

View from the Chair's Office

The last four years have been tough ones, for the nation, for the academic community, and for the University of Michigan. Despite the difficult circumstances, both the University of Michigan and the Mathematics Department have thrived. The Department was asked to cut six percent of its expenditure budget over a three year period, and we have accomplished that.

There have been many changes in the new financial climate, large and small. At the monthly lunches of the Natural Science Chairs with the Dean, lunch is not provided—these days, it's a brown bag affair. Nothing is too small to overlook. The Mathematics Department and the Psychology Department are now sharing a systems group: East Hall Technology Services. There are many experiments in sharing in the interest of cost-cutting. The College has



changed the process that determines how departments are funded. One of the consequences is that there is substantially less discretionary funding, and finding ways to replace that funding has been one of the biggest challenges since the recession started. More than ever, we depend on the generosity of alumni and other friends in order to continue many worthwhile projects, a number of

which are discussed in this newsletter. I want to express my heartfelt gratitude to all those who have been supporting the Department.

There is plenty of good news. Our faculty and students continue to win many awards, both for research and teaching. These are detailed throughout this issue. The Michigan Math and Science Scholars is a thriving program that is igniting the desire to do research in mathematics and the sciences in high school students from all over the nation and the world. I have been doing one of these two week sessions (sixty contact hours for the students!) every summer for many years. The class starts with the Fibonacci numbers and introduces the students to several mathematical techniques, including recursion, ideas from algebraic number theory, and even some abstract algebra. The picture here shows me teaching. Over the past few years I have had students from China, France, India, Japan, Korea, Turkey as well as from many parts of the United States and Puerto Rico. Of course, there are always several from right here in Michigan. The talent and enthusiasm of these kids is refreshing and delightful!

The College has been extraordinarily supportive of our hiring. During my first year as Chair we were permitted to make eleven offers even though, officially, we only had one position. We hired six people. Over the three years that followed we have hired six more, with a seventh pending. The College has reacted to the spectacular creden-

tials of the candidates we bring forward, allowing us to go well beyond our targeted number of tenured and tenure-track faculty. This reflects the spirit of appreciation of excellence that permeates this University.

Our undergraduate program is thriving in every way. It has grown explosively. At the end of the 2011-12 academic year we had 630 declared concentrators and 271 declared minors, with many in financial and actuarial mathematics. As has been typical in recent years, there were over twenty thousand visits to our Math Lab. Last year was exceptional in that three of our seniors won Goldwater Fellowships, and we had one runner-up as well. We have many students each year doing research projects in our REU (Research Experience for Undergraduates) program, and last year it became one of the largest in the country. The quality of the work of these students is amazing.

We are very pleased when alumni share their experiences (career, or otherwise) with us. Each year we have a

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Griess Named Collegiate Chair

Professor Robert L. Griess, Jr. has been named a Collegiate Professor in the College of Literature, Science and the Arts. His professorship is named in honor of Richard Brauer, a U-M Mathematics faculty member from 1948-1952. Brauer worked mainly in abstract algebra, but made important contributions to number theory. He is considered the founder of modular representation theory of finite groups.



Griess is best-known for the 1980 construction of the Monster sporadic finite simple group. Construction was accomplished by Griess, not only for the first time, but also entirely by hand without the aid of a computer. Discovery of this group has touched science and mathematics very deeply. Connections have emerged with areas as diverse as string theory in physics and, within mathematics itself, in very sophisticated number theory.

Over the years, Griess's research has spanned several subjects: finite simple groups; group extensions and cohomology; finite group theory; finite aspects of Lie theory and algebraic group theory; infinite dimensional groups and Lie algebras; nonassociative algebras. Early accomplishments were the determination of Schur multipliers of many finite simple groups, collaboration on odd standard form, and initial investigations on the Monster in 1973. He later be-

came involved with the Monster's construction and consequences, attempts to build a general theory of sporadic groups (e.g., groups and various nonassociative objects), and efforts to launch the classification of finite subgroups of exceptional Lie groups. More recently Griess has had a growing involvement in vertex operator algebras and their automorphisms, and in lattices. The 196884-dimensional algebra associated to the Monster has taken on a life of its own, being known as the Griess algebra. He recently gave an elementary proof of a classic theorem about lattices and has started a program of existence and uniqueness for high dimensional unimodular lattices.

Griess received his Ph.D. from the University of Chicago in 1971. He came to U-M as a Hildebrandt Research Instructor in 1971 and was named Professor in 1981. He received a Guggenheim Fellowship in 1981, presented an invited address at the International Congress of Mathematicians in 1983, and received the Harold R. Johnson Diversity Service Award from the University of Michigan in 2003. In 2007 he was elected to the American Academy of Arts and Sciences. Griess initiated the Mathematics Department's minority outreach program by hosting over four hundred middle school students annually in the U-M's King-Chavez-Parks visitation program. This was the highest level of academic unit participation at the University. Recently he participated in two new U-M outreach programs. The Gear-Up program invited high school students to the U-M campus, and Wolverine Express took groups of research and teaching faculty to high schools across Michigan. Griess was active in both programs and recruited other mathematicians to participate as well. Griess serves as the department historian, gathering data and material for inclusion on a web page.

New Faculty

Shravan Veerapaneni joined the U-M Department of Mathematics in September, 2011 as an Assistant Professor.

Veerapaneni received a Bachelor of Technology in Mechanical Engineering



from the Indian Institute of Technology in 2003. He studied Mechanical Engineering and Applied Mechanics at the University of Pennsylvania, where he received his Ph.D.

in 2008. Prior to his U-M appointment, he was a Research Scientist at the Courant Institute of Mathematical Sciences in New York.

Veerapaneni's research interests are in scientific computing, fast algorithms, potential theory, complex fluids, microfluidics, and biomechanics. His research combines deep knowledge of intricate numerical methods with experience using the largest supercomputing platforms. His work is in the broad area of numerical methods for partial differential equations, with innovative algorithms and novel applications. Some of his new interdisciplinary projects at U-M include: optimizing the geometries of targeted drug carriers used in treating cardiovascular diseases and cancer (with Professor Adefeso, Chemical Engineering), design of microfluidic diagnostic tools (with Professor Nagrath, Chemical Engineering), and drop impact dynamics (with Professor Deegan, Physics).

Recognition for Veerapaneni's research includes the ACM Gordon Bell Prize in 2010 for his work on a large group project, which developed and implemented high-performance computing tools for simulating blood flow. His work was also a Best Paper Finalist at the ACM/IEEE Conference on Supercomputing in 2010.

Faculty Recognition

Hyman Bass, the Samuel Eilenberg Distinguished University Professor of Mathematics and Mathematics Education, was appointed by President Obama to the President's Committee on the National Medal of Science.

Anthony Bloch, the Alexander Ziwet Collegiate Professor of Mathematics was named a Fellow of the Society of Industrial and Applied Mathematics (SIAM). Fellows are SIAM members who are recognized by their peers as distinguished for their contributions to applied mathematics and computational science.

Professor Stephen DeBacker was named a 2011 Arthur F. Thurnau Professor, recognizing his outstanding contributions to undergraduate education. Thurnau Professorships honor those tenured faculty whose commitment to and investment in undergraduate teaching has had a demonstrable impact on the intellectual development and lives of their students.

Professor Charles Doering (left) was named a Fellow of the Society of Industrial and Applied Mathematics (SIAM). Fellows are SIAM members who are recognized by their peers as distinguished for their contributions to applied mathematics and computational science.



Volker Elling, Assistant Professor, was the recipient of a 2011 NSF CAREER award for his project "Non-Uniqueness in Inviscid Flow and Algebraic Vortex Spirals." The CA-

REER awards provide early career development for faculty with outstanding potential. He was also selected a 2011 Alfred P. Sloan Research Fellow. These extraordinarily competitive awards are selected from nominations of the best young scientists from the U.S. and Canada.

Professor Daniel Forger will lead a \$1 million study of how the internal clock controls mood. The project is funded by a competitive international Human Frontier Science Program Grant, which supports basic life science research with funding from 13 countries and the European Union. Forger will collaborate on the project with colleagues in Japan and England.

Professor Curtis Huntington was appointed Chairperson of the Actuarial Board for Counseling and Discipline effective January 1, 2011. Established and supported by the American Academy of Actuaries, the Board responds to actuaries' requests for guidance on professional issues and considers complaints about possible violations of the actuarial Code(s) of Professional Conduct. He is also the 2010 recipient of the Harry T. Eidson Founders Award from the American Society of Pension Professionals & Actuaries (ASPPA). The award was established in 1995 to honor ASPPA's founder, Harry T.

