



# Department of Mathematics Annual Report



Drexel University  
College of Arts & Sciences  
2010 – 2011

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## Message From the Department Head

Dear Alumni and Friends,

It is my pleasure to present our department's annual report which highlights and documents many of the wonderful events and accomplishments of our faculty and students.

In the last year our department has enjoyed recognition by numerous awards to our faculty and students. Assistant Professor Simon Foucart won the 2010 Best Paper Award from the Journal of Complexity for his paper 'The Gelfand widths of  $\ell_p$ -balls for  $0 < p \leq 1$ ' jointly written with A. Pajor, H. Rauhut, T. Ullrich. Teaching Professor Gregory L. Naber was named the Faculty Mentor of the Year by the Graduate Student Association and Associate Teaching Professor Adam Rickert the "2010 Outstanding Online Instructor Award." Mr. Rickert was honored by the Drexel Community and The United States Distance Learning Association (USDLA) at the annual event that recognizes those individuals who have made significant contribution to the field of distance learning. Our teaching assistant Daniel Parry was recognized by the The Society for Industrial and Applied Mathematics (SIAM) for his outstanding efforts for Drexel's SIAM Student Chapter. The accomplishments of our undergraduates also deserve special recognition. At the annual honors day last spring, Francis Ryan and Chelcy Strain won the Robert J. Bickel Award; Jennifer Benhaim, Colleen Owens, Elizabeth Haberkorn and Carrie Bellafronte won the Harry Muchnic award; and Martin Ghaidarov won the Frank Williams prize.

Our department continues to grow in size as well. This year Assistant Professors Patrick Clarke and Simon Foucart joined the department. Professor Clarke is an expert in Algebraic and Symplectic Geometry and studies Landau-Ginzburg models and homological mirror symmetry. Professor Foucart is an expert in Applied and Classical Analysis and studies compressive sensing and approximation theory questions. Our undergraduate teaching mission received fresh support from three new teaching faculty members: Hwan Yong Lee, Dimitrios Papadopoulos, and Benjamin Pittman-Poletta.

This year's distinguished lecture series brought to campus Professor Douglas Arnold, McKnight Presidential Professor of Mathematics at the University of Minnesota. In the first lecture he delivered, which was aimed at a general audience, he described the many aspects of the game of golf that can be understood and improved by mathematical modeling and analysis. Using several models ranging from simple algebra to advanced computational techniques, he demonstrated the relevance of mathematics on a golf course, reinforcing that math is indeed everywhere. With his second lecture 'Finite Element Exterior Calculus: Where Numerical PDE Meets Topology' he captivated the experts in the field.

Our Mathematics Resource Center continues to grow, playing a central role in our beginning undergraduate courses. Again we saw a substantial increase in attendance from the previous academic year, leaving us to wonder how much more we can handle!

There were also some changes in the front office. Teaching Professor Patricia Henry Russell, after many years of service, decided to step down as Associate Department Head to take on a role as Coordinator of STEM and Community Education Programs in the dean's office. Starting July 2011, Professor R. Andrew Hicks joined the front office as Associate Department Head.

We hope that you are as excited about our department as we are. We greatly appreciate your feedback and your involvement as it greatly helps in accomplishing our mission of excellence in research and education.

Thank you and Best Wishes,



Hugo J. Woerdeman  
Professor and Department Head

## Tenured/Tenure-Track Faculty



**David M. Ambrose, Ph.D.** (Duke University) Assistant Professor. Applied analysis and scientific computing for nonlinear systems of partial differential equations, especially free-surface problems in fluid dynamics.



**Robert P. Boyer, Ph.D.** (University of Pennsylvania) Professor. Functional analysis,  $C^*$ -algebras and the theory of group representations.



**Patrick Clarke, Ph.D.** (University of Miami) Assistant Professor. Homological Mirror Symmetry, Landau-Ginzburg Models, Algebraic Geometry, Symplectic Geometry.



**Bo Dong, Ph.D.** (University of Minnesota ) Assistant Professor. Numerical analysis and scientific computing, in particular, discontinuous Galerkin methods, hybridizable finite element methods, and mixed finite element methods.



**Simon Foucart, Ph.D.** (University of Cambridge) Assistant Professor. Compressive Sensing; Approximation Theory, especially Spline Functions; Computational Mathematics; Applied and Classical Analysis.



**Pavel Grinfeld, Ph.D.** (Massachusetts Institute of Technology) Assistant Professor. Intersection of physics, engineering, applied mathematics and computational science.



**Yixin Guo, Ph.D.** (University of Pittsburgh) Assistant Professor. Biomathematics, dynamical systems, ordinary and partial differential equations and math education.



**R. Andrew Hicks, Ph.D.** (University of Pennsylvania) Associate Department Head, Professor. Robotics, computer vision, catadioptrics.



**Pawel Hitczenko, Ph.D.** (Warsaw University) Professor. Probability theory and its applications to analysis, combinatorics, wavelets, and the analysis of algorithms.



**Dmitry Kalyuzhnyi-Verbovetskyi, Ph.D.** (Kharkov National University) Assistant Professor. Operator theory, systems theory, complex analysis,  $C^*$ -algebras and harmonic analysis.

## Tenured/Tenure-Track Faculty



**Georgi S. Medvedev, Ph.D.** (Boston University) Associate Professor. Applied mathematics, nonlinear diffusion equations, mathematical biology, dynamical systems, numerical methods.



**Jennifer Morse, Ph.D.** (University of California, San Diego) Associate Professor. Algebraic and tableaux combinatorics, discrete math, symmetric and special functions, basic hypergeometric series.



**Shari Moskow, Ph.D.** (Rutgers University) Associate Department Head, Professor. Applied PDEs and numerical analysis, in particular homogenization theory, inverse problems, and related asymptotic and numerical methods.



**Ronald K. Perline, Ph.D.** (University of California at Berkeley) Associate Professor. Applied mathematics, numerical analysis, symbolic computation, differential geometry, mathematical physics.



**Marci A. Perlstadt, Ph.D.** (University of California at Berkeley) Associate Professor. Applied mathematics, computed tomography, numerical analysis of function reconstruction, signal processing, combinatorics.



**Eric Schmutz, Ph.D.** (University of Pennsylvania) Professor. Probability, combinatorial optimization.



**Li Sheng, Ph.D.** (Rutgers University) Associate Professor. Discrete optimization, probabilistic methods in combinatorics, operations research, graph theory and its application in molecular biology, social sciences and communication networks, biostatistics, computer science.



**Justin R. Smith, Ph.D.** (Courant Institute, New York University) Professor. Homotopy theory, operad theory, quantum mechanics, quantum computing.



**Hugo J. Woerdeman, Ph.D.** (Vrije Universiteit, Amsterdam) Department Head, Professor. Matrix and operator theory, systems theory, signal and image processing, and harmonic analysis.



**J. Douglas Wright, Ph.D.** (Boston University) Assistant Professor. Partial differential equations, particularly the behavior of nonlinear waves in systems arising in hydrodynamics, optics and cell biology.



## Tenured/Tenure-Track Faculty



**Thomas Yu, Ph.D.** (Stanford University) Associate Professor. Multiscale mathematics, wavelets, applied harmonic analysis, subdivision algorithms, nonlinear analysis, applied differential geometry and data analysis

## Teaching Faculty



**Jason Aran, M.S.** (Drexel University) Instructor.



**Michael Daniel, Ph.D.** (University of Colorado) Assistant Teaching Professor. Number Theorist specializing in Modular Forms and Function Fields.



**Alexander Dolgopolsky, Ph.D.** (Case Western Reserve University) Associate Teaching Professor. Applied mathematics.



**James W. Donnelly, M.S.** (Drexel University) Associate Teaching Professor. Math foundations of engineering.



**Daryl Falco, M.S.** (Drexel University) Assistant Teaching Professor. Discrete mathematics and automata theory.



**Raymond J. Favocci, III, M.S.** (Drexel University) Assistant Teaching Professor.



**Anatolii Grinshpan, Ph.D.** (University of California, Berkeley) Assistant Teaching Professor. Function Theory and Operator Theory, Harmonic Analysis, Potential Theory.

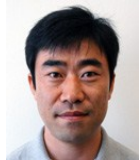


**Robert Immordino, M.S.** (Drexel University) Assistant Teaching Professor.

## Teaching Faculty



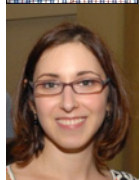
**Taylor Kingsbury, M.S.** (Drexel University) Instructor.



**Hwan Yong Lee, Ph.D.** (University of Utah) Assistant Teaching Professor.



**Andrey Melnikov, Ph.D.** (Ben Gurion University) Assistant Teaching Professor.



**Marna A. Mozeff, M.S.** (Drexel University) Undergraduate Advisor, Associate Teaching Professor.



**Gregory L. Naber, D.A.** (Carnegie-Mellon University) Teaching Professor. Topology, differential geometry, and mathematical physics, particularly relativity and gauge theory.



