNI Mathematics Department. Prior to her arrival at UNI, she was an Assistant Professor at the University of North Carolina. She studies the teaching and learning of mathematics in grades PreK-8. Her research interests include students' understanding of mathematics, especially their understanding of whole numbers, fractions and proportions, and how gender, class, race and culture impact students' learning experiences and achievement. In addition, she has conducted numerous Professional Development courses for elementary and middle school teachers focusing on Cognitively Guided Instruction (CGI). Dr. Steinthorsdottir is currently a PI of the project *Thinking Mathematically in the Middle Grades*, funded by the Iowa Board of Regents.

Dr. William Wood

After working in industry and in government for a few years after earning his M.A. at UC San Diego, William went to Florida State University for his Ph.D. and taught at small liberal arts colleges before coming to UNI. He enjoys many different fields of mathematics, but most of the problems he studies have something to do with geometry. He is particularly interested in questions that connect discrete phenomena to their classical continuous analogs, and he is always looking for ways to include undergraduates in his research. He is also interested in mathematical pedagogy, including technology in teaching, and inquiry-based learning. Dr. Wood is new to Iowa, but his wife Toni lived in the Quad Cities area for most of her life. His main hobby is playing board and card games of all kinds, mathematical and otherwise.

Retiring Faculty: Larry Leutzinger

by **Edward Rathmell**

Larry Leutzinger has been a classroom teacher, an AEA mathematics consultant at two different AEAs, and a professor of mathematics education at the University of Northern Iowa.

Larry has shared his knowledge about teaching and learning mathematics throughout his career. He has been co-author of a monthly activities column in the *Arithmetic Teacher*—now *Teaching Children Mathematics*. He has written chapters in several National Council of Teachers of Mathematics (NCTM) yearbooks and professional development books and recently had a chapter in one of the *Navigations* booklets. He edited an NCTM book on teaching mathematics in the middle school. He has been an author of an elementary textbook series. In the past few years, Larry had been involved in creating activities for problem solving, basic facts, number sense, rational numbers, and formative assessment. More recently he has been involved in the development of a series of mathematics videos to help military parents and their children make sense of mathematics.

Larry has been "Mr. Professional Development" for mathematics in Iowa. Besides his AEA experiences, Larry has worked with mathematics teachers in more school districts in Iowa than anyone. He was a key part of the development of Every Student Counts, which has become a state-wide K-12 professional development project for the Iowa Department of Education. He has spoken at several state and national mathematics education conferences each year for at least thirty years.

Larry has also taken on leadership roles related to the professional development of teachers. He was the co-director of the Iowa Mathematics and Science Coalition for several years. He has been active in working with the Iowa Department of Education.

For years Larry has told teachers that he was in the top 95% of his class. Some of us have questioned that, but I checked it out and he really was in the top 95% of his class. And he is at the top of the class of mathematics educators in Iowa.

Larry has had a great impact on teaching mathematics in the state of Iowa. He has earned the Iowa Council of Teachers of Mathematics Life-Time Achievement Award.

In Memory of **Bonnie Litwiller**

by **David Duncan**

The faculty, students, alumni and friends of the Mathematics Department were saddened last January by the death, at age 75, of Bonnie Litwiller, who taught in the department from 1968 to 2003.

Bonnie grew up in Morton, IL, received her undergraduate education at Illinois State University, taught high school mathematics for a few years in Illinois, and ultimately earned her doctorate in Mathematics Education from Indiana University. She had many interests besides mathematics alone in her early years. The walls of her house in Morton were covered with pictures and awards from her competing in riding and horse showmanship. She also told me that she played center in basketball, which may surprise us as we remember her short stature!

At UNI for 35 years, she taught a variety of courses, but the one constant was the pair of courses in the Teaching of Secondary Mathematics and the Teaching of Middle School/Junior High Mathematics. About 2000 students received their initial instruction in the craft of mathematics teaching from Bonnie. She was truly the face and the soul of secondary mathematics education at UNI. She was totally committed to this work, and demanded no less commitment from her students.

She was a supremely effective leader on committees and task forces in the department, in the broader university, and in the profession off-campus, establishing and maintaining the framework in which her instruction occurred.

She served in leadership roles in at least four significant mathematics education groups: National Council of Teachers of Mathematics, Iowa Council of Teachers of Mathematics, School Science and Mathematics Association, and Association of Mathematics Teacher Educators.

May I emphasize that these duties, services and leadership roles did not simply do themselves; things did not just happen by one's wishing that they would. In each and every setting, Bonnie brought to bear all the force, intensity and commitment of which she was capable, and that's saying a lot!

She also spoke, widely, in well over 100 regional and national conferences, and published well over 1,000 articles. It was my privilege to work with her in some of these projects; I gained much from my association and collaboration with her. All who knew her have been enhanced by her work and her example.

For all these things, she received a well-deserved abundance of honors from UNI and many professional groups. This department and university were blessed by her passion for her work during her life, and will continue to benefit for years to come from her gracious and generous bequest of about $1.5 million for mathematics education at UNI.

With her admirable professional record, Bonnie remained deeply rooted in the Morton, IL, community in which she grew up, always returned, and ultimately passed away. She actually died in the same house in which she grew up, a rarity in this mobile age. I was touched at her funeral by the assortment of speakers who had known her for years, sometimes for all of her years. Perhaps these deep roots gave her a strong sense of who she was and the confidence to accomplish so very much.