Eidson. The award acknowledges individuals who have made significant contributions to ASPPA and/or to the private pension system.

Professor Trachette Jackson was selected to receive the 2011 Imes and Moore Faculty Award from the College of Literature, Science, and the Arts. The award recognizes her for serving as a role model for mathematical scientists and making exceptional contributions to students from under-represented minority groups.

Professor Jeffrey Lagarias was appointed a George Polya Lecturer for the Mathematical Association of America. The Polya lectureships were established to uphold the high expository standards set by George Polya. The lectureship entails giving invited talks at selected MAA Section meetings over a two year appointment period.

Lecturer Gavin LaRose (left) received the 2011 Mathews Underclass Teaching Award



from the College of Literature, Science, and the Arts. The award recognizes his accomplishments in both the quality of teaching and the design and implementation of web-based learning tools.

Professor Robert Megginson was the 2011 nominee from UM for State of Michigan Distinguished Professor of the Year. Each state university gets to nominate one full professor each year for the award.

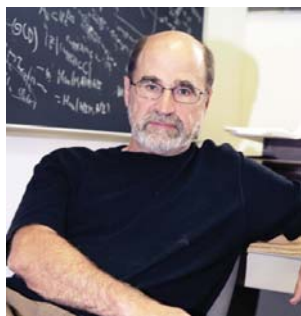
Associate Professor Kristen Moore was the recipient of the 2011 Excellence in Concentration Advising Award, recognizing her work as a mentor and advisor to undergraduate and graduate students in the Department.

Karen Rhea, Lecturer and Director of the Introductory Mathematics Program (now retired, see page 4), was named one of three inaugural Collegiate Lecturers at U-M's Ann Arbor campus, in recognition of her achievements and many contributions to the education of U-M students. To honor a much-loved emeritus faculty member, her title is the Patricia Shure Collegiate Lecturer. Rhea also received a Deborah and Franklin Tepper Haimo Award for Distinguished College or University Teaching of Mathematics from the Mathematical Association of America at the Joint Mathematics Meetings in New Orleans, January 2011. The award honors college or university teachers who have been widely recognized as extraordinarily successful and whose teaching effectiveness has been shown to have had influence beyond their own institutions. In addition to her outstanding work in teaching, Rhea is cited for her contributions to changes in the calculus curriculum nationally, and her work inspiring and developing other outstanding teachers.

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Faculty Retirements

Igor Dolgachev, Professor of Mathematics, retired from active faculty status May 31, 2011.



Professor Dolgachev received his Ph. D. from Moscow State University in 1970, working under the direction of Igor Shafarevich. He left the former USSR in 1977, and came to Michigan in 1978 after a year at MIT. He advanced to the rank of Professor in 1982. Thanks to his wide mathematical knowledge and culture, he has played a central role in the intellectual life of the department over the last thirty years. He was active on the department's Library and Personnel committees, and has run seminars in Algebraic Geometry and Physics & Geometry.

Professor Dolgachev's work combines the most modern techniques of algebraic geometry with an unparalleled knowledge of the classical literature. He has made fundamental contributions to many areas in the field, including the theory of algebraic surfaces and their automorphisms, the theory of singularities and vector bundles, and geometric invariant theory. In 1981 he introduced a class of algebraic surfaces—now called Dolgachev surfaces—that have become very important in topology. A seminal 1998 paper of Dolgachev and Hu studied the phenomena surrounding the variation of polarizations in geometric invariant theory. More recently, Dolgachev and Iskovskikh completed in 2009 the classification of all finite subgroups of the plane Cremona group.

In his career, Professor Dolgachev had 16 successful Ph. D. students, and he energetically mentored many postdocs in algebraic geometry that passed through the Michigan department. He is well known for his expository writing: he published four books, with another (a survey of classical algebraic geometry) on the way, and has written over 75 research papers with numerous coauthors. Professor Dolgachev has taught advanced graduate courses on many different topics, and the online lecture notes from these are widely used throughout the world. He has served on the editorial board of the Michigan Mathematical Journal for 13 years, including two years as managing editor, and is currently on the editorial boards of Number Theory and Physics, Electronic Research Announcements (ERA) and the Journal Gokova Geometry Topology.

A conference in Algebraic Geometry was held in Professor Dolgachev's honor in April 2011. The conference included a gala dinner attended by many of his students and colleagues.

Karen Rhea, The Patricia Shure Collegiate Lecturer of Mathematics, retired from active faculty status May 31, 2012.



Rhea received her B.S. and M.S. in Mathematics from the University of Southern Mississippi, where she taught from 1985 to 1998. Rhea joined the University of Michigan Department of Mathematics in 1999 as a Lecturer III. She was promoted to a Lecturer IV in 2006, and was named one of the University's inaugural Collegiate Lecturers in 2012.

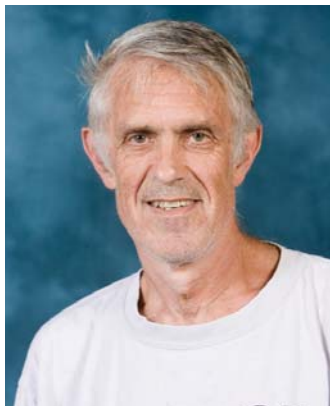
As Director of the Introductory Program in the Department of Mathematics since 2005, one of Rhea's main responsibilities was training new graduate students and new postdoctoral assistant professors to teach Calculus at U-M. She perfected an interactive approach to teaching calculus that impressed educators throughout the nation and has proven to be extremely effective. This process involves endless hours of mentoring new instructors, including classroom visits, individual meetings, and weekly group sessions. Due in large part to the strength of Rhea's vision, the U-M Introductory Calculus program has been proven to outperform those at other institutions. In 2008, all sections of Math 115, first semester calculus, participated in the Calculus Concept Inventory. This multiple institution assessment measured the increase in student understanding of the concepts of beginning Calculus. All 51 sections at U-M outperformed all sections elsewhere that were taught in lecture style, regardless of class size. Moreover, the average gain taken across all sections of Math 115 was two standard deviations above the average for all institutions participating in the study.

Rhea has been a member of the Calculus Consortium for Higher Education since its inception in 1988, and she has co-authored three Calculus text books. She served for six years on the Michigan Mathematical Association's Committee for Professional Development, and is a current member of their Committee on the Teaching of Undergraduate Mathematics. In 2011 she gave 10 invited lectures around the country. Rhea has won a number of awards for her teaching, including the L. S. & A. Excellence in Education Award, the Matthews Underclass Teaching Award from U-M, and the Debra and Franklin Haimo Award for Distinguished College or University Teaching from the Mathematical Association of America.

Faculty Retirements

John Erik Fornæss, Professor of Mathematics, retired from active faculty status December 31, 2011.

Professor Fornæss received his Ph. D. from the University of Washington in 1974, working under the direction of Edgar Lee Stout. In 1974 he joined the faculty of Princeton University as an Instructor in the Department of Mathematics, and advanced to the rank of Professor in 1982. He came to the University of Michigan in 1991, and was named the Frederick W. Gehring Collegiate Professor of Mathematics in 1996.



Professor Fornæss studies higher dimensional complex analysis, specifically several complex variables. His early work involved the pseudoconvexity of complex manifolds and their role on the Cauchy-Riemann operator. In recent years he has worked on problems in complex dynamics, mostly in higher dimensions. Complex Dynamics in higher dimensions uses tools from the theory of several complex variables; it also uses general dynamical systems theory and algebraic geometry.

In his career, Professor Fornæss had 22 successful Ph. D. students, served on the committees of several others, and he energetically mentored many postdocs in several complex variables that passed through the Michigan department. He was the Analysis Area Leader for the department for six years, and served a term as Graduate Chair. He was coordinator for the large Calculus 215 and 216 courses. Professor Fornæss coordinated two special years in several complex variables in the department, hosting numerous distinguished visitors and presenting large conferences. He has published over 150 research papers with many collaborators, and has written four books. Professor Fornæss served on the editorial board of the Michigan Mathematical Journal for 15 years, and was an editorial board member for several other mathematical journals. He received a Sloan Fellowship, Max Planck Award, the Bergman Prize, and the CEHN Award. Professor Fornæss has held several visiting appointments at institutions worldwide.

Berit Stenones, Professor of Mathematics, retired from active faculty status December 31, 2011.

Professor Stenones received her Ph. D. from Princeton University in 1985, working under the direction of John Erik Fornæss. She was an Assistant Professor at Rutgers until 1989, and held a position as Lecturer at Princeton for a year. In 1990 she joined the faculty of the University of Michigan Department of Mathematics as an Associate Professor, and advanced to the rank of Professor in 1996.