**Adam C. Rickert, M.S.** (Drexel University) Associate Teaching Professor.



**Oksana P. Odintsova, Ph.D.** (Omsk State University) Associate Teaching Professor. Math education.



**Dimitrios Papadopoulos, M.S.** (Drexel University) Instructor



**Benjamin Pittman-Polletta, Ph.D.** (University of Arizona) Assistant Teaching Professor



**Patricia Henry Russell, M.S.** (Drexel University) Associate Department Head, Teaching Professor. Probability and statistics.

## Teaching Faculty



**Judy T. Smith, M.A.** (West Chester University) Assistant Teaching Professor.



**Jeanne Steuber, M.S.** (Boston University) Assistant Teaching Professor.



**Kenneth Swartz, Ph.D.** (Harvard University) Assistant Teaching Professor.  
Applied Probability and Statistics



**Vaishalee Wadke, M.S.** (Columbia University) Instructor.



**Richard White, M.S.** (St. Joseph's University) Instructor.

## Visiting Faculty / Post Doctoral Associates



**Elaine Cozzi, Ph.D.** , (University of Texas at Austin ) Visiting Assistant Teaching Professor



**Huilan Li, Ph.D.** (York University) Postdoctoral Associate



**Dennis G. Yang, Ph.D.** (Cornell University) Postdoctoral Associate



## Adjunct Faculty

**John Coppola, M.S.** (Widener University)  
**Harold Gilman, M.S.** (Temple University)  
**June Gordon, M.S.** (Drexel University)  
**Boris Kheyfets Ph.D.** (Drexel University)  
**Elana Koublanova, Ph.D.** (Leningrad State University)  
**Wanda Kunkle, M.S.** (Drexel University)  
**Leo Lampone, Ph.D.** (Drexel University)  
**Richard Owens, B.S.** (St. Joseph's University) & **FSA, CFA**  
**Kathy Yang, B.S.** (HaiNan University , Western Sydney University)  
**Yun Yoo, Ph.D.** (Drexel University)  
**Sergio Zefillipo, M.A.** (Villanova University)

## Emeritus Faculty

**Loren N. Argabright, Ph.D.** (University of Washington) Professor Emeritus  
**Robert C. Busby, Ph.D.** (University of Pennsylvania) Professor Emeritus  
**Ewaugh F. Fields, Ed.D.** (Temple University) Dean Emeritus, Professor Emeritus  
**William M.Y. Goh, Ph.D.** (Ohio State University) Associate Professor Emeritus  
**Charles J. Mode, Ph.D.** (University of California at Davis) Professor Emeritus  
**Chris Rorres, Ph.D.** (Courant Institute, New York University) Professor Emeritus  
**Jet Wimp, Ph.D.** (University of Edinburgh) Professor Emeritus

## Staff



**Byron Greene**  
Administrative  
Coordinator



**Kenneth Hemphill**  
Budget Coordinator



**C. Gene Phan**  
Computer Specialist



**Malinda  
Gilchrist**  
Graduate  
Program  
Coordinator



**David Shen**  
Manager,  
Math Resource Center

## Teaching Assistants and Research Assistants



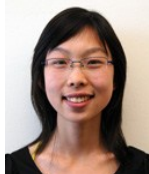
**Gulnara Abduvalieva**



**Jeffrey Armstrong**



**Lei Cao**



**Jingmen Chen**



**Avinash Dalal**



**Phillip Gaudreau**



**Derek Heilman**



**Daniel Jordon**



**Kimberly Kilgore**



**David Kimsey**



**Selcuk Koyuncu**



**Timor Milgrom**



**Michael Minner**



**Daniel Parry**



**Heather Richardson**



**Caroline Shapcott**



**Jonah Smith**



**Le Yu**



**Svitlana Zhuravytska**

## New Faculty Profiles



**Patrick Clarke**  
Assistant Professor

Patrick Clarke received his Ph.D. in Mathematics in 2007 from the University of Miami. During the Spring of 2007, he was a Clay Institute Graduate Fellow at the Institute for Advanced Study. From 2007 - 2010, Patrick was an NSF Postdoctoral Fellow at the University of Pennsylvania, and during the Spring of 2008 he was a Visiting Professor at the Insitute des Hautes Études Scientifiques (France). His research is in Homological Mirror Symmetry which combines techniques from Algebraic Geometry, Symplectic Geometry, Homological Algebra, and Category theory.



**Elaine Cozzi**  
Visiting Assistant Professor

Elaine Cozzi earned a Ph.D. in Mathematics from the University of Texas at Austin in 2007 and a Bachelor of Arts degree in Mathematics and Economics from the University of Virginia in 2000. She was a Postdoctoral Fellow at the Center for Nonlinear Analysis at Carnegie Mellon University from 2007 to 2010. Elaine's research addresses applications of harmonic analysis to incompressible fluid flow. She has recently been awarded a grant from the National Science Foundation to fund her research. In the fall of 2011, Elaine will be starting a tenure-track job in the Mathematics Department at Oregon State University.



**Simon Foucart**  
Assistant Professor

Simon Foucart studied at the Ecole Centrale Paris and at the University of Cambridge, where he followed Part III of the Mathematical Tripos. In 2001, he received a Master's in Engineering and the Certificate of Advanced Study in Mathematics from these institutions. He continued his doctoral studies in Mathematics at the University of Cambridge, specializing in Approximation Theory. After completing his Ph.D. in 2006, he spent three years at Vanderbilt University as a postdoctoral researcher. There he became acquainted with the theory of Compressive Sensing. In 2009, he applied this theory to acoustic fields during a brief postdoctoral appointment at the University of Paris 6 before joining Drexel's Department of Mathematics. His areas of interests are Applied Analysis and Computational Mathematics in general, Compressive Sensing and Approximation Theory in particular.

## New Faculty Profiles



**Hwan Yong Lee**  
Assistant Teaching Professor

Hwan Yong Lee earned his Ph.D. in Mathematics from the University of Utah in 2010, under the supervision of Prof. David Dobson. His research area is Electromagnetic wave propagation in composite media, optimization and inverse problem.



**Dimitrios Papadopoulos**  
Instructor

Dimitrios completed a B.S. in Mathematics at Temple University in 2007. He completed an M.S. in Mathematics at Drexel University in 2010. During his time as a teaching assistant at Drexel, Dimitrios earned the AI Herr Award. Dimitrios is now a full time instructor at Drexel.



**Benjamin Pittman-Polletta**  
Assistant Teaching Professor

Ben Pittman-Polletta earned a Ph.D. in Applied Mathematics from the University of Arizona in 2010, and a Bachelor of Arts degree in Mathematics and Neuroscience from Oberlin College in 2002. His dissertation research dealt with factorization in loop groups, and he remains interested in Lie theory and combinatorics. Dr. Pittman-Polletta is also interested in the applications of mathematics to biology, and in communicating mathematics to the public, something he had an opportunity to pursue as an AMS Mass Media Fellow in 2010.

## Department of Mathematics



**Top Row:** Ray Favocci, Jim Donnelly, Elaine Cozzi, David Ambrose, Daryl Falco, Hugo Woerdeman, Timur Milgrom, Lei Cao, Patricia Russell, Dennis Yang, Andy Hicks, Patrick Clarke, Pavel Grinfeld

**Standing Row:** Alex Dolgolposky, Hwan Lee, Eric Schmutz, Ken Hemphill, Robert Boyer, Byron Greene, Richard White, Simon Foucart, Dmitry Kaliuzhnyi-Verbovetskyi, Robert Immordino, Gulnara Abduvalieva, Bo Dong, Malinda Gilchrist, Shari Moskow, Yixin Guo, Jennifer Morse

**Sitting:** Daniel Jordon, Michael Minner, Heather Richardson, Phillip Gaudreau, Marna Mozeff, Jason Aran, Daniel Parry, Anatolii Grinshpan, Li Sheng, Jeanne Steuber, Kenneth Swartz, David Shen, Andrey Melnikov

**Floor:** Ronald Perline, Benjamin Pittman-Poletta, Taylor Kingsbury, Michael Daniel, Jeffery Armstrong, Caroline Shapcott, Le Yu, Avinash Dalal, Jingmen Chen, Derek Heilman, Dimitrios Papadopoulos



## Faculty Awards

**Simon Foucart**, Assistant Professor, was awarded the Journal of Complexity 2010 Best Paper Award for the paper entitled "The Gelfand widths of  $\ell_p$ -balls for  $0 < p \leq 1$ ," which was authored by Simon Foucart, Alain Pajor, Holger Rauhut, and Tino Ullrich.



