

College of Science and Technology

Mathematics

UPDATE



LOOK INSIDE:

New Faculty: Irina Mitrea.....	2
Graduate Program...	2
New Faculty: Vasily Dolgushev.....	3
Postdoctoral Program.....	3
Faculty Activities.....	3
Undergraduate Program.....	4
Technology Update..	4

Fall 2011

CHAIR'S MESSAGE

The Temple University Department of Mathematics completed a strong year in 2010-2011, and I look forward to an even stronger one in 2011-2012. While it has become a cliché to say that we—as well as mathematics departments and universities across the US and beyond—face challenging times during the next few years, I believe that our foundation remains solid. Our undergraduate program, graduate program and research efforts have all progressed in 2010-2011. I am confident that this trend will continue. Lastly, I am grateful to colleagues, students and staff who put so much of themselves into ensuring the department's ongoing success.

Best wishes to all for 2011-2012,

Ed Letzter

Leon Ehrenpreis Memorial Conference

In 2010, Professor Leon Ehrenpreis passed away. He had been a member of the department since 1984. Before coming to Temple, he was a professor at NYU's Courant Institute of Mathematical Sciences and at Yeshiva University. He also held positions at Brandeis

University and the Institute for Advanced Study. An appreciation of Professor Ehrenpreis appeared in the *Notices of the American Mathematical Society*. The *Philadelphia Inquirer* and the *Philadelphia Daily News* also noted his passing.

Ehrenpreis worked in several areas of mathematics, including partial differential equations, several complex variables, number theory and integral geometry. He made deep and lasting contributions to partial differential equations and several complex variables. In the mid-1950s, Ehrenpreis and Bernard Malgrange independently proved a famous result on the solutions of partial differential equations with constant coefficients. In addition, Ehrenpreis established what is today known as the Fundamental Principle of Ehrenpreis, stating that any solution of a system of linear partial differential equations with constant coefficients can be represented in terms of the exponential polynomial solutions of the system, much as one learns in a first course on ordinary differential equations.



(photo: C. J. Mozzochi, Princeton N.J.)

The Department of Mathematics and the College of Science and Technology held a conference to honor Ehrenpreis' life and work. The speakers were: Charles Epstein (University of Pennsylvania); John Erik Formaess (University of Michigan); Cristian Gutierrez (Temple); Xiaojun Huang (Rutgers University); Henryk Iwaniec (Rutgers University); Joseph Kohn (Princeton University); Igor Rivin (Temple); Peter Sarnak (Institute for Advanced Study); Elias Stein (Princeton University); and Francois Treves (Rutgers University).

Opening remarks to the conference were given by Dr. Kenneth Blank, senior vice provost for research and graduate education at Temple University. The conference was organized by professors Shiferaw Berhanu, Marvin Knopp, Edward Letzter and Gerardo Mendoza.

A memorial banquet, attended by friends, colleagues and students as well as Ehrenpreis' children, grandchildren and wife, Ahava, focused on his remarkable life and career.

Teaching Awards

Professor David Hill and Instructional Assistant Professor Nina Edelman were both honored in fall 2010 with the Dean's Distinguished Teaching Awards. Adjunct Instructor Scott Stringfellow was awarded the Departmental Instructorship Award for 2010-2011. This departmental honor was initiated in 2009-2010, with Instructional Assistant Professors Farzana Chaudhry and Elena Vishik receiving the first awards.

New Faculty Member: Irina Mitrea



Associate Professor Irina Mitrea joined our department in July 2011. Immediately prior to coming to Temple, Mitrea was associate director of the Institute for Mathematics and its Applications at the University of Minnesota. Earlier, she rose to the level of associate professor with tenure at the University of Virginia, where she remained until 2009, and where she received a Fund for Excellence in Science and Technology Award in 2005-2006. Mitrea also has held appointments at the Worcester Polytechnic Institute, Cornell University, Institute for Advanced Study, the Mathematical Sciences Research Institute and the Clay Mathematics Institute.

Mitrea earned her PhD in 2000 at the University of Minnesota, under the direction of Carlos Kenig (University of Chicago) and Mikhael Safanov. While there, she was awarded a Sloan Dissertation Fellowship. Her area of expertise is at the interface between real and harmonic analysis, partial differential equations and geometric measure theory. Her research is supported by an NSF CAREER Grant.