Professor Stenones' research is in the area of several complex variables, which is the study of analytic and geometric questions related to regions parametrized by a collection of variables lying in the complex number system. Her research has included hands-on, iterative construction of objects of interest in the subject (functions, mappings, sets). In several of the most interesting cases, the objects she has constructed were ones which previous expert opinion decreed ought not to exist. Her new results have had a significant influence on the subject by reopening the books on a number of fundamental questions which had been dormant for many years. Recently Professor Stenones has studied domains of finite type and their related problems, as well as working on questions in complex dynamics in several variables.

At Michigan, Professor Stenones had 5 successful Ph. D. students, and has served on the committees of or hosted several others. She energetically mentored many postdocs in several complex variables that passed through the Michigan department. She served a term as Graduate Chair, and was active on many departmental committees. She has published over 20 research papers with several collaborators. In 1995 Professor Stenones received the Excellence in Research Award from the College of Literature, Science, and the Arts. During her career, she has been responsible for teaching many of the honors and advanced calculus courses offered in the Department, as well as numerous graduate courses in her area.

See more news on our web site www.math.lsa.umich.edu

In Memoriam

Professor Emeritus **Douglas G. Dickson** passed away peacefully on July 30, 2011 after a prolonged illness. He was 86 years old.



Born on November 11, 1924, in Montclair, New Jersey, his college career at Wesleyan University in Middletown, CT, was interrupted by military service in World War II. He enlisted in the Air Force in 1944 and served as 1st Lieutenant in the Air Weather Service until 1946. He trained to become a meteorologist at Brown University and the Massachusetts Institute of Technology and served in California, Florida, the District of Columbia, and Canada. After an honorable discharge, he returned to Wesleyan and completed his B.A., then attended Harvard University and received his M.A. in 1948.

His first teaching position was at Dartmouth College, after which he started graduate work at Columbia University while teaching part-time at Hunter College, Barnard College, and Columbia. He completed his Ph.D. in mathematics at Columbia in 1958. His area of research was in complex analysis with an emphasis on exponential sums.

He joined the U-M Department of Mathematics as an assistant professor in 1958 and was promoted to associate professor in 1964 and to full professor in 1974. His research resulted in many original theorems and related corollaries that advanced theoretical mathematics. Professor Dickson was a patient mentor of both undergraduate as well as graduate students and held everyone to high ethical standards. He served as chairman of many department committees, mentored student theses and dissertations, and was a highly respected teacher. From 1988 to 1994 he was Managing Editor of the Michigan Mathematical Journal, a period when the journal grew both in size and in the quality of its publications. He retired from the University of Michigan in 1994.

He was dedicated to his family and friends. He had a wry sense of humor and a big smile of greeting. He particularly enjoyed big band jazz and was a jazz drummer. A fan of the Wolverines, he regularly attended U-M football games. He enjoyed the French language and traveled to Paris with his family and for academic research. He was a summer resident of Tumbler Island, Boothbay Harbor, ME where the family has a home.

He is survived by his wife of 59 years, Marilyn (Mitzi), of Ann Arbor and Boothbay Harbor. He leaves a son Stephen and his wife Lisa, and two grandsons Mitchell and Nathaniel of Augusta, Maine, and a daughter Susan of White Plains, New York.

Professor Emeritus **Charles Joseph Titus** passed away peacefully in his sleep on Saturday, February 12, 2011 at the age of 87. He was born June 23, 1923 in Mount Clemens, MI. He received his B.A. degree from the University of Detroit in 1944, his Master's degree in mathematics from Brown University in 1946, and his PhD in mathematics from the University of Syracuse in 1948. After completing his Ph.D., he taught at the University of Syracuse for one year where he met Marian Brackett who was working on her Master of Fine Arts degree. They married later that year when Charles joined the faculty of the University of Michigan. He retired in 1989.

In the early decades of Professor Titus' career, his work centered on topological generalizations of the Riemann Mapping Theorem. In the late sixties, he proved a famous conjecture of Caratheodory: that every closed convex, analytic sphere-like surface has at least two umbilics (i.e., singularities of the curvature). Later, he worked on the theorems in the singularity theory of sense-preserving and area-preserving maps and in perturbation theory of degenerate critical points, and in mathematical economics. His work was always characterized by insightful geometric intuition into analytic problems. His work was especially well received in Europe, where he made extended visits to universities in Pisa, Copenhagen, Bonn, Aarhus, Helsinki, Strasbourg, and most importantly, to the Institut des Hautes Etudes Scientifiques in Paris. In 1958-59, Professor Titus spent an academic year at the University of Berkeley.

Additionally, Professor Titus began a collaboration with Craig Schensted in the 1950s that led to the invention of a number of challenging and popular abstract board games, including "Y" and "Kaliko." Kaliko was produced and marketed nationwide by his son. It was named to "The Games 100" by Games Magazine and selected "one of the ten best games in the world" by Omni Magazine.

Charles Titus was known for his creativity in many aspects of his life. In particular, he was such an accomplished pianist that he was able to do exciting improvisations on the piano in jazz and blues. He will also be remembered fondly for his quick wit and playfulness, which often made him the life of the party. He was a skillful sailor and sailed Lake St. Clair as a young man. He later sailed the British Virgin Islands and off the coast of Denmark with his family. His love of nature led to spending seven summers with the family in a cottage in the woods of Leelanau County on Lake Michigan. His desire for new and novel experiences, his sense of aesthetics, and his strong appreciation for the arts and Mexican culture were all well fulfilled by living in San Miguel de Allende, Mexico with his wife for 18 winters in retirement.

Charles Titus is survived by his wife of 60 years, his daughter Kathleen, and his son Stephen.

In Memoriam

Distinguished University Professor Emeritus **Frederick W. Gehring**, a world-renowned mathematician, died on May 29, 2012 at age 86. Born in Ann Arbor, his association with the University of Michigan went back two generations to his grandfather, John Oren Reed, who was a member of the physics faculty and Dean of the College of Literature, Science, and the Arts. Gehring joined the U.S. Navy in 1943 and subsequently earned two degrees from U-M—B.S. in mathematics and electrical engineering in 1946, and M.S. in mathematics in 1949. After completing his Ph.D. at the University of Cambridge (England) and spending three years as a Peirce Instructor at Harvard, he returned in 1955 to teach mathematics at U-M. He was promoted to Professor in 1962, was named to a collegiate chair in 1984, and became the T. H. Hildebrandt Distinguished University Professor in 1987. His long history of service at U-M includes three terms as chair of the Department of Mathematics. He retired in 1996.

Gehring was a leading figure in the field of quasiconformal mappings. (Briefly, such mappings of the plane send infinitesimal circles to ellipses with bounded eccentricity.) Fulbright and Guggenheim Fellowships in 1958–1960 allowed him to study in Helsinki and Zürich, where he began to learn about quasiconformal mappings. He was instrumental in developing that theory, often in collaboration with Finnish colleagues, and bring-



ing it into the mainstream of mathematical analysis. In particular, he pioneered an important extension of the planar theory to n -dimensional Euclidean space, emphasizing new tools such as extremal length. His work on the higher integrability of quasiconformal Jacobians lies at the foundation of that theory. In later years, working with his former student Gaven Martin, he brought quasiconformal mappings into a broad study of discrete transformation groups.

In 2006, the American Mathematical Society honored Gehring with a Steele Prize for Lifetime Achievement. The citation (Notices of the AMS 53 (2006), 468–469) says in part, “Largely because of Gehring’s work, the theory of quasiconformal mappings has influenced many other parts of mathematics, including complex dynamics, function theory, partial differential equations, and topology. Higher dimensional quasiconformality is an essential ingredient of the Mostow rigidity theorem and of recent work of Donaldson and Sullivan on gauge theory and four-manifolds...Gehring’s mathematics is char-

acterized by its elegance and simplicity and by its emphasis on deceptively elementary questions which later become surprisingly significant.”

Fred Gehring supervised 29 Ph.D. students, many of whom are now faculty members at research universities, and he mentored more than 40 postdoctoral fellows. He maintained contact with his former students and postdocs for many years and continued to inspire them. Fred and his wife Lois took a personal interest in Fred’s students and postdocs, and brought them into their family circle. Two books coauthored with former students will soon be published by the AMS.

In addition to the Steele Prize, Gehring’s many honors include a Humboldt Award, the U-M Distinguished Faculty Achievement Award, Sokol Faculty Award, and Henry Russel Lectureship. He was named Commander of the White Rose of Finland. In 1989 he was elected to the American Academy of Arts and Sciences and to the National Academy of Sciences.