**Gregory Naber**, Teaching Professor, was awarded the Graduate Student Association's Mentor of the Year by the Drexel Graduate Student Association (GSA). This award is student nominated and exemplifies the continuous commitment, guidance, and support of graduate students. Greg Naber was honored at the Graduate Student Day ceremony held on May 25, 2011 in the Van Rensselaer ballroom.

**Adam Rickert**, Associate Teaching Professor, received the 2010 Outstanding Online Instructor Award on November 9, 2010. He was honored by the Drexel Community and The United States Distance Learning Association (USDLA) at the annual event that recognizes those individuals who have made significant contribution to the field of distance learning. The mission of the USDLA is to support the development and application of distance learning, education and training by uniting learners around the world. The event was held in Behrakis Grand Hall.



President John Fry and Adam Rickert

The Drexel University Employee Service Awards Ceremony was held on Wednesday, December 16, 2010. The following members of the Drexel Mathematics department were recognized for their service at Drexel University.

### *Five Year Award Recipients*

**Jeanne Steuber**, Assistant Teaching Professor  
**Judy Smith**, Assistant Teaching Professor  
**Ray Favocci**, Assistant Teaching Professor  
**Oksana Odintsova**, Associate Teaching Professor  
**Thomas Yu**, Associate Professor



## Faculty Grants

**Ambrose, David**, National Science Foundation, DMS 0926378, Long Time Behavior In Free Surface Problems in Fluid Dynamics, 2009-2010, \$40,805

**Ambrose, David**, National Science Foundation, DMS 1016267, Collaborative Research: Efficient Surface-Based Numerical Methods for 3D Interfacial Flow with Surface Tension, 2010-2013, \$269,989

**Ambrose, David**, National Science Foundation, DMS 1008387, Dispersive PDE and Interfacial Fluid Dynamics, 2010-2013, \$159,000

**Ambrose, David**, National Science Foundation, DMS 0707807 (renumbered DMS 0926378), Long-Time Behavior of Free-Surface Problems in Fluid Dynamics, 2007-2011, \$119,999

**Dolgopolsky, Alex**, National Science Foundation, DMS 0948881, Student Support for the International Symposium Plasma Chemistry, 2010-2011, \$18,000

**Foucart, Simon**, National Science Foundation, DMS 1120622, Improving Analysis of Microbial Mixtures through Sparse Reconstruction and Statistical Inference, 2011-2014, \$667,322

**Grinfeld, Pavel**, Steffens 21st Century Foundation, Hamilton Fluid Films, 2011-2014, \$31,000

**Grinshpan, Anatolii**, National Science Foundation, DMS 0910628, Decompositions for Multivariable Schur-class Functions, Christoffel-Darboux Type Formulas, and Related Problems, 2009-2012, \$475,578

**Hicks, R. Andrew**, National Science Foundation, DMS 0908299, Distributions for Optical Design, 2009-2012, \$264,00

**Hitczenko, Pawel**, National Security Agency, H98230-09-1-0062, Probabilistic Properties of Permutation Tableaux and Other Combinatorial Structures, 2009-2011, \$66,506

**Hitczenko, Pawel**, Simons Foundation, Collaborative research in Combinatorics and Probability, 2011-2016, \$35,000

**Kaliuzhnyi-Verbovetskyi, Dmitry**, National Science Foundation, DMS 0901628, Decompositions for Multivariable Schur-class Functions, Christoffel-Darboux Type Formulas, and Related Problems, 2009-2012, \$475,578

**Kaliuzhnyi-Verbovetskyi, Dmitry**, US-Israel Binational Science Foundation, BSF 2010432, Noncommutative Function Theory and its Applications, 2011-2015, \$88,000

**Medvedev, Georgi**, National Science Foundation, DMS 1109367, Mathematical Analysis of Synchronization in Complex Networks, 2011-2014, \$139,835

**Morse, Jennifer**, National Science Foundation, DMS 1001898, Combinatorics of Affine Schubert Calculus, K-theory, and Macdonald Polynomials, 2010-2013, \$150,000

**Morse, Jennifer**, National Science Foundation, DMS 0652641, FRG: Affine Schubert Calculus: Combinatorial, geometry, physical, and computational aspects, 2007-2011, \$671,270

**Morse, Jennifer**, National Science Foundation, DMS 0652668, FRG: Affine Schubert Calculus: Combinatorial, geometry, physical, and computational aspects, 2007-2011, \$103,528

## Faculty Grants

**Moskow, Shari**, NSF DMS: Collaborative Research: Direct Reconstruction Methods for Optical Tomography and Related Inverse Problems, 2011-2014, \$289,998.

**Moskow, Shari**, DOE, Recognition of and Activities for Women in Mathematical Sciences. 2010-2013, \$251,235

**Woerdeman, Hugo**, National Science Foundation, DMS 0901628, Decompositions for Multi-variable Schur-class Functions, Christoffel-Darboux Type Formulas, and Related Problems, 2009-2012, \$475,578

**Wright, J. Douglas**, National Science Foundation, DMS 0807738, Dynamics and Interactions of Free Fluid Interfaces, 2008-2012, \$111,162

**Wright, J. Douglas**, National Science Foundation, DMS 0908299, Distributions for Optical Design, 2009-2012, \$264,000

**Wright, J. Douglas**, National Science Foundation, DMS 1105635, Degenerate Dispersive Effects in Partial and Lattice Differential Equations, 2011-2014, \$202,837

## Faculty Appointments / Conference Organizations

**Ambrose, David**, Session Organizer of Scientific Committee for The Seventh IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory, University of Georgia, Athens, GA 2011

**Dolgopolsky, Alex**, Member of Organizing Committee, International Symposium On Plasma Chemistry, Philadelphia, PA 2011

**Grinfeld, Pavel**, Co-organizer (with JC Nave), Mini-symposium at Equadiff, Loughborough University, Loughborough, UK, 2011

**Hitczenko, Pawel**, Organizer, Analysis and Probability, Bedlewo, Poland, 2012

**Morse, Jennifer**, Formal Power Series and Algebraic Combinatorics, Executive Officer on Permanent Program Committee: Reykavik, Iceland (2011), San Fransisco, CA (2010)

**Naber, Gregory**, Standing Committee for the 14th International Conference on Geometry, Integrability, and Quantization, Varna, Bulgaria, June 2012

**Sheng, Li**, Program Committee Member, International Conference on Computer Communication Networks, ICCCN2011, Maui, Hawaii, July 31 - August 4, 2011

**Sheng, Li**, The Ninth International Conference on Machine Learning and Application, Washington D.C., December 12-14, 2010

**Wright, J. Douglas**, Grant Reviewer for Council for Physical Sciences of the Netherland Organization for Scientific Research

## Faculty Appointments / Conference Organizations

**Woerdeman, Hugo**, Minisymposium organizer at the International Workshop of Operator Theory and its Applications, Seville, Spain, July 2011.

**Woerdeman, Hugo**, Member of the Nominating Committee of the International Linear Algebra Society.

**Woerdeman, Hugo**, Chair of the International Linear Algebra Society (ILAS) Institutional Membership Committee.

**Woerdeman, Hugo**, Member of the Organizing Committee for the 2013 International Linear Algebra Society (ILAS) meeting to be held June 2013 in Providence, RI, USA.

## Faculty Publications

**Foucart, Simon** and M.-J. Lai, Sparse recovery with pre-Gaussian random matrices. *Studia Mathematica*, **200**, 91--102, 2010.

**Foucart, S.** and R. Gribonval, Real versus complex null space properties for sparse vector recovery. *Comptes Rendus de l'Academie des Sciences*, **348/15-16**, 863--865, 2010.

**Foucart, S.**, A. Pajor, H. Rauhut, T. Ullrich, The Gelfand widths of  $\ell_p$ -balls for  $0 < p \leq 1$ . *Journal of Complexity*, **26/6**, 629--640, 2010.

**Grinfeld, Pavel** and Strang, G., "Laplace Eigenvalues on Regular Polygons A Series in  $1/N$ " *Journal of Mathematical Analysis Applications* **385** (1), p. 135-149, 2012

**Grinfeld, Pavel** and Fiore, A., "The Calculus of Moving Surfaces and Laplace Eigenvalues on an Ellipse with Low Eccentricity", *Numerical Function Analysis and Optimization*, **31** (6), 2010

**Grinfeld, Pavel**, "Small Oscillations of a Soap Bubble", *Studies in Applied Mathematic*, **128**(1), 30-39, 2011

**Grinfeld, Pavel**, "A Proposed Experiment for the Verification of Thompson's Nucleation Theory", *Ferroelectrics*, **413** (1), p. 65-72, 2011

**Grinfeld, Pavel**, "Viscous Equations of Fluid Film Dynamics", *Computers. Materials and Continua*, **19** (3), p. 239-254, 2010

**Grinfeld, Pavel**, "A Variable Thickness Model for Fluid Films Under Large Displacements", *Physics Review Letters*, **105**:137802-1 137802-4, 2010

**Guo, Y.** and Rubin, J., "Multi-site Stimulation of Subthalamic Nucleus Diminishes Thalamocortical Relay Error in a Biophysical Network Model. *Neural Networks*", Elsevier. Volume **24**, Issue 6, 602-616. 2011 Special Issue: Neurocomputational Models of Brain Disorders.