Although Bonnie is physically gone, her legacy continues whenever one of her former students teaches mathematics anywhere in this country. And that is truly a legacy to honor.

John & Marla Peterson

Making an Impact

Despite the separation of time and geography, there is a corner in the hearts and minds of John and Marla Peterson that will always be occupied by the University of Northern Iowa.

John '62 and Marla '63, of Knoxville, Tennessee, met when they were working on the Old Gold yearbook. John, a native of Waterloo, Iowa, received his degree in math education. Marla, a Strawberry Point, Iowa, native, was in business education. They each chose UNI for the same reason – the quality of education and personal attention.

"I came to UNI because of its reputation for fine teacher preparation," Marla says. "The good liberal arts education I received there was a big contributor to my success in graduate school and in earning my PhD." John echoes Marla's thoughts. "UNI had, and still does have, a nationwide reputation for teacher education, especially math education."

The Petersons each earned masters degrees from UNI and received PhDs from The Ohio State University and spent their careers in higher education. John taught math and math education, retiring in 2001 from Chattanooga State Technical Community College. He has also authored or co-authored 18 technical mathematics textbooks. Marla retired from the University of Tennessee-Knoxville, where she served as Dean for Research and was a professor of Counselor Education and Counseling Psychology.

As life-long educators, they saw students struggle to meet college costs. "I know how hard it is for some graduate students," Marla says. "They struggle with significant indebtedness – assistantships need to be increased."

John and Marla each received assistantships as masters and PhD students, and know first-hand how important the financial support is for students. They have included UNI

in their estate through a bequest that will create two scholarships to benefit graduate students, the *John C. Peterson Mathematics Education Graduate Student Scholarship* and the *Marla Putzier Peterson Counselor Education Graduate Student Scholarship*. They want to help future generations of students, and preserve their connection to UNI.

"We had personal attention from faculty. They wanted to know what I was doing and how I was doing," John says. "Including UNI in our estate is a way to keep that important relationship intact."

The Peterson's future gift will create a legacy that will ensure they will always be a part of the future of the University of Northern Iowa.

Note: The article was originally published in *Impact* 2008. Since then, the Petersons have been providing annual funding for the John C. Peterson Mathematics Education Graduate Student Scholarship.

The guest speaker for the 2012 edition of the **Hari Shankar Mathematics Lecture Series** was Dr. Douglas R. Hofstadter. Hofstadter is Distinguished College of Arts and Sciences Professor of Cognitive Science and Comparative Literature at Indiana University Bloomington where he also directs the Fluid Analogies Research Group at the Center for Research on Concepts and Cognition.

Hofstadter earned a B.S. in Mathematics, with distinction, from Stanford University (1965) and a Ph.D. in Physics from the University of Oregon (1975). During his undergraduate years as a math student, he invented and conducted explorations of the properties of many recursively-defined sequences. Among the by-products of that work are what today are called *meta-Fibonacci sequences*. Years later, in the course of his doctoral work in solid-state physics, Hofstadter discovered the first fractal object ever found in physics, now known as the "Hofstadter butterfly".

After receiving his Ph.D., Hofstader moved into cognitive science, and for the past 30 years his research has involved the computer modeling of conceptual fluidity and creative analogy-making in carefully designed microworlds. Most of Hofstadter's

ideas have been published in several books, of which *Gödel, Escher, Bach: an Eternal Golden Braid* (1979) is the book for which he is best known and for which he was awarded the Pulitzer prize in 1980.

Scheduled on March 6, 2012, Hofstadter's Hari Shankar lecture *An Introduction to Gödel's Incompleteness Theorem* was dedicated to a famous theorem proved in 1931 by Kurt Gödel. According to Hofstadter, the topic of his lecture is one that has fascinated him the majority of his life. He first learned about Gödel's ideas when he was about 14 years old and became fascinated by the idea of mathematics being used as a tool to study mathematics itself which is, in his view, what Gödel's theorem is all about.

The first part of the lecture was an excursion into the realm of elementary number theory: Hofstadter talked about prime numbers and the Goldbach conjecture, Fibonacci numbers, and the Collatz conjecture. He used these topics to discuss how mathematicians do not distinguish between true and provable mathematical statements, summarizing this identification as what he called the "mathematician's credo": if something is true then it is provable and, vice-versa, if something can be proved, then it is true. That

motivated the second part of his talk, in which he presented the main ideas behind the proof of Gödel's theorem. His presentation followed Alfred Tarski's idea of expressing number theoretical statements formally, using a limited number of symbols, and then labeling them with natural numbers in the order of their complexity. Hofstadter pointed out that, in a similar fashion, Gödel "arithmetized" the process of proof. However, instead of considering true/false statements, Gödel considered provable statements. Starting with a system of axioms and using basic rules of inference, one can prove simple theorems, which in turn can be used to prove more complicated theorems, and so on. Hofstadter described the provable statements (theorems) in this system as "fruits on an infinite tree." He discussed how Gödel constructed a true statement which is not provable in that system, and stressed that this put a wedge between mathematical truth and provability.

This year's Hari Shankar Mathematics Lecture was sponsored by the Hari Shankar Fund, the UNI Department of Mathematics, and the UNI Faculty Senate Speaker Series Fund.