Fred was a devotee of fine wines and single malt whiskies. He loved classical music, foreign languages (he was remarkably fluent in Finnish), and camping. He is survived by his wife Lois, his sons Kalle and Peter, two grandchildren, and his sister Barbara Gehring. A memorial gathering was held in August in Ann Arbor and was attended by 200 people from around the world.

Submitted by Peter Duren

Faculty Recognition

(continued from page 3)

Sijue Wu, the Robert W. and Lynne H. Browne Professor of Mathematics, was awarded the Morningside Gold Medal of Mathematics at the Fifth International Congress of Chinese Mathematicians, hosted in December by Tsinghua University, the Chinese Academy of Sciences, and the Morningside Group. The Morningside Medal is considered the most prestigious award for Chinese experts in Mathematics. Wu is the first woman recipient in the medal’s history.

Associate Professor Michael Zieve gave a plenary talk at the 2011 Fall Central Section Meeting of the American Mathematical Society. His talk, “*The happy marriage between arithmetic geometry and dynamical systems*,” described results he proved jointly with former Michigan undergraduates Alex Carney, Geoff Iyer, Feiqi Jiang, and Ruthi Hortsch, and former Michigan graduate student Ben Weiss.

The Fred & Lois Gehring Professorship

In 1997 Fred and Lois Gehring established an endowed fund to bring distinguished mathematicians to the U-M Math Department to share their knowledge and collaborate with colleagues here. Since that time, more than 40 long- and short-term visiting scholars have received support through the Gehring Professorship, serving as a fitting legacy for Fred’s research.

Inquiry Based Learning at Michigan

What is Inquiry Based Learning?

Surely you remember walking to class, sitting down and waiting for the professor to come. You were ready for the lecture to start. You had done your homework, and felt up-to-date in your work. And surely you remember being confused by the lecture sooner rather than later, and unable to follow it for long, just taking notes for later. Maybe the lecture just went too fast. After all, the material was hopefully easy for your professor. Maybe some critical component for your understanding had been omitted in the lecture and you did not have a chance to ask a question, or you just felt too intimidated. Beyond that, it would be nearly impossible for your instructor to guess all the difficulties any one student may have with the material. Most importantly, you did not have the opportunity to grapple with the material yourself and make it your own.

Inquiry Based Learning, or IBL for short, is an answer to some of the shortcomings of lecture style teaching. It engages the students, and emphasizes discovery, analysis and investigation to deepen the students' understanding of the material and its applications. Students learn through guided exploration with the help of experienced instructors. IBL has its roots in the Moore method which was used by R. L. Moore at the University of Texas at Austin, and adapted by other famous mathematicians, for example Paul Halmos (at Michigan in the 1960s). Here is a second description of the method from the website of the Academy of Inquiry Based Learning:

Boiled down to its essence IBL is a teaching method that engages students in sense-making activities. Students are given tasks requiring them to solve problems, conjecture, experiment, explore, create, and communicate...all those wonderful skills and habits of mind that Mathematicians engage in regularly. Rather than showing facts or a clear, smooth path to a solution, the instructor guides students via well-crafted problems through an adventure in mathematical discovery.

IBL at Michigan

While IBL courses have been taught in smaller colleges and a very few larger universities for some time, five major mathematics departments committed to develop IBL on their campuses in 2004, in response to grants offered by Harry Lucas, Jr., and the Educational Advancement Foundation. Besides Michigan, the universities of Chicago, Texas, UC Santa Barbara and Harvard all started IBL Centers.

Since the inception of our IBL Center in 2004, we have developed and taught IBL classes, and trained many new faculty and grad students in IBL methods. We have IBL classes in three rather distinct avenues of the undergraduate educational experience.

We offer two freshmen seminars as IBL courses. The first is an introduction to cryptology, taught in the Fall. The students get to understand basic number theory, combinatorics and their applications to coding and decoding messages. They also learn to argue, write and explain precise mathematical arguments. We consider this class a grand training ground for students' analytical skills. Also, this course has attracted quite a few students to the mathematics major. In the Winter term, we offer a follow-up class exploring analysis and topology of the real line. This is a bridge back to our calculus sequences, and it again emphasizes mathematical thinking, this time about calculus. We also offer our Calc I and II courses in small classes to thousands of students. In these, we intersperse short lectures with in-class group work. Our way of teaching calculus has proved very successful in national assessments, for example in the Calculus Inventory Test. Additionally, we train many young instructors in our way of teaching calculus, giving them an edge in their job search later.

Our math majors have several IBL classes to choose from: real analysis, topology, probability and a very special class exploring mathematical research. The latter is an intense experience with groups of students working on open ended problems. It has fewer class meetings but instead the groups meet with the instructor and assistants extensively during lab hours. Students prepare a written report and give a talk about their findings. The problems come from diverse areas of mathematics, and are accessible to students early on.

In our third and possibly most important effort, we have reformed our pre-service teacher education in mathematics to include IBL courses which emphasize mathematical thinking and understanding over rote learning of algorithms. We very much hope that these future teachers will incorporate both their improved understanding and also the IBL methodology in their future K-12 classes.

Remarkably, IBL ideas have also found their way into more traditional lecture courses, for example via special IBL days or projects and other work led by the students. Interestingly, the positive engaging atmosphere of the IBL component often spreads to the lecture part and makes the students much more comfortable interacting and asking questions.

The Evidence

Sandra Laursen and her group of ethnologists at the University of Colorado in Boulder conducted an assessment of the IBL Centers over three years starting in 2007. She was assisted locally by Vilma Mesa (Michigan) and graduate students in our School of Education.

The outcomes of this large study have been very positive and encouraging. Compared to traditional lecture based courses, they reported higher cognitive gains. In particular

they found better understanding of concepts, and improved thinking and problem-solving skills. Similarly, there are excellent affective gains: Confidence increased, attitude and persistence improved, and students were better able to collaborate and discuss mathematics amongst themselves. Particularly striking is Laursen's finding that the percentage of time that the instructor spent on student-centered activities was the single best predictor of student gains.

Laursen's study detected the foremost advantages among women and students with weaker backgrounds and less prior mathematical achievement. The gains continued through subsequent required mathematics courses, IBL or not. To quote Laursen: "IBL approaches appear to level the playing field for women, compared to traditional lecture-based approaches." And, for all students, "taking IBL courses may benefit, and certainly does not harm, their performance in later mathematics courses."

We refer to <http://www.colorado.edu/eeer/research/steminquiry.html> for more detailed reports.

The Future

This is a critical time in higher education. Many forces are pulling on the standard model of lecture based courses, mostly trying to make education more "efficient" or "cheaper." This typically means delivering the material covered in a standard class with fewer instructors, more students and less interaction. Large classes with or without tutorial sessions, web based classes and other innovations have this potential. Will this actually educate our students, and make them into thinking individuals who can solve problems at their future workplace? While there is a place for communicating information in the most efficient way possible, this is different from understanding it and being able to use it actively.

At the Michigan Mathematics Department, we plan to address this concern by offering a substantial number of IBL courses aimed at very different students and interests. This will complement traditional lectures and other types of learning and allow our students to acquire the critical thinking skills so much needed.

We will also train many new instructors in IBL techniques, with the expectation that they will be able to implement these ideas at their future homes. This puts Michigan once again at the forefront of an important movement in education.

Support

The IBL Center at Michigan has been supported by Harry Lucas, Jr. and the Educational Advancement Foundation, by the National Science Foundation, the IDEA Institute at the University of Michigan and, of course, the University of Michigan itself. This support has been substantial but will not be sufficient to carry on our center long term as we envision it, shaping powerful ideas in education and training both the next wave of students in mathematics and their educators. We are

in the process of setting up a fund for the IBL Center that will accept additional donations. They will be used to fund the IBL Center in general and in particular to set up postdoctoral fellowships and scholarships and prizes for students pursuing mathematics in an IBL environment.

We invite you to explore our IBL Center at: www.math.lsa.umich.edu/ibl/, and especially recommend Kyle Petersen's description of MATH 175 at: www.math.lsa.umich.edu/ibl/InquiryBasedLearninginCryptography.pdf.

*Professor Ralf Spatzier
IBL Program Director*

View from the Chair's Office

(continued from page 1)

Career Day in November when alumni return to talk about what they are doing. As academics, we rely on alumni to tell us (and therefore the current students) about career options and the usefulness of math out in the real world. This year we already have 20 alumni signed up for the career conference. If alumni can't make the career conference, our Undergraduate Program Director, Professor Stephen DeBacker, would be more than happy to hear their stories via e-mail to lsa-math-updir@umich.edu.