**Guo, Yixin**, Park C, Rong M, Worth RM, Rubchinsky LL. Modulation of Thalamocortical Relay by Basal Ganglia in Parkinson's Disease and Dystonia. *BMC Neuroscience*, **12**(Suppl 1):P275, 2011

## Faculty Publications

Guo, Yixin and Yang, Dennis G., Entrainment of a Thalamocortical Neuron to Periodic Sensorimotor Signals, *BMC Neuroscience*, 12(Suppl 1):P135, 2011

Hicks, A., The customized reflections of freeform mirrors, *Physics Today*, volume 63, number 10, 72-73, 2010

**Hitczenko, P.** and Janson, S., Asymptotic normality of statistics on permutation tableaux, *Contemporary Mathematics*, **520**, 83-104, 2010

Dasse-Hartuat, S. and **Hitczenko, P.**, Some properties of random staircase tableaux, *Proceedings of the 8<sup>th</sup> Workshop on the Analytic Algorithmics and Combinatorics*, pp. 58-66, 2011

**Hitczenko, P.** and Wesolowski, J. S., Renorming divergent perpetuities, *Bernoulli*, **17**, 880-894, 2011

**Hitczenko, P.**, On tails of perpetuities, *Journal of Applied Probability*, **47**, 1191-1194, 2010

**Hitczenko, P.**, Convergence to Type I distribution of the extremes of sequences defined by random difference equation, *Stochastic Processes and their Applications*, **121**, 2231-2242, 2011

**Medvedev, G.**, Synchronization of coupled limit cycles, *J. of Nonl. Sci.*, **21** (3), 441-464, 2011.

Lam, T., Lapointe, L., **Morse, J.**, Shimozono, M., Affine Insertion and Pieri Rules for the Affine Grassmannian, *Memoirs of the AMS* 208, no. 977., 2010

**Naber, G.**, *Topology, Geometry and Gauge Fields: Interactions*, Second Edition, Applied Mathematical Sciences **141**, Springer, New York, 2011

**Schmutz, E.**, Period Lengths for Iterated Functions, *Combinatorics, Probability & Computing* **20**(2), 289-298, 2011

**Sheng, Li**, Chen, D., Liang, Q., Singh, S., Sense through Wall Human Detection Using UWB Radar., *EURASIP Journal on Wireless Communications and Networking*, 2011:20, doi:10.1186/1687-1499-2011-20, 2011

Mihaly Bakonyi and **Hugo J. Woerdeman**, *Matrix Completions, Moments and Sums of Hermitian Squares*, Princeton University Press, Princeton, NJ, 2011.

**Woerdeman, Hugo**, and **Koyuncu, S.** The Inverse of a Two-level Positive Definite Toeplitz Operator Matrix, *Operator Theory: Advances and Applications*, **218**, 387–401, 2011

**Wright, J. Douglas** and Spirn, D., Linear Dispersive Decay Estimates for the 3+1 Dimensional Water Wave Equation with Surface Tension, *Canadian Mathematical Bulletin*, 2011

**Wright, J. Douglas** and Hoffman, A., Exit Manifolds for Lattice Differential Equations, *Proceedings of the Royal Society Edinburgh: Section A*, v. **140**, no. 1, 77-92, 2011

## Faculty Presentations

**Ambrose, David**, Computation of Time-Periodic Interfacial Fluid Flows, AMS Western Section Meeting, Riverside, CA, November 2009

**Ambrose, David**, Free Surface Problems in Fluid Dynamics, Invited, Colloquium, Arizona State University Math Department, Tempe, AZ, September 2010

**Ambrose, David**, Free Surface Problems in Fluid Dynamics, Invited, Colloquium, University of Pittsburgh Math Department, Pittsburgh, PA, October 2010

**Ambrose, David**, Analysis Seminar, Invited, Temple University Math Department, Philadelphia, PA, October 2010

**Ambrose, David**, Two Problems in Interfacial Fluid Dynamics, Invited, Courant Institute of Mathematical Sciences New York University, New York, NY October 2010

**Ambrose, David**, Partial Differential Equations Seminar, Invited, Boston University Math Department, Boston, MA March 2011

**Ambrose, David**, The Seventh IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory in the Session, Invited, University of Georgia Center for Continuing Education, Athens, GA, April 2011

**Ambrose, David**, Recent Developments in Mathematical Studies of Water Waves, University of Georgia Center for Continuing Education, Athens, GA, April 2011

**Ambrose, David**, FACM 2011: Frontiers in Applied and Computational Mathematics, Invited, New Jersey Institute of Technology, University Heights Newark, NJ, June 2011

**Ambrose, David**, AMS Eastern Sectional Meeting, College of the Holy Cross, Worcester, MA, April 2011

**Ambrose, David**, 3rd Workshops on Fluids and PDE, University of Campinas, Institute of Mathematics, Statistics, and Scientific Computation, Campinas, Brazil, June 2011

**Ambrose, David**, Some Existence Problems in Interfacial Fluid Dynamics, Second Franco-Brazilian Fluids Summer School, Lyon, France, July 2010

**Boyer, Robert**, Asymptotics and Zeros for Partition Statistics Polynomials, Joint Math Meetings, Invited, New Orleans, LA, January 2011

**Foucart, Simon**, Compressive Sensing and the Hard Thresholding Pursuit algorithm, Colloquium, Department of Mathematics, Towson University, Towson, Maryland, April 2011

**Foucart, Simon**, Recovery Algorithms in Compressive Sensing, Colloquium, Department of Mathematics, University of South Florida, Tampa, FL, December 2010

**Foucart, Simon**, Recovering Space Vectors Via Hard Thresholding Pursuit, Seminar, Whiting School of Engineering, Johns Hopkins University, Baltimore, Maryland, March 2011

**Foucart, Simon**, Geometry of  $L_1^1$  via Compressive Sensing. VIGRE Seminar, Department of Mathematics, University of Georgia, Athens, Georgia, February 2011

## Faculty Presentations

**Foucart, Simon**, Compressive Sensing and the Hard Thresholding Pursuit Algorithm, Seminar, CSCAMM, University of Maryland, College Park, MD, December 2010

**Foucart, Simon**, Hard Thresholding Pursuit: An Algorithm for Compressive Sensing; The Dimension of Trivariate Spline Spaces on Alfeld Splits, International Symposium in Approximation Theory, Invited, Vanderbilt University, Nashville, TN, May 2011

**Foucart, Simon**, Recovering Jointly Sparse Vectors via Hard Thresholding Pursuit, 9th International Conference on Sampling Theory and Applications, Invited, Nanyang Technological University, Singapore, May 2011

**Foucart, Simon**, Hard Thresholding Pursuit for Sparse Reconstruction, AMS Southeastern Meeting, Invited, Conference, Statesboro, GA, March 2011

**Guo, Yixin**, Deep Brain Stimulation Diminishes Thalamocortical Relay Errors in Computational Models, Mathematical Neuroscience Workshop, International Center for Mathematical Sciences, Edinburgh, UK, April 2011

**Guo, Yixin** and **Yang, Dennis G.**, Entrainment of a Thalamocortical Neuron to Periodic Sensorimotor Signals, SIAM Conference on Applications of Dynamical Systems, Snow Bird, UT, May 2011

**Hitczenko, Pawel**, Tails of Perpetuities, 39<sup>th</sup> Conference on Applications of Mathematics, Zakopane, Poland, September 2010

**Hitczenko, Pawel**, Some Properties of Random Staircase Tableaux, Probability Seminar, Technical University of Warsaw, Poland, October 2010

**Hitczenko, Pawel**, Perpetuities with Light Tails, Functional Analysis Seminar, Institute of Mathematics Polish Academy of Sciences, Warsaw, Poland, October 2010

**Hitczenko, Pawel**, On Tails Perpetuities, Stochastic Processes Seminar, Institute of Mathematics, Polish Academy of Sciences, Warsaw, Poland, October 2010

**Hitczenko, Pawel**, Central Limit Theorem for Certain Parameters of Staircase Tableaux, Probability Seminar, Technical University of Warsaw, Poland, October 2010

**Hitczenko, Pawel**, Perpetuities with Light Tails, Probability and Stochastic Processes Seminar, Nicolaus Copernicus University, Torun, Poland, October 2010

**Hitczenko, Pawel**, Staircase Tableaux, PhD Student's Colloquium, Institute of Mathematics, Polish Academy of Sciences, November 2010

**Hitczenko, Pawel**, Staircase tableaux, Discrete Math Seminar, Adam Mickiewicz University, Poznan, Poland, December 2010