During his visit to UNI, on March 7, 2012 Hofstadter also presented the Guest Lecture *Celebrating the Alan Turing Centenial: Some Critical Reflections*, which was sponsored by the UNI Department of Philosophy and World Religions.

Mrs. Rekah Shankar

Dr. Hofstadter giving the lecture

Projects and Grants

• The University of Northern Iowa's Center for Teaching and Learning Mathematics (CTLM) has partnered with the Waterloo Community Schools to provide instructional coaching in both Cunningham and Irving Elementary Schools through the 2013-2014 academic school year. With a focus on changing teachers' beliefs and classroom practices, University mathematics faculty collaborate with Building Interventionists and District Math Coaches to provide intensive modeling, coaching, and professional development to the elementary teachers. The instructional focus is on successful implementation of the district's newly adopted TERC Investigations series. Success criteria for the project include an increase in teacher content knowledge of mathematics, improvement in teachers' implementation of instructional strategies aligned with the adopted district mathematics curriculum, and an increase in mathematics achievement by the elementary students. Mathematics faculty involved in the partnership include Dr. Elizabeth Hughes, Dr. Larry Leutzinger, Peggy Magner, Dr. Glenn Nelson, Dr. Olof Steinthorsdottir, Dr. Brian Townsend, and Dr. Matthew Webb. The Director of the Center for Teaching and Learning Mathematics is Dr. Vicki Oleson.

• Dr. Jihwa Now was awarded an NSF EPSCoR (Experimental Program to Stimulate Competitive Research) grant and a UNI seed grant. During her Professional Development Assignment, Dr. Noh and her colleagues conducted a pilot study to launch a full-scale international study with the goal of examining pre-service teachers' content knowledge for teaching and its relationship with learning opportunities during their teacher preparation programs in South Korea and the USA. A total of 379 pre-service teachers from four 4-year institutions participated in this study.

• Dr. Olof Steinthorsdottir's "Thinking Mathematically in the Middle Grades" project, funded by the Iowa Board of Regents, is a two-year professional development program designed to (1) improve teacher's content knowledge and pedagogical content knowledge in the area of fractions, proportions, and algebraic connections, as comprised in the Iowa Core State Standards in Mathematics; (2) improve student achievement in pre-requisite skills such as fractions, proportions, and proportional reasoning, needed for success in algebra; and (3) impact teacher practice by emphasizing and exploring student-centered methods of instructions. These goals will be achieved through in-depth professional development workshops, which will provide teachers the opportunity to be immersed in rich explorations regarding the mathematics of the Iowa Core and investigate innovative methods of instruction that utilize student thinking about mathematics to enhance their practice. Teachers will have the opportunity to adapt these ideas to their instructional practice and conduct action research to determine the effect their instructional decisions have on students' understanding and learning.

• Dr. Theron Hitchman continues to participate in the NSF sponsored Undergraduate Teaching in Mathematics with Open Software and Textbooks (UTMOST) grant project. He uses the support to start integrating the free, open-source, mathematical software system Sage into his linear algebra class. That project continues through this year.

Student Spotlight

Melinda McDowell

I decided to attend UNI because of its reputation for preparing students to become great educators. I knew that I wanted to pursue a degree in mathematics teaching when I came to UNI. I have always wanted to be a teacher and I loved math, so I wanted to share my love of mathematics and show my students that math is used every day. Even though I knew I wanted to be a mathematics teacher, I was still wondering if that was the correct choice for me. The UNI Mathematics Department helped me to see that I really wanted to pursue a career in mathematics teaching. I took the I-Teach seminar class during my first semester, and I found that to be very beneficial to me while making my decision. They brought in teachers and coaches from around the area to tell us about the joys and even difficulties of teaching, so I was able to get a lot of information right away from experienced teachers to help me confirm that I wanted to be

a mathematics teacher. The I-Teach seminar also provided scholarships and internships that I am very grateful to have received and experienced. I interned at the Boys and Girls Club of Black Hawk County for two summers, where I gained a lot of experience with classroom management and lesson planning. I also got involved early on in my college career with the mathematics education lab. Being able to tutor other students and expand my teaching techniques and math knowledge gave me even more confidence and experience. It also provided me the opportunity to network with professors and gain experience with the many resources available to mathematics educators.

The main highlights from my college career with the UNI Mathematics Department include confirming that my passions are mathematics and teaching, gaining the knowledge that I can use to help me in my teaching career, working in the mathematics education lab, networking with the professors and staff, and making lasting friendships. I am also honored to have received the many scholarships that I did and the Purple and Old Gold Award. The scholarships I've received for education and from the Mathematics Department include the TEACH Grant, IMSEP scholarships (from the I-Teach seminar), and the Marcia E. Traer scholarship. Receiving those scholarships helped to take some of the weight off of my shoulders to pay for college. I did work to help pay for college, but getting those scholarships

meant that I didn't have to work as much, and that I could concentrate more on my studies. This allowed me to be able to have a chance to be the recipient of the Purple and Old Gold Award. I feel so blessed to be the recipient of this award. I worked hard throughout my college career and I am so thankful to the Mathematics Department and all of the professors for all their help, support, and kindness while I was at UNI. I spent a lot of time in Wright Hall throughout my 4 years, but I feel like it was more than just a place to work and go to class. The professors and staff provided me with a lot of extra help and resources, and I always knew that I was welcome to come in to just chat with the office personnel and the professors. I don't think I would have had such a great experience at UNI if I hadn't received the help and support from the Mathematics Department. Thank you for everything!