One of our important programs is the development of courses at least part of which are taught using the ideas of Inquiry Based Learning. The students get to discover at least part of the material on their own, which imparts a richer, deeper understanding. We are starting a separate support fund for IBL activities. These activities are discussed in greater detail on page 8.

For many years we have had Math Club and Actuarial Club meetings; this year, we have a new Women in Math Club as well. Despite these difficult times, the Department has been outstandingly successful in meeting its obligations as a research institution and as a center for education, both at the graduate and undergraduate levels.

Professor Mel Hochster, Chair

Considering a gift to UM?

Online giving is available here
<https://dartbbncprod.dsc.umich.edu/>

Or make a donation by phone 1-888-518-7888

Some giving opportunities are listed on the Math Web Page

2010-11 Graduate Program Fellowships & Awards

The Wirt and Mary Cornwell Prize in Mathematics

Chelsea Walton

Alice Webber Glover Scholarship

Pedro Acosta
Harry Altman
Samuel Altschul
Guaiying Gu
Daniel Hathaway
Seung Jin Lee
Kin Kwan Leung
J. Felipe Perez
Ariel Shnidman
Mary Wootters
Xin Zhou

Allen L. Shields Fellowship

Eugene Eisenstein

Arthur Herbert Copeland, Sr. Memorial Scholars

David Benson-Putnins
Adam Kaye
Russell Ricks

Cameron & John Courtney Scholarship

Peter Bosler
Yefeng Shen

CONACYT - Consejo Nacional de Ciencia Y Tecnología

Luis Nunez Betancourt

E.S. & A.C. Everett Memorial Scholarship

Pedro Acosta

Gabrielle & Sophie Rainich Fellowship

Huaiying Gur

IGERT Fellowship

Maria Riolo
Jared Whithead

Luther Claborn Mathematics Fellow

Zhao Lan

Juha Heinonen Memorial Graduate Fellowship

Zhibek Kadyrsizova

Mathematics Alumni/ Alumnae Scholarship

Suchandan Pal

Mathematics Department Graduate Fellowship

Kevin Carde
Emily Clader
Daniel DeWoskin
William Drobny
Brittan Farmer
Balin Fleming
Nicolas Ford
Purvi Gupta
Giwan Kim
Rafe Kinsey
Matthew Masarik
Nathan Priddis
David Prigge
Hamed Razavi
Gregory Simon
Yi Su
Brooke Ullery
Jeremy West
Tengren Zhang
Yuchong Zhang
Zhou Zhou
Andrew Zimmer

Mathematics Outstanding GSI Awards

Jennifer Beichman
Harlan Kadish
Geoffrey Scott
Mark Shoemaker

National Defense Science and Engineering Graduate Fellowship

Michael Chmutov
Ross Kravitz

National Physical Science Consortium Fellowship

Christopher Fraser

National Science Foundation Fellows

William Abram
Rachel Karpman
Zachary Scherr
Brandon Seward

Natural Science & Engineering Research Council of Canada Scholarship

Jeffrey Calder

President's Challenge for Graduate Support

Shawn Henry

Rackham International Fellowship

Yu-Jui Huang

Rackham One-Term Dissertation Fellows

Peter Bosler
Max Glick
Ashley Holland
Daniel Kneezel
Joseph Roberts

Rackham Predoctoral Fellow

Matthew Elsey

Rackham Research Grant

Ashley Holland

Rackham Science Award

Suchandan Pal
David Prigge
Ashley Wheeler

Mathematics Regents Fellowship

Rafe Kinsey
Burhan Sadiq

Research Training Grant (RTG)- Algebra

Max Glick
Jose Gonzalez
Daniel Hernandez
Brian Jurgelewicz
Alexander Mueller
Julian Rosen
Mark Shoemaker
Michael Von Korff
Chelsea Walton
Benjamin Weiss
Emily Witt

Research Training Grant (RTG)- Geometry

William Gignac
Becky Hoai
Sara Lapan
Robin Lassonde
Michelle Lee
Jeffrey Meyer
Geoffrey Scott
Jordan Watkins

Sumner B. Myers Memorial Prize

Kevin Tucker

Departmental Spring Scholarship

Linquan Ma
Alfredo Wetzel
Yilin Wu
Xiaolei Zhao

2011 Doctorate Degrees

Florian Block completed his dissertation “*Plane Curves, Node Polynomials, and Floor Diagrams*” under the direction of Sergey Fomin. He is a postdoctoral fellow at the University of Warwick.

Eugene Eisenstein completed his dissertation “*Inversion of Adjunction in High Codimension*” under the direction of Robert Lazarsfeld. He is an associate in risk assessment with Goldman Sachs.

Matthew Elsey completed his dissertation “*Algorithms for Multiphase Motion with Applications to Materials Science*” under the direction of Selim Esedoglu. He is a postdoctoral fellow at the Courant Institute.

Timothy Ferguson completed his dissertation “*Extremal Problems in Bergman Spaces*” under the direction of Peter Duren. He is a postdoctoral fellow at Vanderbilt University.

Jose Gonzalez completed his dissertation “*Toric Projective Bundles*” under the direction of Mircea Mustata. He is a postdoctoral fellow at the University of British Columbia.

Daniel Hernández completed his dissertation “*F-Purity for Hypersurfaces*” under the direction of Karen Smith. He is a postdoctoral fellow at the University of Minnesota.

Gerardo Hernández-Dueñas completed his dissertation “*An Algebra of Singular Semi-classical Pseudodifferential Operators, and Numerical Methods for Shallow Water and Porous Media Flows*” under the direction of Smadar Karni and Alejandro Uribe. He is a postdoctoral fellow at the University of Wisconsin.

Brian Jennings completed his dissertation “*Generalized Lagrangian States and Their Propagation in Bargmann Space*” under the direction of Alejandro Uribe. He is a visiting assistant professor at Westfield State University.

Harlan Kadish completed his dissertation “*Complexity in Invariant Theory*” under the direction of Harm Derksen. He is a postdoctoral fellow at Texas A & M University.

Hyosang Kang completed the dissertation “*Cofinite Classifying Spaces for Lattices in R-Rank One Semisimple Lie Groups*” under the direction of Lizhen Ji.

Daniel Kneezel completed his dissertation “*Verlinde K-Theory*” under the direction of Igor Kriz.

Manuel Rodrigo Parra completed his dissertation “*Currents and Equidistribution in Holomorphic Dynamics*” under the direction of Mattias Jonsson.

Ricardo Portilla completed his dissertation “*Finite Order Automorphisms and a Parametrization of Nilpotent Orbits in p-adic Lie Algebras*” under the direction of Stephen DeBacker. He has taken a job outside of academics.

Austin Shapiro completed his dissertation “*Independence Models for Integer Points of Polytopes*” under the direction of Alexander Barvinok.

Xinyun Sun completed the dissertation “*CM Lifting of Abelian Varieties*” under the direction of Brian Conrad.

Nathan Totz completed his dissertation “*A Rigorous Justification of the Modulation Approximation to the 2D Full Water Wave Problem*” under the direction of Sijue Wu. He is a postdoctoral fellow at Duke University.

Chelsea Walton completed her dissertation “*On Degenerations and Deformations of Sklyanin Algebras*” under the direction of Karen Smith and Toby Stafford. She is a NSF postdoctoral fellow at the University of Washington.

Ting Wang completed the dissertation “*Stochastic Analysis of Insurance Products*” under the direction of Virginia Young. Ting is an associate in finance with Goldman Sachs.

Benjamin Weiss completed his dissertation “*Diophantine Equations With Two Separated Variables*” under the direction of Jeffrey Lagarias and Michael Zieve. He is a postdoctoral fellow at the Technion in Haifa, Israel.

Emily Witt completed her dissertation “*Local Cohomology and Group Actions*” under the direction of Mel Hochster. She is a Durham Jackson Assistant Professor at the University of Minnesota.

Qian Yin completed the dissertation “*Lattès Maps and Combinatorial Expansion*” under the direction of Mario Bonk. Qian is a postdoctoral fellow at the Mathematical Sciences Research Institute.

Crystal Zeager completed her dissertation “*The Azukawa Metric and the Pluricomplex Green Function*” under the direction of John Erik Fornæss. She is an associate with McKinsey & Co.