**Hitczenko, Pawel**, On Random Staircase Tableaux, 8<sup>th</sup> Analytic Asymptotics and Combinatorics (ANALCO) (a satellite meeting to SODA), January 2011

**Hitczenko, Pawel**, Two-Sided Bounds for Tails of Thin Tailed Perpetuities, Probability Seminar, CUNY Graduate Center, May 2011



## Faculty Presentations

**Hitczenko, Pawel**, Some Properties of Random Staircase Tableaux, 15<sup>th</sup> International Conference Random Structures and Algorithms 2011, Atlanta GA, May 2011

**Hitczenko, Pawel**, On Tails of Perpetuities, 22<sup>nd</sup> International Meeting on Probabilistic, Combinatorial and Analytic Methods in the Analysis of Algorithms (AofA), Bedlewo, Poland, June 2011

**Kaliuzhnyi-Verbovetskyi, Dmitry**, Matrices with Normal Defect One, Operator Algebras/ Operator Theory Seminar, Tel Aviv University, Tel Aviv, Israel, December 2010

**Kaliuzhnyi-Verbovetskyi, Dmitry**, Noncommutative Power Series and Noncommutative Functions, International Conference Function Theory and Operator Theory: Infinite Dimensional and Free Setting, Ben-Gurion University, Beer-Sheva, Israel, June 2011

**Kaliuzhnyi-Verbovetskyi, Dmitry**, Noncommutative Power Series and Noncommutative Functions, International Workshop in Operator Theory and Applications, University of Seville, Seville, Spain, July 2011

**Kaliuzhnyi-Verbovetskyi, Dmitry**, Matrices with Normal Defect One, International Workshop in Operator Theory and Applications, University of Seville, Seville, Spain, July 2011

**Morse, Jennifer**, Background and Open Problem Session on  $k$ -Schur functions and connections to quasisymmetric functions, Banff International Research Station, Vancouver, BC, Canada, November 2010

**Moskow, Shari**, Scattering and Resonances of Thin High Contrast Photonic Structures , Scattering Theory Seminar, University of Delaware, Newark, DE, October 2010

**Moskow, Shari**, Spectrally Matched Grids for Anisotropic Problems, Invited, Applied Inverse Problems, Minisymposium, Texas A&M University, College Station, TX, May 2011

**Moskow, Shari**, Inverse Born Series for the Calderon Problem, Invited, NJIT FACM Conference, June 2011

**Moskow, Shari**, Scattering and Resonances of Thin High Contrast Photonic Structures, Invited, ICIAM, Vancouver, BC, Canada, July 2011

**Moskow, Shari**, Inverse Born Series for the Calderon Problem, ICIAM, Minisymposium, Vancouver, BC, Canada, July 2011

**Perline, Ronald**, A Class of Vortex Filament Solitons in Fluids, Plasmas and Superconductors, SIAM Nonlinear Waves and Coherent Structures, Philadelphia, PA, August 2010

**Sheng, Li**, Physical Mapping of DNA, Invited, Joint meeting of The 5th National Conference in Intelligent Computing, Nanjing, Jiangsu Province, China, July 2011

**Sheng, Li**, Probe Interval Graphs in NDA Physical Mapping , Probe Interval Graphs in NDA Physical Mapping, National University of Defense Technology, Changsha, Hunan Province, China. July 2011

## Faculty Presentations

**Wright, J. Douglas** , Well-Posedness Issues for Degenerate Dispersive Equations, Conference on Frontiers in Applied and Computational Mathematics, New Jersey Institute of Technology, University Heights Newark, NJ, June 2011

**Wright, J. Douglas** , Interaction Manifolds in Reaction Diffusion Systems, Math Department, North Carolina State University, Raleigh, NC, February 2011

**Woerdeman, Hugo**, A New Sparsity-Targeting Iterative Thresholding Algorithm for Inverse Problems at the Workshop 'Control, Optimization, and Functional Analysis: Synergies and Perspectives, in honor of Professor Bill Helton, San Diego, California, October 2010

**Woerdeman, Hugo**, Multivariable Moment Problems, Colloquium, Temple University, Philadelphia, May 2011

**Woerdeman, Hugo**, The Multivariable Matrix Valued K– Moment Problem on  $\mathbb{R}^d$ ,  $\mathbb{C}^d$  and  $\mathbb{T}^d$ , International Workshop on Operator Theory and its Applications, Seville, Spain, July 2011

**Woerdeman, Hugo**, Uniqueness in A. Horn's Problem, International Workshop on Operator Theory and its Applications, Seville, Spain, July 2011

**Woerdeman, Hugo**, Rank Properties of Multivariable Moment Matrices, International Conference for Industrial and Applied Mathematics, Vancouver, BC, Canada, July 2011

## Editorial Positions

**Ambrose, David**, Guest Editor, *Mathematics and Computers in Simulation*

**Morse, Jennifer**, Associate Guest Editor: *Journal of Combinatorics*

**Naber, Gregory**, Editorial Board, *Journal of Dynamical Systems and Geometric Theories*

**Naber, Gregory**, Associate Editor, *Journal of Geometry and Symmetry in Physics*

**Woerdeman, Hugo**, Associate Editor, *SIAM Journal of Matrix Analysis and Applications*

**Woerdeman, Hugo**, Editor, *International J. of Information and System Sciences*

## Special Topics Courses

### Fall 2009

MATH 680  
Fluid Dynamics  
Taught by David Ambrose

### Winter 2010

MATH 279  
Mathematics for Nursing  
Taught by Jason Aran and Harold Gilman

MATH 498  
Financial Mathematics  
Taught by Justin Smith

MATH 680  
Convex Optimization  
Taught by Hugo Woerdeman

MATH 680  
Applied Analysis I  
Taught by R. Andrew Hicks

### Spring 2010

MATH 680  
Applied Analysis II  
Taught by R. Andrew Hicks

MATH 680  
Compressed Sensing  
Taught by Simon Foucart

MATH 680  
Asymptotic & Special Functions  
Taught by Robert Boyer

## Honors Day Awards

The Drexel University College of Arts and Sciences Honors Day was held on May 19, 2011 in the Mandell Theater. This year's winners are:

Harry Muchnic Award - Jennifer Benhaim, Colleen Owens, Elizabeth Haberkorn, Carrie Bellafronte

Robert J. Bickel Award - Francis Ryan, Chelcy Strain

Frank Williams Prize - Martin Ghaidarov



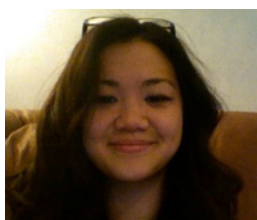
**Martin Ghaidarov** joined the Mathematics department in 2007 as an incoming freshman from Plovdiv, Bulgaria. He had the desire to study Mathematics since primary school so for Martin this was a dream come true. What fascinates Martin about the field is the uniformity of the language and understood all over the world. He is grateful for the opportunity and knowledge the faculty have given him. Some of Martin's favorite classes were Calculus, Discrete Mathematics, and Abstract Algebra. Martin's ultimate goal is to work in finance where he can develop and use his own mathematical valuation models.



**Colleen Owens** always liked math from a very young age. Her father taught her that math is a game, and if you play by the rules of the game, you will win every time. This seemed like a great idea to her, so after a brief flirtation with architecture, she switched to becoming a math major and has never looked back. This competitive nature has carried over to Boathouse Row where Colleen has been a varsity rower on Drexel's Crew for the past four years, spending time in the Freshmen/Novice 8, Varsity 4, 2nd Varsity 8, and Varsity 8. Three of those years were spent as the student-athlete Drexel Crew and Alumni Banquet coordinator. In addition, she was elected vice president of the Drexel Actuarial Science Student Association this past academic year, and hopes to someday soon see an actuarial science minor become a reality in the mathematics department.



**Jennifer Benhaim** has loved math for as long as she can remember. Given her love for math, around tenth grade she started to look into potential career paths as a math major. This is when she stumbled upon Actuarial Science which peaked her interest immensely. As a result, she started pursuing this career path, beginning with a college education. She transferred to Drexel from Community College of Philadelphia and continued to pursue her passion for math and Actuarial Sciences. As part of her time at Drexel, she was the founder and has been the president of Drexel Actuarial Science Student Association since it began. She has especially appreciated how extremely helpful, caring, supportive, and accommodating the Math department has been throughout her entire journey at Drexel.



**Carrie Bellafronte** was raised in New Jersey and came to Drexel as a freshman Mathematics major in the fall of 2009. She is now in her second year at Drexel and is interested in pursuing a career as an Actuary. She is Vice President and Treasurer of Math Student Organization and Head of the Exam Committee of Drexel Actuarial Science Student Association. Since January of 2010, she has also been an academic tutor at the Math Resource Center. Currently, she is on co-op working for ACE, a reinsurance company in Center City, with several contract analysts.