After graduation, I got a job at South Tama County High School to teach Algebra 1, Geometry, and Advanced Geometry. I am also hoping to be the new freshmen volleyball coach as well. I am very excited about these new positions and am currently preparing for the volleyball season and for school to start in August!
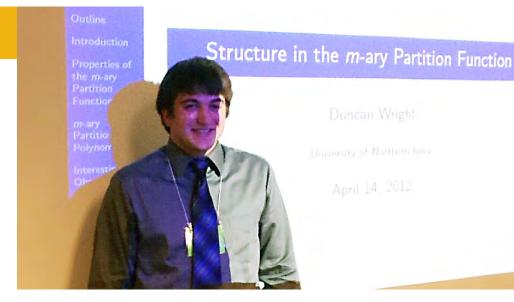
Hobbies: reading, playing golf, and spending time with friends and family.

Duncan Wright

Duncan transferred to UNI from the Des Moines Area Community College in the fall of 2009, interested in becoming an actuary. However, early in the program he took the Complex Analysis class "just for fun" and that course has changed his academic path. "That was the first time I was really introduced to what a degree in mathematics could lead to and I was instantly hooked" says Duncan. Nevertheless, he feels that the most significant impact on his development as a young mathematician so far was made by the Intermediate Analysis class: "I believe that after taking that class I was prepared for any and every other class that I could take."

Duncan loves doing mathematics. He has worked recently on a research project under Dr. Theron Hitchman's guidance. Duncan's project was on the structure of the m-ary partition function. The m-ary partition function encodes the number of ways an integer can be decomposed as a sum of powers of a given integer m. Duncan investigated properties of m-nomial coefficients and a recursive, fractal-like pattern in m-ary partition functions. He spent a significant amount of time using computers to compute and investigate these mathematical objects, and found patterns in the recurrence relations that had not been observed before. "We are hopeful that this will lead to a more streamlined and conceptual proof of some number theoretic properties of the m-ary partition function" says Dr. Hitchman.

Duncan presented the results of his research at various conferences and meetings such as the Midwest Undergraduate Research Symposium (MUMS) and the "Research in the Capitol" event (both in April 2012), the MAA MathFest 2011, and the CNS Symposium (July 2011).

In May 2012, Duncan earned his BA in Mathematics. This fall he returned to UNI as a graduate student in the Department of Mathematics. Duncan feels that a key factor in his decision to continue his education at the graduate level was his fulfilling undergraduate research experience. "I finally realized how much there is in mathematics that has not been discovered and who better to discover those things than me?"

After earning an MA in mathematics he would like to pursue a PhD in mathematics. His career goal is to become a college professor. "I wish to teach students at the university level in order to share my love of mathematics with any and all students who share my passion for the subject."

Hobbies: playing soccer, disc golf, and board games such as Catan.

Recent winners of the Purple and Old Gold Award

for Academic Excellence Department of Mathematics

Melinda McDowell & Leah Decker (2012)

Nicole Hancock (2011)

Ehrich Pakala (2010)

Megan Klein (2009)

Laura Bader (2008)

Dustin Ross (2007)

Beth Nanke (2006)

Kenneth Doss (2005)

Emily Shoopman (2004)

Curtis Martinek (2003)

Alumni Spotlight

Karla Digmann ('05)

On June 11, 2012, the White House announced the winners of the Presidential Awards for Excellence in Mathematics and Science Teaching. Among the 97 awardees of this prestigious award is Karla Digmann of Dubuque. Karla earned her B.S. in mathematics and teacher education, magna cum laude, from Loras College in 1999. In addition, in 2005 she got an M.A. in teaching middle school mathematics from the University of Northern Iowa.

Karla is currently an eighth-grade mathematics teacher at the George Washington Middle School in Dubuque, IA, where she has been teaching mathematics for the past ten years. She is also the coordinator of a mathematics club and coaches the school's MathCounts team. Prior to her current position, Karla taught middle school and high school mathematics in Preston, IA and Dyersville, IA.

At George Washington Middle School, Karla has taken leadership in implementing the middle school mathematics curriculum, incorporating technology into the classroom, and developing common assessments. In addition, she has led a variety of training sessions for in-service teachers. Karla is a member of the National Council of Teachers of Mathematics and the Iowa Council of Teachers of Mathematics.

Karla values her UNI experience: "I really need to give the UNI program credit for much of my success. I grew so much as a teacher during my master's program. All the classes gave me something to think about and try in my classroom. It really helped develop my teaching."

Karla lives in Farley, IA with her husband Mark and their children Leah, Ryan, Ella, and Anna.

Kamilla Svajgl ('00)

Kamilla is a UNI graduate (class of 2000) who double-majored in Applied Mathematics and Computer Science. She passed her first actuarial exam in the spring of 2003 and joined Milliman later that summer. "While Milliman is a well-established consulting firm that has been in existence over 60 years, its Financial Risk Management group was formed in 1998 and was relatively new when I joined it. I was one of the first six people to join the group and now our group has grown to over 100 employees in U.S., Europe, Australia and Asia. I passed my actuarial exams in four years and got my FSA in 2007. I also became a partner at Milliman last year, in 2011" says Svajgl.