2011-12 Graduate Program Fellowships & Awards

A. W. Flint Memorial Scholarship

Xiaolei Zhao

Allen L. Shields Fellowship

Aurel (Mihai) Fulger

Cameron & John Courtney Scholarship

Corey Everlove
Yefeng Shen

CONACYT

Luis Nuñez Betancourt

Departmental Scholarship, Spring 2012

Zhibek Kadyrsizova
Seung Jin Lee
Sijun Liu
Linquan Ma
Hieu Ngo
Jingchen Wu
Zhixian Zhu

Gabrielle & Sophie Rainich Fellowship

Nicolas Ford

IGERT Fellowship

Maria Riolo
Jared Whitehead

Juha Heinonen Memorial Graduate Student Fellowship

Brooke Ullery

Luther Claborn Mathematics Scholarship

Kin Kwan Leung

Marjorie Lee Browne Scholars

Daniel Jonas
Raymundo Navarrete
Andre Souza
Dana Suttman

Mathematics Alumni/ Alumnae Scholarship

Gary Marple

Mathematics Department Graduate Fellowship

William Abram
Pedro Acosta
Harry Altman
David Benson-Putnins
Andrew Brouwer
Daniel DeWoskin
William Drobny
Brittan Farmer
Balin Fleming
Stefan Froehlich
Weichen Gu
Daniel Hathaway
June Huh
Matthew Jacobs
Rachel Karpman
Adam Kaye
Giwan Kim
Gene Kopp
Jake Levinson
Jiaqi Li
Wei Li
Suchandan Pal
David Prigge
Rohini Ramadas
Hamed Razavi
David Renardy
Maria Riolo
Andrew Schaug
Wenling Shang
Gregory Simon
Daniel Smyth
David Stapleton
Yi Su
Olivia Walch
Robert Walker
Jeremy West
Xin Zhou
Zhou Zhou

Mathematics Scholarship Fund

Juan Perez

President's Challenge for Graduate Support

Mary Wootters

National Science Foundation Fellow

Rebecca Rebhuhn-Glanz
Zachary Scherr
Brandon Seward
Robert Silversmith
John Wiltshire-Gordon

National Physical Science Consortium Fellowship

Christopher Fraser

Natural Science & Engineering Research Council of Canada Scholarship

Jeffrey Calder

Rackham International Fellowship

Purvi Gupta
Yuchong Zhang

Rackham One-Term Dissertation Fellows

Samuel Altschul
Jennifer Beichman
Sijun Liu
Sarah Mayes
Lindsey McCarty

Rackham Outstanding GSI Award

Mark Shoemaker

Rackham Science Award (RSA)

Suchandan Pal
David Prigge
Robert Walker

Ralph B. Baldwin Prize in Astrophysics and Space Sciences

Catherine Kublik

Research Training Grant (RTG) - Algebra

Kevin Carde
Nicolas Ford
Andrey Mishchenko

Alexander Mueller
Julian Rosen
Ariel Shnidman
Michael Von Korff
Ashley Wheeler

Research Training Grant (RTG) - Geometry

Emily Clader
William Gignac
Becky Hoai
Sara Lapan
Robin Lassonde
Michelle Lee
Nathan Priddis
Russell Ricks
Geoffrey Scott
Mark Shoemaker
Jordan Watkins
Nina White
Andrew Zimmer

Sumner B. Myers Memorial Prize

Matthew Elsey

The Department of Mathematics Outstanding Teaching Award

Jae Kyoung Kim

The Karen Rhea Excellence in Teaching Award

Kevin Carde

The Mort Brown Excellence in Teaching Award

Jeremy West

The Pat Shure Excellence in Teaching Award

Emily Clader

Wirt & Mary Cornwell Prize

Matthew Masarik

2012 Doctorate Degrees

Taeyong Ahn completed the dissertation “*Foliation Structure for Generalized Henon Mappings*” under the direction of John Erik Fornæss.

Aubrey da Cunha completed his dissertation “*Turing Machines, Cayley Graphs, and Inescapable Groups*” under the direction of Andreas Blass. He has a position with MathWorks.

Elizabeth DeWitt completed her dissertation “*Identities Relating Schur s -Functions and Q -Functions*” under the direction of John Stembridge.

Steven Flores completed his dissertation “*Correlation Functions in Two-Dimensional Critical Systems with Conformal Symmetry*” under the direction of Charlie Doering.

Aurel Fulger completed the dissertation “*Local Volumes*” under the direction of Robert Lazarsfeld. Aurel has a position with Princeton University.

Max Glick completed his dissertation “*The Pentagon Map: Combinatorial and Geometric Perspectives*” under the direction of Sergey Fomin. He has a position at the Mathematical Sciences Research Institute.

Xueying Hu completed the dissertation “*Essays in Financial and Insurance Mathematics*” under the direction of Erhan Bayraktar. Xueying has a position with Goldman Sachs.

Geri Izbicki Jennings completed the dissertation “*Efficient Numerical Methods for Water Wave Propagation in Unbounded Domains*” under the direction of Smadar Karni.

Robin Lassonde completed her dissertation “*Splittings of Non-Finitely Generated Groups*” under the direction of Peter Scott.

Michelle Lee completed her dissertation “*Dynamics on the $PSL(2, C)$ -character variety of certain hyperbolic 3-manifolds*” under the direction of Richard Canary. She has a position at the University of Maryland.

Matthew Masarik completed his dissertation “*Decay of Solutions to the Wave Equation in Static Spherically Symmetric Spacetimes*” under the direction of Joel Smoller. He has a position with SRI International.

Lindsey McCarty completed her dissertation “*Preemptive Rerouting of Airline Passengers under Uncertain Delays*” under the direction of Divakar Viswanath. She has a position with Cedarville University.

Ajinkya More completed the dissertation “*Symbolic Powers and other Contractions of Ideals in Noetherian Rings*” under the direction of Mel Hochster.

Darragh Rooney completed the dissertation “*Control of Finite-Dimensional Quantum Systems under Lindblad Dissipation*” under the direction of Anthony Bloch. Darragh has a position with Universitat Wurzburg.

Jordan Sahattchiev completed the dissertation “*Solutions to Two Open Problems in Geometric Group Theory*” under the direction of Peter Scott.

Michael Von Korff completed his dissertation “*The F -Signature and Frobenius Splitting on Toric Varieties*” under the direction of Karen Smith.

Nina White completed her dissertation “*Bounds on Eigenvalues of the Laplace-Beltrami Operator for Certain Classes of Hyperbolic 3-manifolds*” under the direction of Juan Souto and Richard Canary. She has a position with the University of Michigan.

Jared Whitehead completed his dissertation “*Topics in Geophysical Fluid Dynamics*” under the direction of Charlie Doering. He has a position with Los Alamos National Laboratory.



The 2012 Mathematics All-Stars IM Basketball team: (l-r) Chris Fraser, Kurt Mishchenko, Yijun Wei, Greg Simon, Luis Nunez Betancourt, David Stapleton, Yu-Jui Huang, Jae Kyoung Kim, Daniel Smyth.

Actuarial Program Highlights

Our programs in Actuarial and Financial Mathematics are extremely popular and continue to thrive. Our Actuarial Program was designated by the Society of Actuaries as a Center of Actuarial Excellence in 2010. Only 23 schools in the world have earned this designation.

At last count, nearly 400 students had declared concentrations in Actuarial and Financial Mathematics; they comprise over 60% of the total number of undergraduate mathematics concentrators. Moreover, we have three Masters students focusing on Actuarial Mathematics and we have six Ph.D. students working on problems in insurance and finance.

Our students are well-recruited by employers. In 2011-2012, representatives from 15 companies visited campus to recruit our students for full-time positions and summer internships. Moreover, our students visited six companies at their headquarters.

Our student-run actuarial club, Student Actuaries@Michigan, or SAM, had a busy year. With more than 150 members, this group is one of the more active academically-focused groups on campus. Their activities include resume and interview workshops, campus visits from and field trips to prospective employers, outreach to local high schools to promote the actuarial profession, intramural sports, and social events.

Students who are members of SAM and have completed courses related to the professional examinations become eligible for subsidization of their examination fees. These fees are a significant expense for college students. The first two examinations cost \$200 each and the later exams are more expensive. With increased enrollments and increased examination fees, the subsidization program has become a significant recurring expense.

In September 2011, students, faculty, and alumni attended the Actuarial Alumni/ae Leadership Council to discuss future directions for the Michigan program. In October 2011, Tom Terry (MA 1975) hosted a reception for alumni/ae in conjunction with the Society of Actuaries Annual Meeting in Chicago. Over 40 alumni/ae, faculty, and students attended the event.

In April 2012, we held the Tenth Annual Cecil J. Nesbitt Commencement Lecture. Over 100 people attended, including graduating seniors, their families, and the faculty. We celebrated the graduates' accomplishments with a brunch, and our speaker was Tom Levy (MA 1965), Senior Vice President and Chief Actuary at The Segal Company. This event is a high point of the actuarial academic year.