Other awards and honors include the Ruth Michler Memorial Prize from the Association for Women in Mathematics in 2008. Mitrea also gave a one-hour invited address at the spring 2010 meeting of the American Mathematical Society. In 2000, she received a Liftoff Fellowship from the Clay Mathematics Institute.

Mitrea currently serves on the Executive Committee of the Association for Women in Mathematics. She is on the education board of the Institute for Computational and Experimental Research in Mathematics at Brown University and is an associate editor for the *American Mathematical Monthly*.

GRADUATE PROGRAM UPDATE

The department's graduate program completed another successful year and begins fall 2011 with 25 students in the PhD program funded by teaching assistantships, research assistantships and university fellowships.

Four students, Jessica Hamm, Rebeca Lufi, Christian Millichap and Brian Paljug attended the Ninth Annual Graduate Student Topology and Geometry Conference (where Assistant Professor David Futer gave an invited lecture). Rebeca Lufi also attended the Graduate and Postdoc Summer School at the Center for Mathematics at Notre Dame (where Associate Professor Vasily Dolgushev gave an invited series of lectures). Scott Ladenheim attended the Summer School in Inverse Problems and Partial Differential Equations, at the University of Washington.

Meredith Hegg spent six weeks at the Max Planck Institute for Mathematics in the Sciences with her adviser, Associate Professor Yury Grabovsky.

Kirk Soodhalter presented a talk at the Householder Symposium on Numerical Linear Algebra (where Postdoctoral Research Assistant Professor Fei Xue also presented and Professor Daniel Szyld, Soodhalter's thesis advisor, gave a plenary lecture). Soodhalter spent summer 2011 as a student intern at the Computer Science Research Institute at Sandia National Labs.

Two graduate students from Europe participated in the ATLANTIS exchange program. Professor Cristian Gutierrez is the Temple organizer of this program, which brings students from selected

universities in Europe to the U.S. and in turn enables Temple mathematics graduate students to visit those European universities for a semester.

During the past year the graduate program also initiated a change in the structure of the comprehensive examinations. Beginning in fall 2011, students will elect to take three exams out of a choice of Algebra, Complex Analysis, Real Analysis or Partial Differential Equations. Previously, students had been required to take Algebra, Complex Analysis and Real Analysis. The intention is to maintain high academic standards while providing a more flexible program for a student body with wide-ranging mathematical interests.

The department has introduced a Teaching Training and Certification course for graduate students, with Professor Maria Lorenz as organizer, coordinator and teacher. Training and certification programs for graduate student teachers have recently emerged at several leading universities in the U.S. We expect Temple students will benefit greatly from this new feature.

Three students recently completed their PhD degrees: Michael Dobbins (supervised by Igor Rivin); Zachary Hanson-Hart (supervised by Gerardo Mendoza); and Sheng Xiong (supervised by Wei-Shih Yang). Dobbins and Xiong had academic job offers, and Hanson-Hart will continue his research and teaching at Temple for another year.

The Graduate Program Director is Professor Gerardo Mendoza.

DEPARTMENT RESEARCH FUNDING

The research of fifteen faculty members is currently supported by external grants:

Shiferaw Berhanu (NSF)	Gerardo Mendoza (NSF)
Prince Chidyagwai (NSF)	Irina Mitrea (NSF)
Vasily Dolgushev (NSF)	Isaac Pesenson (DOD)
David Futer (NSF)	Igor Rivin (NSF)
Yury Grabovsky (NSF)	Benjamin Seibold (NSF)
Cristian Gutierrez (NSF)	Daniel Szyld (DOE, NSF)
Edward Letzter (NSA)	Fei Xue (NSF)
Martin Lorenz (NSA)	

New Faculty Member: Vasily Dolgushev



Associate Professor Vasily Dolgushev joined the department in 2010-2011. He received a PhD in physics in 2003 from the Joint Institute for Nuclear Research (Dubna, Russia), and in 2005 he received a PhD in mathematics from MIT, under the direction of Pavel Etingof and Dmitry Tamarkin. At MIT, Dolgushev was awarded the Charles W. and Jennifer C. Johnson Prize for outstanding research paper by a graduate student. His research, funded by NSF, focuses on noncommutative geometry, homological algebra, category theory and mathematical physics.