Currently, Kamilla is the Director of Hedge Operations for Milliman's Financial Risk Management Practice. She leads a team which manages large-scale hedging activities for a range of U.S. and international insurers and banks. She oversees activities covering production of risk analysis, performance attribution analysis, financial reporting, and back-office functions. Kamilla is a frequent speaker at industry events and is sought after to provide expertise on the use of hedging to strengthen the retirement security system.

"On the personal front, I am married to Jim Svajgl, also a UNI grad. He received his JD at DePaul University here in Chicago and is an attorney. We have a three year old daughter, Audrey, who is pretty awesome and a lot of fun."

Jim and Kamilla

Suzanne Shontz ('99)

Suzanne Shontz, assistant professor of mathematics and statistics at Mississippi State University (and formerly of computer science and engineering at The Pennsylvania State University), is among 96 researchers nationwide, and 20 researchers National Science Foundation (NSF) nominees for the Presidential Early Career Awards for Scientists and Engineers, the highest honor bestowed by the U.S. Government on science and engineering professionals in the early stages of their independent research careers. The recipient was presented with her award at a White House ceremony held in July 2012.

"Discoveries in science and technology not only strengthen our economy, they inspire us as a people." President Barack Obama said. "The impressive accomplishments of today's awardees so early in their careers promise even greater advances in the years ahead."

Shontz received her award for research in computational and data-enabled science and engineering. "I design computational techniques used to solve problems in science and engineering involving motion. These computer methods are used to approximate the shape of an object as it changes over time due to its motion," Shontz said. "Scientists and engineers are able to use these algorithms for studying numerous applications including design of new cars, flapping of an airplane wing, and placement of a medical device, for example. It's a great honor to receive this award. It means that my research at Penn State has been recognized by the White House as being important to the nation."

The Presidential early career awards embody the high priority the Obama Administration places on producing outstanding scientists and engineers to advance the nation's goals, tackle grand challenges and contribute to the American economy. The recipients are employed or funded by the following departments and agencies: Department of Agriculture, Department of Commerce, Department of Defense, Department of Education, Department of Energy, Department of Health and Human Services, Department of the Interior, Department of Veteran Affairs, Environmental Protection Agency, National Aeronautics and Space Administration, and the National Science Foundation, which join together annually to nominate the most meritorious scientists and engineers whose early accomplishments show the greatest promise for assuring America's preeminence in science and engineering and contributing to the awarding agencies' missions.

The awards, established by President Clinton in 1996, are coordinated by the Office of Science and Technology Policy within the Executive Office of the President. Awardees are selected for their pursuit of innovative research at the frontiers of science and technology and their commitment to community service as demonstrated through scientific leadership, public education, or community outreach.

Shontz received her doctorate in applied mathematics from Cornell University in 2005. She received bachelor's degrees in mathematics and chemistry from the University of Northern Iowa in 1999 and master's degrees in computer science and applied mathematics from Cornell University in 2002. Before joining Mississippi State in August 2012, she was an assistant professor in the Department of Computer Science and Engineering at The Pennsylvania State University, a postdoctoral associate in the Department of Computer Science and Engineering at the University of Minnesota, and a Minnesota Supercomputing Institute Research Scholar at the University of Minnesota.

In addition to the current NSF honor, Shontz received a National Physical Science Consortium Fellowship from 1999-2004 and an Honorable Mention for the Alice T. Schafer Prize for Women in Mathematics in 1999. In 2007, she was selected as the Computer Engineering Faculty Marshall for the Spring Commencement exercises at Penn State. In 2009, she received an Office of Naval Research Summer Faculty Fellowship.

This article is an updated version of Suzanne Shontz's PECASE announcement.

Dr. Theron Hitchman helping students discover the mathematics of the Möbius band

Math Day 2012

Math Day is the main recruitment event of the year organized by the Department of Mathematics. Initiated in the fall of 2006 and continuing the tradition of the now discontinued College of Natural Sciences (CNS) Science Symposium, Math Day gives prospective students and their families the chance to visit our campus, learn more about the programs offered by the Department of Mathematics, and meet with faculty members and current mathematics majors. While a relatively new event, Math Day has already established a remarkable track-record: approximately 67% of all students who attend the event come to UNI the next academic year.

The sixth annual Math Day was held on Thursday, February 2, 2012. Thirty prospective students and their parents came to campus to participate in the day's activities. The schedule of events involved separate activities for the prospective students and for their parents. The students took a one-hour mathematics examination which was used by the department to select scholarship winners. They also participated in two 45-minute mathematics workshops facilitated by

Dr. Theron Hitchman and by Dr. Douglas Shaw. The workshops involved hands-on activities intended to help students to discover important mathematical objects and their properties. For their part, the parents watched a presentation on career options for mathematics majors, participated in a question and answer session with a student panel, and rounded out the formal part of their activities with a financial aid presentation. The highlight of the event was a luncheon in which prospective students, their parents, current students, and department faculty members participated. All told, over 100 people attended the luncheon.

The 2012 Math Day was organized by the Mathematics Recruitment and Retention Committee chaired by Dr. Adrienne Stanley and was sponsored by the Department of Mathematics.