We are pleased to report that we recently renovated the Cecil J. Nesbitt Undergraduate Common Room. It is a comfortable and inviting room for studying, socializing, or relaxing. Moreover, the Undergraduate Mathematics Club meets there every Thursday afternoon to enjoy pizza and an accessible talk on current areas of mathematical research or insights on old or new

mathematical problems. The newly renovated room features floor-to-ceiling chalkboards, a glass wall for writing, large tables, a sofa, and beanbag chairs.

The Nesbitt Commencement Lecture and Nesbitt Undergraduate Common Room are named for the late Professor Cecil Nesbitt, who was a mainstay of our Actuarial Program for 63 years. Professor Nesbitt was an outstanding teacher, mentor, administrator, and department citizen. Many of his students went on to become CEOs, CFOs, chief actuaries, and presidents of the professional actuarial societies. Professor Nesbitt was adored by his students; indeed, their loyalty and fondness for him is uncanny. We are sad to report that Professor Nesbitt's wife, Ethel Nesbitt, passed away in September 2011 at the age of 97.

The faculty and students look forward to hearing from you with any comments, questions or suggestions you might have. And, if your travels bring you though Ann Arbor, please let us know so that we can host a visit in our East Hall home.

Kristen Moore
Associate Professor of Mathematics

The group below posed at the Actuarial Commencement ceremony. Front row, l-r: Lecturer Bradley Hinesman, Lecturer Joseph Marker, Associate Professor Kristen Moore, Professor Curtis Huntington. Back row, l-r: Nathan Hallman, Keivelle Lake, Yueh Phing Chung, David Moskowitz, Qingzi Kong, Zheng Xiang Ong.



Math Circle Program Mentors Future Mathematicians

On Thursday evenings during the fall and winter terms, the Department of Mathematics is populated by a group of local middle and high school students attending the Michigan Math Circle. Math Circles are a form of educational enrichment and outreach that bring professional mathematicians into direct contact with pre-college students. Focusing on the process of mathematical discovery and open-ended exploration, the Circle's goal is to deepen the students' passion for mathematics through the study of challenging, new, and exciting material. The parent of one of the middle school students writes, "[because of Math Circle] My son is energized about math and about learning in an entirely new way. He wishes that all of school were like Math Circle and constantly talks about that."

A typical Math Circle evening in East Hall begins with the statement of a problem. For example:

The economy of East Hall has only two types of coins: one is worth five cents while the other is worth seven. The economy requires exact change for every purchase. What is the most expensive item you cannot purchase using these coins?

Within seconds the students begin thinking, scribbling, and discussing. On the evening that the above problem of Frobenius was posed, the solution (23--don't trust us, check for yourself) was found by all within a few minutes. Over the next two weeks, more general questions about coins were asked



Middle school students work on a problem in Math Circle.

and answered, and, along the way, many beautiful topics, like generating functions, were introduced, discussed, and used. One high school student says that she finds Math Circle "a really rewarding experience. The math we discuss is absolutely fascinating, but what I most appreciate is that, in the process of discussion, we learn how to think through problems and discover the answers ourselves. Because of Math Circle, I now have a deeper appreciation and understanding of interesting topics in mathematics, which I would not have gained from the usual process of memorizing and following a set of steps from a textbook."

Every two weeks, a new instructor introduces a new topic. The instructors are usually local mathematicians—including university faculty, graduate students, and others. Past top-

ics presented by faculty include Pythagorean triples, magic squares, primes, puzzles, games, probability, geometry, and combinatorics.



High school students at a Math Circle presentation.

out excited about whatever was being discussed."

In the Department, Math Circle is spearheaded by Professor Stephen DeBacker, who is also the Undergraduate Program Director. In addition to the rotating cast of instructors, he is also assisted by a loyal group of undergraduate volunteers. With the help of the undergraduates, the ratio of "students" to "teachers" can be as low as two-to-one and never exceeds three-to-one.

DeBacker says "the idea of forming a local Math Circle had been kicking around for some time. But, everyone was very busy dealing with the growth of the undergraduate program. Then, two summers ago two families from the area approached the Math Department about forming a Math Circle. This external push got the ball rolling, and I think that it has worked out well for everyone. In fact, it has even helped on the undergraduate side: the Math Circle provided an excellent outlet for undergraduates to share their passion with others."

DeBacker hopes to continue Math Circle and eventually expand it to include a program for middle and high school teachers in the area. "We would like to engage teachers in a conversation about mathematics. It is not just about resources, knowledge, certification, but also about forming a larger community, a "circle" if you will, with a thriving mathematical culture. Math is fun and cool, but without a supporting culture, it is hard to remain enthusiastic throughout an entire school year." Math Circle is one step towards forming a greater community in which students of all ages, educators, and academics can connect and share their enthusiasm for mathematics.

For more information on the Michigan Math Circle, please see the webpage <http://www.math.lsa.umich.edu/mathcircle/>.

2011 Undergraduate Awards

Putnam Competition

The Department's team for the 2011 William Lowell Putnam Competition placed 20th in the competition. The members of the team were **Paul Lewis**, **Han Qi** and **Nicholas Triantafillou**. In the individual competition, **Paul Lewis** and **Zeyin Zhang** received honorable mentions, placing in the top 50 out of more than 4000 students.

In the 28th Annual University of Michigan Undergraduate Mathematics Competition **Zeyin Zhang** was first, **Nicholas Triantafillou** placed second and **Matt Tanzer** was third.

Margaret S. Huntington Awards in Actuarial Outreach

Justin Barnowski
Luke Bruski
Sonya Tung Choi
Kathleen Chou
David Hiskens
Yazan Kherallah
Andrew Le
Megan Lim
Keith Minbiole
Tsz Yuet Agnes Shum
Ashwin Varghese
Sarah Wales

Evelyn O. Bychinsky Awards

recognizing underclass students who show exceptional promise in mathematics:

Michelle E. Bodnar
Rebekah Bartlett
Blythe S. Moreland
Justin D. Priest
Han Qi
Peggy B. Sah
David A. Sherman
Daniel B. Smolkin
Charles H. Stibitz
Nicholas G. Triantafillou
Huisu Xu

Leon P. Zukowski Prize

recognizing outstanding service in the Mathematics Learning Center:

Nur Ain Afiqah Binto Sunaim

Sumner B. Myers Award in Analysis

Garrett Lyon

William LeVeque Award in Number Theory

Alexander Carney

Jack McLaughlin Award in Algebra

Feiqi Jiang

George Piranian Excellence in Mathematical Writing Award

Justin Campbell

Wilfred Kaplan Award in Applied Mathematics

Michael Simonov

Mathematics Alumni/Alumnae Scholarship

Justin Campbell

Outstanding Achievement in Mathematics Awards

Eric Blancke
Jordan Eizenga
Hamza Ghadyali
Wenli Gu
Shuying Ke
Adam Lamm
Ho Seung Lee
Madeline Metzger
Melissa Ng
Michael Quail
Scott Reed
Daniel Russo
Tongtong Shi
Andre Shultz
Kyle Sinclair
Danyang Su
Brian Tseng
Meng Wang
Pearce Washabaugh
Ping Xiao
Shuyuan Zhao

Otto Richter Memorial Prize in Actuarial Science

Philip Rutila

Irving Wolfson Award

Shuhan Wang

CIGNA Award

Xiaoxiao Liu

Lois Zook Levy Award

recognizing an outstanding mathematics student who plans to pursue a career in K-12 mathematics education:

Lara Hulbert
Amanda McCormick

Michigan Mathematics Merit Scholar

Mendel Feygelson
Claudia Raithel
Spencer Smith

Outstanding Graduating Seniors

David Clyde
Ruthi Hortsch
David Montague
Yang Xiu

Wirt and Mary Cornwell Prize in Mathematics

Alexander Carney



Professor Curtis Huntington presents the Wilfred Kaplan Award in Applied Mathematics to Michael Simonov.

2012 Undergraduate Awards

Putnam Competition

The Department's team for the 2012 William Lowell Putnam Competition placed 8th in the competition, receiving an Honorable Mention Award. The members of the team were **Paul Lewis, Nicholas Triantafillou, and Zeyin Zhang**. In the individual competition, **Zeyin Zhang, Nicholas Triantafillou, Jafar Jafarov** and **Matt Tanzer** all ranked in the top 100 out of more than 4400 students.

In the 28th Annual University of Michigan Undergraduate Mathematics Competition **Nicholas Traintafillou** was first, **Matt Tanzer** placed second and **Zeyin Zhang** was third.