For his postdoctoral work, Dolgushev was a Boas Assistant Professor at Northwestern University. Following that appointment and until his arrival at Temple, he was an assistant professor at University of California, Riverside. In 2005, he was awarded a Lifford Fellowship from the Clay Mathematics Institute. Dr. Dolgushev also has held short-term positions at the University of Chicago and ETH Zurich.

Advanced in Mathematics recently noted that Dolgushev has one of the top 10 most-cited papers from that journal during 2005-2010. This past summer, Dolgushev gave a plenary talk at the XXX Workshop on Geometric Methods in Physics (Poland) and a series of lectures at the Notre Dame Summer School on Quantization and Related Topics.

■ POSTDOCTORAL PROGRAM UPDATE

The department's vigorous postdoctoral program, featuring six early-career research mathematicians, continues to thrive. Prince Chidyagwai, who received his PhD in 2010 from Rice University, joined the department in fall of that year. His research is focused on numerical analysis and scientific computing, fluid dynamics, flow in porous media, finite element methods, discontinuous galerkin methods and partial differential equations. Chidyagwai's faculty mentor is Assistant Professor Benjamin Seibold.

New PhDs have started their careers at Temple for many years in postdoctoral positions. Today's expanded postdoctoral program should be credited to efforts of the previous department chair, Professor Omar Hijab. Postdoctoral research assistant professors teach a mix of upper and lower level courses. They participate in the departmental research seminars, and they bring with them new ideas and fresh perspectives. Each postdoctoral research assistant professor has a fac-

ulty mentor. The continuing postdoctoral research assistant professors (non-tenure-track) for 2010-2011 are:

- Chris Atkinson (PhD, University of Illinois-Chicago), studying Low-Dimensional Geometry and Topology (mentor: Assistant Professor David Futer);
- Justin Malestein (PhD, University of Chicago), studying low-dimensional geometry/topology, rigidity theory, and applications to zeolites (mentor: Professor Igor Rivin)
- Kei Nakamura (PhD, University of California, Davis), studying low-dimensional topology and geometric group theory (mentor: Futer)
- Louis Theran (PhD, University of Massachusetts, Amherst) studying combinatorial and computational geometry, algorithms, matroids and combinatorial rigidity with applications to zeolites (mentor: Rivin).
- Fei Xue (PhD, University of Maryland, College Park), studying numerical linear algebra, sparse matrix computations and scientific computing (mentor: Professor Daniel Szyld).

■ FACULTY PROFESSIONAL ACTIVITIES

Over 2010-2011, several faculty members were involved in organizing high-profile international conferences and workshops: Martin Lorenz, CIMPA-UNESCO-VIETNAM School and Workshop on Braids in Algebra, Geometry and Topology (Vietnam); Cristian Gutierrez, Fabes Lectures 2011 Conference on Real Analysis and PDEs (Argentina); Daniel Szyld, Conference on Computer Aspects of Numerical Algorithms (Poland) (Szyld is also chair of the Gene Golub Society for Industrial and Applied Mathematics Summer School Committee 2010-2013.); Shiferaw Berhanu, Workshop on Partial Differential Equations and Several Complex Variables (Brazil).

This was Berhanu's second major conference in two years, previously serving as co-organizer of the Marrakesh Workshop on Geometric Analysis of Several Complex Variables and its interactions (Morocco).

Several faculty members are involved in editorial work at international research journals. Daniel Szyld is an associate editor at *SIAM Journal on Matrix Analysis and Applications*, *Numerical Linear Algebra with Applications*, *Mathematics of Computation*, *Electronic Journal of Linear Algebra* and *Bulletin of the Spanish Society of Applied Mathematics*. He is editor-in-chief of *Electronic Transactions on Numerical Analysis*.

Cristian Gutierrez is an associate editor at the *Journal of Mathematical Analysis and Applications*; Irina Mitrea is an associate editor at the *American Mathematical Monthly*; and Igor Rivin is an associate editor at *Geometriae Dedicata* and the *Online Journal of Analytic Combinatorics*.

continued on page 4

■ UNDERGRADUATE PROGRAM UPDATE

The department ended 2010-2011 with 154 mathematics majors and 32 students receiving bachelor's degrees in mathematics.