Squigonometry

An article with the above title, written by Dr. William Wood, was published in the October 2011 issue of the prestigious *Mathematics Magazine* (Vol. 84, No. 4). The article shows how to use elementary differential equations to develop a model of trigonometry for different planar geometries. Using only elementary calculus, the article introduces functions analogous to sine and cosine to parameterize the unit "squircle", i.e. the planar curve of equation $x^4 + y^4 = 1$. The ideas presented in the paper yield very interesting connections with elliptic integrals, non-euclidean geometry, number theory, and complex analysis.

The article was well received by the mathematical community and lead to several invited talks and lectures by Dr. Wood:

- "Squigonometry," MAA Iowa Section Meeting, Center College, October 2011

- "Squigonometry," Coe College, March 2012

- "Elliptic Integrals and Generalized Trigonometric Functions", South Dakota State University, March 2012

During the summer of 2012, Dr. Wood has supervised an undergraduate research project. His student, Wesley Keene, developed the ideas from the article further by finding analogs of angle sum formulas and exploring questions like what "pi" means in these alternate geometries.

Student Organizations

Actuarial Science Club

The UNI Actuarial Science Club plays an important role in the Actuarial Science program. Its main goal is to foster interaction among students, participating actuaries, and other representatives of actuarial companies in order to facilitate summer internships and full-time positions. Actuarial companies which have been recently recruiting through this Club include well-known companies such as Allied Insurance, Allstate, American Family Insurance, Ameriprise Financial Group, AVIVA, CIGNA, Geico, Mutual of Omaha, Nationwide Mutual Insurance, Northwestern Mutual, Principal Financial Group, State Farm, Transamerica (AEGON), and Traveler's Insurance Company.

KME

Kappa Mu Epsilon (KME) is a specialized honor society in mathematics. KME was founded in 1931 to promote the interest of mathematics among undergraduate students. Its chapters are located in colleges and universities of recognized standing which offer a strong mathematics major. The chapters' members are selected from students of mathematics and other closely related fields who have maintained standards of scholarship, have professional merit, and have attained academic distinction. The majority of KME meetings are hosted by department faculty in their homes.

MATH Club

The UNI Math Club is a student organization for mathematics majors and lovers. The purpose is to provide UNI students opportunities to learn and pursue mathematics outside of class and gather to celebrate their love of mathematics. Recent events have included monthly meetings with invited mathematical speakers, hosting the UNI Integration Bee, celebrating pi day, field trips to math-related sites, and game nights.

TEAM

TEAM (Teaching Educators About Mathematics) is a student group which meets monthly to discuss topics of interest to preservice elementary and middle school education majors. Past activities have included: problem solving sessions lead by students or professors, guest speakers including local teachers and administrators, seminars lead by previous TEAM members who are currently teaching, trips to regional and national NCTM meetings, and mathematics materials displays and sales. Each year, TEAM hosts a Math Fair for local 4th, 5th, and 6th grade students. At the Fair, students experience mathematics through hands-on activities and games facilitated by TEAM members and faculty.

News from KME

The first fall 2011 KME meeting was held on September 26, 2011 at Professor Mark Ecker's house where student member Hannah Andrews presented her paper entitled "Weather Changes". Student member Adam Feller presented his paper entitled "Baseball Salary Regression" at the second KME meeting on November 7, 2011 at Professor Syed Kirmani's home. Student member Lisa Stoecken addressed the fall initiation banquet with "A Statistical Analysis of the Factors Affecting University Endowments". The fall banquet was held at Pepper's Grill and Sports Pub in Cedar Falls on December 5, 2011, where six new members were initiated.

The first spring 2012 KME meeting was held on February 22, 2012, at Professor Mark Ecker's residence where student member David Ta talked about his KME paper entitled "Blackjack Winning Strategies". The second meeting was held on March 28, 2012, at Professor Doug Mupasiri's residence where student member Renee Greiman presented her paper on "Finding the Center of a Circle". Student member Kassaundra Young addressed the spring initiation banquet with "Determinants of Property Crime". The banquet was held at Godfather's Pizza in Cedar Falls on April 25, 2012, where nine new members were initiated.

The KME student officers for Fall 2011-Spring 2012 were:
Hannah Andrews (Secretary)
Adam Feller (President)
Renee Greiman (Vice-President)
Lucas Thomas (Treasurer)

Liz Mastalio

During the summer of 2012, Liz Mastalio, a senior majoring in mathematics teaching, participated in an eight-week Research Experience for Undergraduates (REU) program organized by the Department of Mathematics at Illinois State University. Eight other undergraduate students participated in the program with Liz. The program was led by a team consisting of two faculty members (one in mathematics and the other one in mathematics education) and a graduate student. The participants explored, in teams of four, various topics from discrete mathematics. Liz's team investigated properties of Stanton graphs and decomposing complete graphs into these types of graphs using different graph theory techniques.

The REU participants had the opportunity to interact for one week with six high school students from the Chicago Public School system (enrolled in a high school program at Illinois State University) and three junior high students from Normal, IL. The REU students adapted versions of their research topics into modules that they taught to these students and got them involved in mathematics research during the week they were there.

Liz says, "I think that this program will help me in many ways when I get into a classroom. We discussed how math research relates to teaching mathematics two afternoons a week, and it was really beneficial just to get the different viewpoints of how the 15 of us would each do something in a classroom. We also discussed extensively how the research process can be used in the classroom to get students to truly experience mathematics, rather than just learning rules and formulas to use. Doing math research is also beneficial, because it forces me to think of many different ways to tackle a problem and helps me to gain some insight into different strategies my students might use."