## Honors Day Awards



**Elizabeth Haberkorn**, better known as Libby, came to Drexel as a Fashion Design major, or Graphic Design depending on how you look at it, and through some convoluted (but not unwelcome) twist of events is graduating with a degree in math. Libby's favorite math classes were Differential Equations and Statistics. Although, the biggest thing she will take away from her experience at Drexel is the memories of all the people who inspired her to succeed and helped her find direction in life. Libby is about to graduate, and while she is excited about moving forward with the next step in her life, she will continue to look back fondly on her time at Drexel.



**Chelcy Strain** was born and raised in rural Utah and has loved math for as long as she can remember. She credits her success to the many great teachers who have helped and encouraged her as well as the support of family and friends. A special mention must go to Mr. Johnson, teacher of her high school Calculus class, whose love of math and extraordinary teaching skills is almost solely responsible for her decision to major in Mathematics. Chelcy transferred to Drexel as a pre-junior and quickly got involved in the Mathematics Student Organization and tutoring in the Math Resource Center. She plans to graduate in 2013 but hopes to continue learning for years to come.



**Francis Ryan** is a senior majoring in Mathematics with a minor in Computer Science. He came to Drexel as a Mechanical Engineering major in the Fall of 2006, but soon switched, feeling there was not enough math involved. During his five years at Drexel, Francis has been on the Dean's list every semester, has received a music scholarship for Concert Band, and has been a recipient of the A.J. Drexel Scholarship. He also received an award for Mechanical Engineering during freshman year and the Harry E. Muchnic Award during his third year. Following graduation, Francis will be starting a software company and looks forward to returning to Germany in the future.



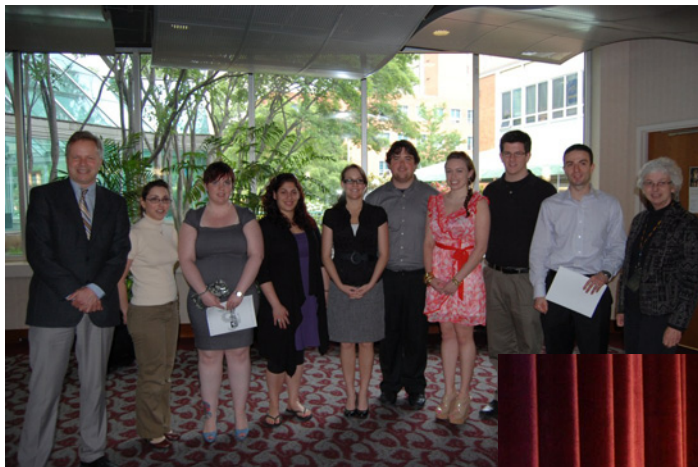
## Undergraduate Awards

### Senior First Honors

- Erin Hamalainen

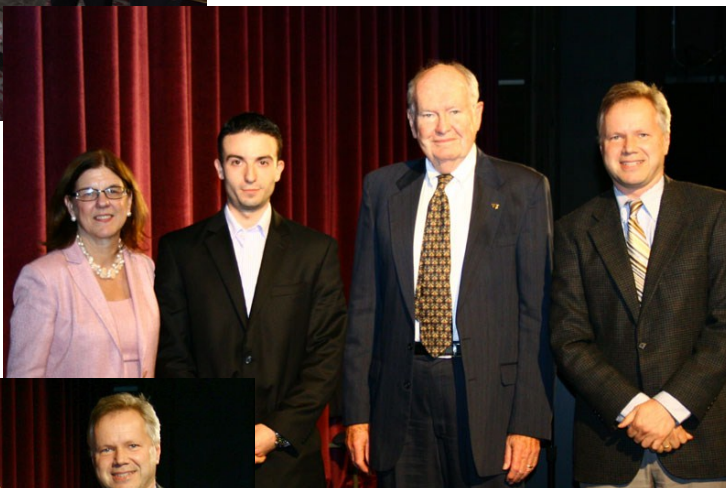
### Senior Second Honors

- Sean Ballentine



◀ Hugo Woerdeman, Marna Mozeff, Elizabeth Haberkorn, Jennifer Benhaim, Chelcy Strain, Sean Ballentine, Erin Hamalainen, Francis Ryan, Martin Ghaidarov, Patricia Russell

Donna Murasko, Martin Ghaidarov, Don Williams, Hugo Woerdeman ▶



Hu-

◀ Donna Murasko, Francis Ryan, Chelcy Strain, go Woerdeman



## Bachelor of Science Degrees Awarded

### Mathematics Majors

Sarah Block  
Elizabeth Lilley  
Elvin Ndoka  
Dixant Rai  
Danielf Bagnell  
Mary Long  
Sean Ballentine  
Jennifer Benhaim  
Jacob Brophy  
Samantha Brown  
Robert Conner  
Volha Davydchyk  
Elizabeth Haberkorn  
Erin Hamalainen  
Wenxin Li  
Matthew Plourde  
Nicholas Rouse  
Francis Ryan  
Michael-Anthony Savino  
Ashley Stanton  
Nedko Yordanov  
Takuya Kato  
Kevin Reohrig

### Mathematics Minors

Mayra Aguas  
Ishtiaque Ahmed  
Maria Caperelli  
Gary Chan  
Francis Clark  
William Frazier  
Michael Giampapa  
Francis Gongloff  
Ashwin Hamal  
Mohammad Hasan  
David Ho  
Maria Kolakowska  
Steven Leonhardt  
Tze Lim  
Timonthy McJilton  
Nupur Patel  
Joseph Pelle  
Jasemine Phillips  
Somya Sharan  
Monik Sheth  
Kevin Smiley  
Ishin Ueyama  
Amanda White  
Michael Willy  
Michael Witucki  
Stacey Wrazien

## Masters of Science Degrees Awarded

Bruce Mackay  
Baron Walker

## Doctor of Philosophy Degree Awarded

On May 12, 2010 Mr. Timur Milgrom presented and defended with success his Ph.D. thesis entitled "A Study of Boundary-Value Problems in Interfacial Fluid Dynamics." His Ph.D. advisor was Assistant Professor David Ambrose.

On June 22, 2011 Mr. David Kimsey presented and defended with success his Ph.D. thesis entitled "Matrix Valued Moment Problems." His Ph.D. advisor was Professor Hugo Woerdeman.

On May 26, 2011 Mrs. Svitlana Zhuravystka presented and defended with success her Ph.D. thesis entitled "Noise-Induced Phenomena in Electrically Coupled Neuronal Networks." Her Ph.D. advisor was Associate Professor Georgi Medvedev.

## Distinguished Visitor Lecture Series

May 11, 2011

**Douglas Arnold**

University of Minnesota

*Mathematics That Swings: The Math Behind Golf*

**Abstract:** Math is everywhere, and the golf course is no exception. Many aspects of the game of golf can be illuminated or improved through mathematical modeling and analysis. We will discuss a few examples, employing mathematics ranging from simple high school algebra to computational techniques of the frontiers of contemporary research.

May 12, 2011

**Douglas Arnold**

University of Minnesota

*Finite Element Exterior Calculus: Where Numerical PDE Meets Topology*

**Abstract:** This talk aims to provide an accessible introduction to the finite element exterior calculus, or FEEC, a new approach to designing and understanding numerical methods for a variety of PDEs. FEEC arises at the confluence of two streams of research, one emanating from the fields of numerical analysis and scientific computing, the other from topology and geometry. The former stream provides key concepts like Galerkin methods, saddle point variational principles, and finite elements, while the latter contributes ideas such as elliptic complexes, de Rham cohomology, and Hodge theory. These tie together elegantly in the theory of Hilbert complexes and their discretization, which can be used to guide the development of new finite element methods. FEEC has succeeded in unifying, improving, and extending finite element methods for a variety of PDEs arising in fluid and solid mechanics, electromagnetics, and other areas, and has led to the discovery of simple stable numerical methods for problems which were previously untractable.



Caroline Shapcott, Hugo Woerdeman, Douglas Arnold



## Dean's Seminar

April 20, 2011

**Simon Foucart**

Compressive Sensing: Making the Most of Few Measurements



**Abstract:** A revolution in signal processing occurred a few years ago when mathematicians showed that "sparse" or "compressible" signals, such as digital photographs or cell phone messages, could be reconstructed from far fewer measurements than engineers previously thought. This surprising observation had far-reaching implications in many domains, from information theory to medical imaging and computational biology. This talk will provide a rudimentary explanation of the mathematics behind the fascinating theory that has emerged since then: Compressive Sensing.