In a significant new development, the Temple Board of Trustees approved a new Bachelor of Science in Applied Mathematics. This major offers students a solid foundation in applied mathematics and mathematical computing as preparation for graduate study or work in industry. This major joins the recently revamped and strengthened Bachelor of Science in Mathematics, which now provides a more theoretical focus. The Bachelor of Arts in Mathematics also was revised, affording students more flexibility. Undergraduate research has also continued, with recent projects supervised by faculty members Gerardo Mendoza and Benjamin Seibold.

Several undergraduate students won departmental awards: Geoffrey Schnieder, Francis James Sholomskas Memorial

Award in Mathematics; Michael Power, Christopher W. Cople Award for Excellence in the Field of Mathematics; Peter Lobu, Phyllis Zayon Steinberg Memorial Award in Mathematics; and Ian Harding, Most Promising Mathematics Major Award.

Many of these awards winners are moving forward in their academic careers. Schneider will continue his mathematical studies in the department's graduate program. Recent graduate Wright will pursue graduate study in systems engineering at the University of Pennsylvania and Schultz, another recent graduate, will enter the PhD program in mathematics at Rutgers University.

The Director of Undergraduate Studies is Professor Boris Datskovsky.

Transition in the Math Office

In fall 2011, after 22 years of service to the department and 42 years of service to Temple, longtime Administrative Assistant Rita Jackson retired. A departmental reception was held for her November 19, 2010.

Alexandria Cogan joined the math office staff in spring 2011, as administrative assistant. She was previously at Temple's School of Law.

Alexandra Grinshpun left the department to become manager of finance/accounting in Temple's Office of International Affairs. She was business manager for the department for two years. Andrew DiMeo, of the Dean's Office, has stepped in to assume her role.

Math and Music Joint Event

On December 6, 2010, the Temple University mathematics department and music department held what is believed to be a first joint colloquium. Dmitri Tymoczko (Princeton University) spoke on his work tying modern algebraic geometry (and in particular, orbifolds) to musical style. The event was lively and very well attended. The event was supported by the Temple University Faculty Senate's Lectures and Forums Committee. The departments colloquium organizers for fall 2010 were Benjamin Seibold and David Futer.)

Faculty Activities

continued from page 3

Shiferaw Berhanu is an associate editor at the *African Diaspora Journal of Mathematics*; Yury Grabovsky is an associate editor at *Continuum Mechanics and Thermodynamics*; and Vasily Dolgushev is an associate editor at the *Tbilisi Journal of Mathematics*. Martin Lorenz was an associate editor at the *Proceedings of the American Mathematical Society* from 2001 through 2010.

For 2010-2011, Igor Rivin was a visiting member at the *Institute for Advanced Study*. Associate Professor Yury Grabovsky held visiting positions at the Max Planck Institute for Mathematics in the Sciences and the Hausdorff Center for Mathematics, University of Bonn. In spring 2011, Assistant Professor Benjamin Seibold was a visiting researcher at the Center for Computational Engineering Science, RWTH Aachen University (Germany).

Professor John Paulos continues to publish mathematical articles in the popular media, including *The New York Times*, *The New York Review of Books* and ABCnews.com.

■ TECHNOLOGY UPDATE

The departments computing activities and infrastructure made notable advances in 2010-2011.

High performance computing played an increased role in our department's research. Benjamin Seibold and Prince Chidyagwai have been using departmental high-performance workstations for their research on traffic modeling and radiative transfer. Igor Rivin, Louis Theran and student Garrett Wright used the departmental GPU workstation for their studies on computational geometry and chemistry.

Rivin is also co-principal investigator on an NSF grant that funded the purchase of a new hybrid CPU/GPU cluster computer for the College of Science and Technology. (Jie Wu of Computer & Information Sciences is the Principal Investigator. The other co-principal investigators are Yuan Shi, Computer & Information Sciences; Saroj Biswas, Electrical Engineering; and Michael Klein, Chemistry and director of the Institute for Computational Molecular Science.) This new cluster, called "the Owls' nest," became operational in spring 2011.

Benjamin Seibold and Prince Chidyagwai have been using the cluster for their research on highly accurate simulations of radiative transfer and multiphase fluid dynamics.

In addition, the department's computer lab was updated, funded by a Technology Fee Grant from the university. The lab now has 15 new iMacs, equipped with state-of-the-art software for computationally focused coursework and research.

**For more details
and updates, go to
www.math.temple.edu**