Liz is a UNI Presidential Scholar and a member of several student organizations including Kappa Delta Pi Educational Honor Society and Kappa Mu Epsilon Mathematics Honor Society. She intends to graduate in May 2013.

Rachel Volkert

Between June 3 and July 28, 2012 Rachel Volkert, a double-major in liberal arts mathematics and computer science, participated in the REU program coordinated by the Mathematics Department at Lafayette College in Easton, PA. She was part of a team that studied perfect parallelepipeds, which are parallelepipeds with integer length sides, face diagonals, and body diagonals. Rachel and her team were able to construct a number of examples of perfect parallelepipeds, which lead to a novel parameterization of an infinite family of distinct perfect parallelepipeds.

When we asked Rachel how she feels about her summer experience, she responded: "This summer at Lafayette College has been a great way to experience mathematics in the making, as well as form friendships with fellow mathematicians. My group was able to present our findings to the other REU groups at Lafayette College and at Ursinus College. We look forward to giving a talk at the Young Mathematicians Conference at the Ohio State University and will also be attending the Joint Mathematics Meetings in San Diego in January 2013. I have learned a lot about mathematical research and have gained valuable research skills that will come in handy in my future career. I am very thankful to have had this opportunity!"

Rachel is a UNI senior this academic year. She has outstanding academic achievements: she has been on the Dean's List for six semesters, has been a distinguished scholar (2009), and is currently an Honors student. She intends to graduate from UNI in May 2013.

Addresses by Mathematics Faculty

Many faculty members in our department have participated and made presentations at various meetings and conferences. Among them are:

Dr. Russell Campbell
Annual meetings of the American Society of Naturalists, the Society for the Study of Evolution, and the Society of Systematic Biologists in Norman, OK (2011) and Ottawa, Canada (2012)

Dr. Theron Hitchman
MAA Iowa Section meeting at the Central College (2011), Sage EDU Days 4 in Seattle, WA (2012)

Dr. Elizabeth Hughes
NCTM meeting in St. Louis, MO (2011), Iowa AMTE conference in Des Moines, IA (2012), NCTM annual meeting in Philadelphia, PA (2012)

Dr. Douglas Mupasiri
Miami University (2011), MathFest (2011), and the First Annual Conference for the Exchange of Mathematical Ideas, Prescott, AZ (2012)

Dr. Jihwa Noh
Invited lecture at Ajou University, Korea (2011); the 12th International Congress on Mathematical Education in Soul, Korea (2012)

Dr. Vicki Oleson
Mathematics and Science Partnership Conference in Chicago, IL (2012)

Dr. Olena Ostapyuk
AMS Spring Central Sectional Meeting, University of Kansas (2012)

Dr. Olof Steinthorsdottir
NORMA (Reykjavik, Iceland) (2011), Little Rock, AR (2011), PME-North America Chapter in Reno, NV (2011), and Iowa AMTE conference in Des Moines, IA (2012)

Dr. James Stevenson
John Deere Six Sigma conference in Moline, IL (2011), John Deere Harvester Works in Moline, IL (2011), LETS Conference in Mannheim, Germany (2012), and the Professional Development Conference of the Minneapolis Section of the ASQ in Minneapolis, MN (2012)

Dr. William Wood
MAA Iowa Section meeting at the Central College (2011); invited addresses at Coe College (2012) and South Dakota State University (2012)

Megan Balong Remains at UNI

Megan Balong remains at UNI as an instructor in the Department of Mathematics and field experience coordinator in the Department of Teaching, effective August 2012. Megan earned both her B.A. and M.A. in Mathematics degrees (secondary teaching emphasis) from UNI. She is a National Board Certified teacher and has taught middle school and high school mathematics for seventeen years. Most recently, she taught at the Price Laboratory School. In addition, she has mentored pre-service mathematics educators through field experiences and has provided professional development for in-service teachers. She was part of the development team for the *Making Sense Courses* through UNI's Center for Teaching and Learning Mathematics and a member of the original writing team for the Iowa Core Mathematics. Her interest areas are inquiry-based learning and discourse in the mathematics classroom.

Electronic or hard copy
(future issues published online)

Department of Mathematics Goes Digital

We are planning to publish future issues of our department newsletter online (www.uni.edu/math). If you would like a hard copy of this newsletter in the future, please send this note to us with your address, or e-mail us at mathematics@uni.edu with that information.

Department of Mathematics
University of Northern Iowa
Wright Hall 220
Cedar Falls, IA 50614-0506

Alumni info request — *Let us hear from you...*

Let us know what you have been up to. You can email us at mathematics@uni.edu or return this form to:

Department of Mathematics
University of Northern Iowa
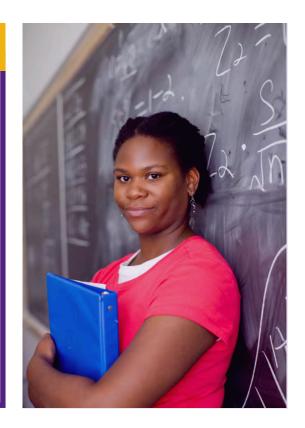Wright Hall 220
Cedar Falls, IA 50614-0506

First Name _____ Last Name (maiden)_____
Address _____
City _____ State _____
Email:_____

Please share any news about you or your family to be included in the next Mathematics Newsletter.