## Colloquium

September 23, 2010

**Andrea Barreiro**

University of Washington

Dynamics and Impact of Spike-Time Correlations

October 7, 2010

**Sebastian Cioaba**

University of Delaware

Eigenvalues of Graphs

October 14, 2010

**Guy Kortsarz**

Rutgers-Camden

The Achromatic Number and Related Issues

October 21, 2010

**Robert Kohn**

New York University

Surface Relaxation Below the Roughening Temperature: Steps, PDE, and Self-Similarity

October 28, 2010

**David Colton**

University of Delaware

Transmission Eigenvalues and Inverse Scattering Theory

November 11, 2010

**Curtis Greene**

Haverford College

Inequalities for Combinatorial Families of Symmetric Functions

December 2, 2010

**Gene Wayne**

Boston University

Dynamical System Theory and the Two-Dimensional Navier-Stokes Equations

January 13, 2011

**Laurent Younes**

Johns Hopkins University

From EPDiff to Diffeons: Finite Dimensional Control of Diffeomorphic Matching

February 3, 2011

**Benjamin Pittman-Polleta**

Drexel University

Decompositions for Matrices and Permutations

March 10, 2011

**Dennis Yang**

Drexel University

Entrainment of a Thalamocortical Neuron to Periodic Sensorimotor Signals

## Colloquium

March 31, 2011

**Lior Fishman**

Brandeis University

Schmidt's Game, Friendly Measures and Exceptional Sets on Fractals

April 12, 2011

**Michael Robinson**

University of Pennsylvania

Measuring Topology and Geometry by Distributed Sensing

April 21, 2011

**Leonid Rubchinsky**

IUPUI

Synchronized Oscillations, Basal Ganglia, and Parkinson's Disease

May 5, 2011

**Kris Jenssen**

Pennsylvania State University

The Cauchy Problem for Systems of Conservation Laws

May 11, 2011

**Douglas Arnold**

Mathematics That Swings: The Math Behind Golf

University of Minnesota

May 12, 2011

**Douglas Arnold**

University of Minnesota

Finite Element Exterior Calculus: Where Numerical PDE Meets Topology



May 26, 2011

**Simon Foucart**

Drexel University

Compressive Sensing and Banach Space Geometry

June 2, 2011

**Elaine Cozzi**

Drexel University

Existence and Uniqueness Theory for the Incompressible Euler Equations

## Analysis Seminar

October 1, 2010

**David Kimsey**

Drexel University

The Truncated Matrix-Valued K-Moment Problem on  $\mathbb{R}^d$ ,  $\mathbb{C}^d$ , and  $\mathbb{T}^d$

October 8, 2010

**Simon Foucart**

Drexel University

Algorithms for Compressive Sensing -- Basis Pursuit and Hard Thresholding Pursuit

October 15, 2010

**Hugo Woerdeman**

Drexel University

A New Sparsity-Targeting Iterative Thresholding Algorithm for Inverse Problems

October 22, 2010

**Dmitry Kaliuzhnyi-Verbovetskyi**

Drexel University

Chain rules for higher derivatives

October 29, 2010

**Simon Foucart**

Drexel University

Some open problems in Approximation Theory

November 5, 2010

**Daniel Parry**

Drexel University

Geometric properties of the polylogarithm

November 12, 2010

**W. Steven Gray**

Old Dominion University

On generating series and convergence of interconnected analytic nonlinear systems

November 19, 2010

**Bob Boyer**

Drexel University

Spherical Functions on Infinite Dimensional Spaces

December 3, 2010

**Hugo Woerdeman**

Drexel University

Open problems: sums of squares & normal completions

January 7, 2011

**Hugo Woerdeman**

Drexel University

Open problems: sums of squares



## Analysis Seminar

January 21, 2011

**Ronald Perline**

Drexel University

Vortices, Polynomials, and Combinatorics

April 8, 2011

**Sean Ballentine**

Drexel University

Napoleon's Theorem and an Interesting Fact About Planar Rotations

April 15, 2011

**Hugo Woerdeman**

Drexel University

A Sum of Squares Approximation of Nonnegative Polynomials

April 22, 2011

**Andrey Melnikov**

Drexel University

A New Class of Potentials for Sturm Liouville ODE

April 29, 2011

**Hugo Woerdeman**

Drexel University

Multivariable Moment Problems

May 6, 2011

**Dmitry Kaliuzhnyi-Verbovetskyi**

Drexel University

Noncommutative calculus: A Gentle Introduction

May 13, 2011

**David Kimsey**

Drexel University

A Matrix-Valued Generalization of Bochner's Theorem

May 20, 2011

**Lei Cao**

Drexel University

Littlewood-Richardson Functions and our Conjecture

May 27, 2011

**Joseph A. Ball**

Virginia Tech

Test functions, Kernel Functions, and Matrix-Valued Schur-Agler Class

## Combinatorics and Algebraic Geometry Seminar

Sep 23, 2010

**Dave Anderson**

University of Washington  
Okounkov Bodies and Toric Degenerations

Sep 30, 2010

**Bruce Sagan**

Michigan State  
Combinatorial and Colorful Proofs of Cyclic Sieving Phenomena

Oct 7, 2010

**Angela Gibney**

University of Georgia  
Conformal Blocks Divisors on  $M_{\{0,n\}}$  from  $sl_2$  and  $sl_n$

Oct 14, 2010

**Jim Haglund**

University of Pennsylvania  
A Polynomial Identity for the Hilbert Series of the Quotient Ring of Diagonal Coinvariants

Oct 21, 2010

**Richard Ehrenborg**

University of Kentucky and IAS  
The Topology of Restricted Partition Posets

Oct 28, 2010

**Margaret Readdy**

Univ. of Kentucky and IAS  
Flag Enumeration in Geometry and Algebra

Nov 4, 2010

**Mahir Can**

Tulane University  
Unipotent Invariant (complete) Quadrics

November 11, 2010

**Curtis Greene**

Haverford College  
Extensions of Muirhead's, Maclaurin's, and Newton's Inequalities

December 2, 2010

**Lenny Tevlin**

New York University  
Shadows of the Noncommutative Symmetric Macdonald Polynomial

January 25, 2011

**Mirko Visontai**

University of Pennsylvania  
A Multivariate Refinement of a Result of Bona on Stirling Permutations

## Combinatorics and Algebraic Geometry Seminar

February 1, 2011

**Brittany Sheldon and Mark Skandera**

Lehigh University

Path Tableaux and Combinatorial Interpretations for  $S_n$ -class Functions

February 1, 2011

**Alejandro Morales**

MIT

q-Analogues of Derangements and Fixed Point Free  
Involutions and Relations to Garsia and Remmel q-rook numbers

February 24, 2011

**Kagan Kursungoz**

Pennsylvania State University

A Generalization of Algorithm-Z with an Application

March 3, 2011

**Alex Yong**

University of Illinois

Patch Ideals and Peterson Varieties

March 17, 2011

**Birge Huisgen-Zimmerman**

UC-Santa Barbara

Generic Representation Theory of Quivers with Relations

March 22, 2011

**Elizabeth Beazley**

Williams College

Maximal Newton Polygons and the Quantum Bruhat Graph

## PDE/Applied Mathematics Seminar

September 27, 2010

**Xiaoming Wang**

Florida State University

Well-Posedness of the Hele-Shaw-Cahn-Hilliard System

October 18, 2010

**Yury Grobovsky**

Temple University

The Problem of Multiple Integrals in Calculus of Variations

October 25, 2010

**Cristian Gutierrez**

Temple University

Constructing Reflecting and Refracting Surfaces using the Legendre Transform

## PDE/Applied Mathematics Seminar

November 1, 2010

**Yves Capdeboscq**

Oxford/Princeton

Homogenization of a 1-D Singular Eigenvalue Problem  
with Neumann Boundary Conditions

November 8, 2010

**Ronald K. Perline**

Drexel University

Topics in Integrable Curve Dynamics

November 15, 2010

**Tom Beale**

Duke University

Computing with Singular and Nearly Singular Integrals

November 22, 2010

**Elaine Cozzi**

Drexel University

The Inviscid Limit of the Incompressible Navier-Stokes  
Equations for Flows with Nondecaying Vorticity

January 10, 2011

**Richard O. Moore**

NJIT

Rare Events in Nonlinear Optics

February 7, 2011

**Paul Milewski**

University of Wisconsin

Sharp Stability Results in Two-Layer Stratified Shallow Water

February 18, 2011

**Daniel Sporn**

University of Minnesota

Vortex Liquids and the Ginzburg-Landau Equations

February 21, 2011

**Leonid Berlyand**

Pennsylvania State University

Solutions with Vortices of a Semi-Stiff Boundary Value Problem for the  
Ginzburg-Landau Equation

February 28, 2011

**Sebastien Motsch**

University of Maryland

Mathematical Modeling of Collective Displacements: from Microscopic  
to Macroscopic Description

## PDE/Applied Mathematics Seminar

March 7, 2011

**Hwan Yong Lee**

Drexel University

Diffraction through a Periodic Aperture Array in a Perfect Conductor

April 8, 2011

**Philip Rosenau**

Tel-Aviv University

Brother, Can you Spare a Compacton?