Margaret S. Huntington Awards in Actuarial Outreach

Michael Gapczynski
Joyce Jih
Vishaal Kalwani
Spencer Kim
Heather Logan
Akshay Moorthy
Paul Myer
Max Olender

Evelyn O. Bychinsky Awards

recognizing underclass students who show exceptional promise in mathematics:

Rebecca Gleit
John Holler
Molly Logue
Juan Jing Ng
Salvatore Parenti III
Wei Qian
Dominic Spadacene
Sarah Wales
Nicholas Wasylshyn
Ashley Weber
Elliot Wells
Michaela Wood

Sumner B. Myers Award in Analysis

Justin Priest

William LeVeque Award in Number Theory

David Sherman

Jack McLaughlin Award in Algebra

Charles Stibitz

George Piranian Excellence in Mathematical Writing Award

Molly Logue
Dominic Spadacene

Wilfred Kaplan Award in Applied Mathematics

Rebecca Gleit

Mathematics Alumni/Alumnae Scholarship

Rebekah Bartlett

Outstanding Achievement in Mathematics Awards

James Brunner
Ben Charoenwong
Chen Yulan
Yueh Phing Chung
Xiang Dong
Zhenyu Jia
Courtney Kaita
Yen Yen Khoo
Ernest Koh
Hyun Mo Koo
Kelly Ku
Cory Levinson
Seong Gee Lim
Ellen Lin
Yunjun Mao
Andrew Mills
Kai Liang Nyo
Douglas Rottmann
Alexander Schmidt
Khai Zhi Sim
Weichao Wang
Ziheng Yang

Otto Richter Memorial Prize in Actuarial Science

Albert Tan

Irving Wolfson Award

Nathan Hallman

Lois Zook Levy Award

recognizing an outstanding mathematics student who plans to pursue a career in K-12 mathematics education:

AnnieJae Fishburg

Michigan Mathematics Merit Scholar

Justin Campbell
Alexander Carney
AnnieJae Fischburg
Cassandra Hall
Geoffrey Iyer
Feiqi Jiang
Paul Lewis
Christopher Link
Han Qi
Albert Tan
Shuhan Wang

Outstanding Graduating Seniors

Justin Campbell
Alexander Carney
Paul Lewis

Wirt and Mary Cornwell Prize in Mathematics

David Sherman

ContinuUM Editorial Board:

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Suzanne H. Rogers, Editor
Stephen DeBacker
Curtis E. Huntington
Kristen Moore
Ralf Spatzier

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www.math.lsa.umich.edu/alumni/

Undergraduate Mathematics Problem Solving at UM in the Early 1980s - by Martin Erickson

Participation in the Math 289 Problem Solving courses was an important part of my mathematics studies at the University of Michigan in the early 1980s. These one credit seminars, in addition to preparing students to take the William Lowell Putnam Mathematical Competition, vividly demonstrated how the different branches of mathematics tie together for the goal of solving challenging problems.

Professor Mel Hochster's class was a weekly lecture on a different subject (parity, pigeonhole principle, recurrence relations, etc.) followed by a problem set. Some of the problems were memorable, such as this old chestnut: Given a point inside an equilateral triangle at distances 3, 4, and 5 from the vertices, what is the side length of the triangle? A good problem leads to rich mathematics. This one leads to Kummer's tetrahedral surface. My peers and I were stimulated by these problems. We were delighted when we solved one and got a turn at the blackboard to share a solution.

In 1981 Professor Hochster gave us a "Putnam-Like Exam" consisting of six problems--a forerunner of the long-standing University of Michigan Undergraduate Mathematics Competition. The first problem on the exam was cute: Four distinct spheres of radius one are contained in a regular tetrahedron in such a way that each is tangent to three faces and to the three other spheres as well. Find the side length of the tetrahedron.

The fun and learning continued in Professor Hugh Montgomery's classes. He lectured on Chebyshev polynomials, Lagrange's four squares theorem, and algebraic inequalities, among other topics. The problems ranged from routine to unsolved. An example of the latter is this geometry question: Prove that n^2+1 unit squares cannot cover a square of side length greater than n . This remains an open problem today, although Alexander Soifer has made progress.

I proposed a problem myself in Professor Montgomery's course and was

happy to have it included in a problem set. Suppose you start at the southwest corner of an $n \times n$ square grid, and progress right or up one unit at a time, choosing the direction at random. When you reach the north or east edge, what is the expected number of steps to the northeast corner? We didn't realize that this is a version of Stefan Banach's Matchbox Problem, but I was becoming hooked on the venerable mathematical activity of problem posing and solving.

By the time I entered the graduate program at UM, I was on my way to being a problem composer. Here is one I contributed to the 1986 (UM)²: Suppose that five particles travel back and forth on the unit interval $[0, 1]$. At the start, all five particles move to the right with the same velocity. When a particle reaches 0 or 1, it reverses direction but maintains its speed. When two particles collide, they reverse direction and maintain speed. How many particle-particle collisions occur before the five particles occupy their original positions and are moving to the right?

Involvement in the UM problem solving seminars helped me decide to go into mathematics as a profession. Where I teach, I have heard students comment that problem solving is their favorite course. One of my international students told me that this is how mathematics is taught in his home country of Vietnam. Problem solving courses complement the subject curriculum. I don't have a survey, but it's plausible that the problems we wrestle with in our formative years have an impact on our developing mathematical tastes. Through contests, seminars, and journal problems, UM professors in the 1980s showed us the importance of problem solving!

Martin Erickson (B.S. 1985, Ph.D. 1987) is a professor of mathematics at Truman State University. He coached Truman's Putnam team from 1988 to 2008. He has written seven mathematics books. The most recent title, Beautiful Mathematics, was published by the MAA in 2011.

Alumni Updates

David Carson (BBA 1955) was the senior actuary of the Hartford, then became the chief executive of Middlesex Mutual Assurance. He was named CEO of People's Bank in Connecticut, then spent ten years as director of Mutual Funds, retiring from Prudential Retail Funds in 2009. Most recently he served on the State Commission on Educational Achievement, producing a report on overcoming the achievement gap between rich and poor students in public education. Read it at: www.ctachieve.org. If you have a Michigan degree you can do anything!

Alan Wilde (BS 1970, MA 1973) is a Platinum member of Cambridge Who's Who, and was included in the 2011 Worldwide Who's Who. He received a medal in 2008 as one of the "Outstanding People of the 20th Century."

Lawrence M. Kahn (BS 1971) is a Professor of Economics and Labor Relations at Cornell. He is the inaugural holder of the Braunstein Family Professorship and is editor of the *Industrial & Labor Relations Review*.

Alex Kasman (BS 1989, Ph.D. 1995) is a professor at the College of Charleston. He has written the books *Glimpses of Soliton Theory: The Algebra and Geometry of Nonlinear PDEs* (AMS, 2010), *The Bispectral Problem* (AMS, 1998) and *Reality Conditions* (MAA, 2005).

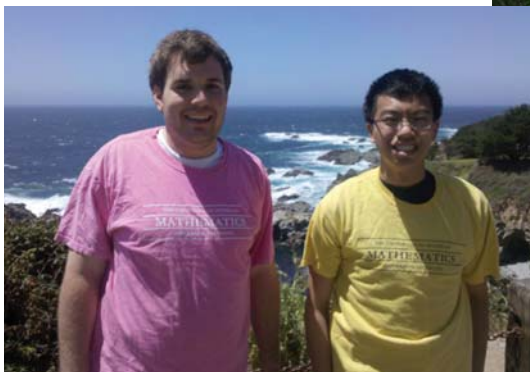
Jennifer (Hohmann) Walsh (BS 2000) received her Master of Education in 2003 from Harvard, and MS in School Administration from Touro College in 2006. She is the Mathematics Chair at Sleepy Hollow High School in New York.

Caroline Bowden (BS 2008) is a Retirement Associate with PricewaterhouseCoopers in Chicago.

Eric Fu (BS 2008) received his MS in math from the University of North Carolina. He is a lecturer of Mathematics at Coastal Carolina University.

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Top row, l-r: Pei Ying Goh (2009) in a rice paddy in Malaysia; Dan Hermes (2010) and Fernando Delgado (2007) in the garden at Google headquarters; Cory Levinson (2012) at Milford Sound, New Zealand. Middle row, l-r: Dan Echlin (2010) and Michael Lee (2010) in the Pacific Northwest; Kit Clement at Pictured Rocks National Lakeshore; MI, David Sherman striking the pose. Bottom row, l-r: Will Turner (2008) in the Physics lab in Urbana; Tim Blassius (2010) at the Parthenon; Bob Nelson (1975) visiting Masada.



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