Department of Mathematics Contribution Form

Would you like to support a Mathematics student and/or the Mathematics Department?

If so, please fill out the form below and return it to: **UNI Foundation Financial Services**
1223 W. 22nd St.
Cedar Falls, IA 50614-0239

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Name

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Address   City, State, Zip

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E-mail   Phone   ☐ home ☐ cell ☐ business

☐ Please check if new address, phone or e-mail.

I/we would like to support the following fund(s).

$_____ **Mathematics Department Quasi-Endowed Fund** (provides Alumni Scholarships, faculty development and travel, equipment, and support for all programs) 20-220127

$_____ **Mathematics Education Leadership Endowed Fund for Excellence** (discretionary fund for all mathematics education programs in the UNI Department of Mathematics) 30-221015

$_____ **Actuarial Science Fund** (provides John E. Bruha Award in Actuarial Science, Northwestern Mutual Scholarship, non-endowed scholarships, and covers student fees on successfully completed actuarial exams) 21-221288

$_____ **Mathematics Leadership Fund** (for the enhancement of teaching secondary mathematics) 21-221162

$_____ **Mathematics Undergraduate Research Assistant Fund** (for general undergraduate research assistance) 21-222452

Online: If you prefer, you may give via the UNI Foundation secure website: https://www.uni.edu/math. Use the "Donate to Mathematics" button on the right side. This will take you to a secure site with three mathematics funds choices. Please enter your donation amount in the boxes, or click "Take me directly to the giving page" to contribute to any other project (enter the project name or gift intention in the area marked "Please specify designation" in the "Other" category).

Additional funds, established by alumni and friends, provide scholarships to students in our programs. These scholarships are described on the reverse of this page.

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Charge my: ☐ VISA ☐ MasterCard ☐ Discover ☐ American Express *(please check one)*
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Department of Mathematics Funds

The following funds and scholarships are named for UNI emeritus faculty members:

Diane Sorenson Baum Fund – scholarships for elementary education majors with a K-8 mathematics minor (21-210591)

E.W. Hamilton Quasi-Endowed Scholarship – scholarships for students enrolled in any mathematics program (20-210174)

Bonnie Litwiller Mathematics Teacher Endowed Scholarship – scholarships for students majoring in Mathematics-Teaching (30-212639)

Fred W. Lott Endowed Scholarship in Mathematics – scholarships for incoming freshmen who are mathematics majors (30-211124)

Michael H. Millar Endowed Scholarship – scholarships to graduate students (30-211718)

Augusta Schurrer Endowed Scholarship for Mathematics Excellence – scholarships for students majoring in mathematics – Teaching (30-211292)

Augusta Schurrer Mathematics Grant – scholarship for math majors with 65 hours of completed work at UNI; preference to secondary teaching major (21-221293)

Carl and Wanda Wehner Math Teaching Endowed Scholarship – scholarships for juniors or seniors majoring in Mathematics – Teaching (30-210474)

The following funds have been established by alumni and friends of the Department of Mathematics:

Robert Allender Mathematics Teaching Endowed Scholarship – scholarships for sophomore, junior, or senior students majoring in Mathematics-Teaching (30-211638)

American Society for Quality Control-Endowed Math & Computer Science – scholarship for juniors or seniors majoring in mathematics (30-210419)

Aviva Actuarial Scholarship – scholarships for students majoring in Actuarial Science (21-212673)

Conrad and Jeannette Baumler Mathematics Education Scholarship – scholarship for juniors or seniors in mathematics education (21-212506)

Robert W. Bettle Math Education Endowed Scholarship – scholarships for seniors in mathematics education (30-211269)

Glenn Boysen Endowed Math Scholarship – scholarships for students majoring in mathematics (30-211136)

Alice & George Brown Endowed Math Scholarship – scholarships for a declared major in the Department of Mathematics (30-211526)

Irvin and Dorothy Brune Mathematics Education Endowed Scholarship – scholarships for mathematics education majors (30-211613)

Robert and Carol Hendrickson Crane Scholarship in Secondary Math Education – scholarships for juniors or seniors in secondary mathematics education (21-212418)

John F. and Ruth Cross Endowed Scholarship – scholarships for Statistics and Actuarial Science majors (30-211516)

Rich and Dee James Secondary Mathematics Teaching Endowment – scholarships for juniors or seniors in secondary mathematics education (30-212220)

Patricia Lange Memorial Endowed Math Scholarship – scholarships for juniors or above in any mathematics major (30-210976)

George and Mary McCoige Mathematics Education Scholarship – scholarships for sophomores and above majoring in Mathematics-Teaching (21-212664)

Marian Rigdon Ponder Math Education Scholarship – scholarships for incoming freshmen mathematics education majors (21-212206)

Principal Financial Group Actuarial Scholarship – scholarships for juniors or above majoring in Actuarial Science (21-212396)

Marcia E. Traer Endowed Scholarship Fund – scholarships for juniors or seniors in any mathematics major (30-211199)

Charles & Dorothy McLeod Tubbs Math Education Endowed Scholarship – scholarships for students majoring in mathematics education (30-211553)