April 25, 2011

**Wei Wang**

Florida International University

Multiscale Discontinuous Galerkin Methods and Applications

## Community Outreach

In conjunction with the Chew and Belfield Neighbors club run by Rev. Chester H. Williams, members of Drexel's mathematics department helped Reverend Williams to organize a free math tutoring program for children and adults in Germantown. Associate Department Head Shari Moskow and staff member Byron Greene attended organizational meetings and helped to find tutors. Staff member Byron Greene and Instructor Dimitrios Papadopoulos volunteered as tutors. The free sessions were held at the Joseph E. Coleman Northwest Regional Library on Saturdays in the winter and spring terms of 2010-2011.



## Departmental Committees

### Departmental Committees 2010-2011

#### Strategic Planning

Boyer, Chair  
Hitczenko  
Kalyuzhnyi-Verbovetskii  
Morse  
Woerdeman (ex-officio)

#### Tenure and Promotion

Moskow, Chair  
All tenured faculty members

#### Graduate Program

Sheng, Chair  
Ambrose  
Hitczenko  
Moskow  
Graduate Advisor: Hicks  
Qualifying Exam Subcommittee  
To be appointed by Graduate Program Committee

#### Undergraduate Program

Perlstadt, Chair  
Clarke  
Medvedev  
Rickert  
Undergraduate Advisor: Mozeff

#### Assessment

Medvedev, Chair  
Perlstadt  
Smith  
Wright

#### Teaching Faculty Promotion

Perline, Chair  
Guo  
Naber  
Russell  
Schmutz  
Associate Teaching Faculty, depending on cases considered

#### Teaching/Visiting Faculty Search

Schmutz, Chair  
Foucart  
Mozeff  
Russell (ex-officio)  
Woerdeman (ex-officio)

## Departmental Committees

Computer & Web site

Yu, Chair  
Dong  
Grinfeld  
Smith

Departmental Grants Advisor: Boyer

Colloquium Coordinator: Naber

Distinguished Speaker Coordinator: Perline

Library Liaison: Kalyuzhnyi-Verbovetzkii

Resource Center Coordinator: Shen

CoAS Undergraduate Program representative: Perlstadt

CoAS Graduate Program representative: Sheng

CoAS Tenure and Promotion representative: Moskow

CoAS Assessment representative: Medvedev

Goodwin Liaison: Mozeff

University 101 representative: Mozeff

Math 121-122-123 coordinator: Falco and Immordino

Math 101-102 coordinator (fall/winter): Rickert

Math 101-102 coordinator (winter/spring): Mozeff

Math 100 coordinator: Daniel (on-line) and Mozeff (fall)

Math 110 coordinator: Morse (fall)

Math Competition coordinator: Naber

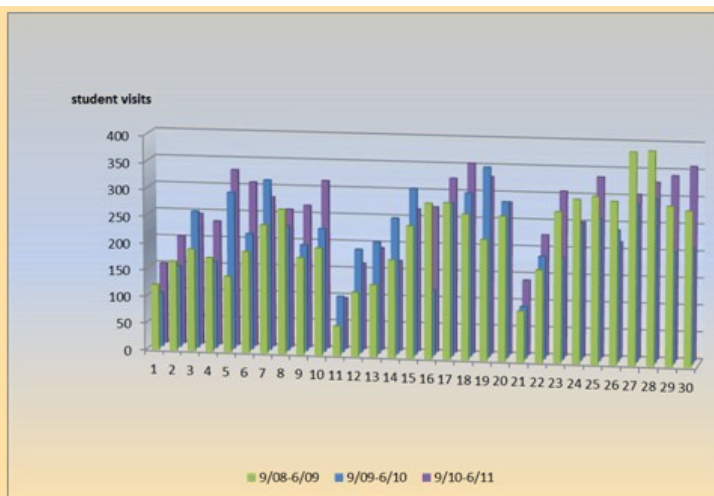
Mathematics Student Organization faculty adviser: Falco

## Mathematics Resource Center

The Math Resource Center (MRC) continues to flourish despite inadequate space. Word spreads that we are an invaluable resource: our weekly average of student visits swelled to 270, an increase of 13% from last year. Twice we set records for student visits per week in a quarter - 261 in the fall of 2010 and 291 in the spring of 2011.

That 1441 students along with 72 tutors tromp through our modest room during 12 months is eye-opening. On average, students stay for an hour and visit an average of 5.9 times. The 1441 students represent 26% of all student taking a Math course at Drexel University - an extraordinarily high number for a help center.

The MRC pools together the office hours of 46 faculty and TA's and the tutor hours of 26 undergraduates. It provides quality tutoring for 42 hours during the week- Monday through Thursday 10-7 and Friday 10-4. F's become C's. C's become A's. A's become A+'s.



### Highlights of the year:

An unusually high surge of freshmen in the fall and of Math 200 students in the spring were met with an increase of undergraduate tutor to 26



For the 1<sup>st</sup> time, we provided quality tutoring for Math 220, Math Reasoning, as well as continue tutoring for other high level courses, such as Linear Algebra, Differential Equations and Probability & Statistics.

## Mathematics Resource Center



“I found the MRC to be incredibly helpful to my math trouble. I honestly don’t think I could have passed any of my courses without its assistance. I found the kind nature and the slow pace that many tutors taught at to be more than helpful. It was truly lifesaving.”



“When possible, one-on-one help was very informative, but being able to sit in on other people asking questions also helped to expand my understanding of concepts.”

“Math has always been my weakest subject....I have been dreading this term for the sole reason that it would involve my very first calculus class....The help the MRC gave me in Math 102 has greatly freed me from a huge burden....I have even reached a point in my math class where I can assist other struggling students while in class.”

“My first exam I scored a 74....The MRC provided me with endless help....My second exam I scored a 100.....my third and final exams, extremely high percentiles, earning me an A+ in Calculus I....Two terms later, I’ve earned A’s in both Calculus II and Multivariate Calculus.....While I was a new and struggling student, the MRC not only helped organize and educate me....but also gave me a community to participate in. The tutors are extremely friendly, knowledgeable, and ready to help. “

## Student Activities

### Graduate Student Seminar

October 6, 2010

**Dan Parry**

A Survey of Results on Plane Partition Polynomials

October 20, 2010

**Caroline Shapcott**

Modeling Integer Compositions with Geometric Random Variables

November 3, 2010

**Dan Jordon**

Mathematics of Climate Change and Data Assimilation

November 17, 2010

**Annalisa Crannell**

Franklin & Marshall College  
Happily Ever Aftermath

December 1, 2010

**Kim Kilgore**

A Brief Introduction to the Theory of Inverse Problems

January 19, 2011

**Avinash Dalal**

Symmetric Functions, the Young Tableau, and the Pieri Rule

February 2, 2011

**Derek Heilman**

A New Proof of the Pieri Rule for the Dual Grothendieck Polynomials

February 9, 2011

**David Kimsey**

An Introduction to Positive-Definite Functions on Locally Compact Abelian Groups

February 23, 2011

**Le Yu**

Generating Functions of Simply Generated Trees

March 9, 2011

**Timur Milgrom**

On Boussinesq Approximation Equations

April 20, 2011

**Phillip Gaudreau**

Component Order Edge Connectivity for Graphs of Fixed Size and Order

April 27, 2011

**Svitlana Zhuravystka**

Bifurcations in Morris-Lecar Neuronal Model

## Student Activities

### Student Presentations

**Kimsey, David**, Truncated Matrix-Valued K-Moment Problems on  $\mathbb{R}^d$ ,  $\mathbb{C}^d$ , and  $\mathbb{T}^d$ , Joint Mathematical Meetings, New Orleans, January 2011

**Koyuncu, Selcuk**, The Inverse of a Two-level Positive Definite Toeplitz Operator, The 22nd International Workshop on Operator Theory and its Applications, Seville, Spain, July 3-9, 2011

**Milgrom, Timur**, An Existence and Uniqueness Theorem for Periodic Solutions to Boussinesq Equations, Joint Mathematical Meetings, New Orleans, January 2011

**Milgrom, Timur**, An Existence and Uniqueness Theorem for Periodic Solutions to Boussinesq Equations, 30th Southeastern-Atlantic Regional Conference on Differential Equations, Virginia Tech, Blacksburg, VA, October 2010

**Shapcott, Caroline**, A Stopped-Sequence Construction for Studying Random Integer Compositions, Graduate Student Combinatorics Conference, Penn State University, State College, PA, April 2011

**Shapcott, Caroline**, Probabilistic Analysis of Integer Compositions with Restricted Part-Sizes, Research Day, Drexel University, Philadelphia, PA, April 2011

**Shapcott, Caroline**, Asymptotic and Rare Event Probabilities, College of Arts & Sciences 20th Anniversary Student Research Symposium, Drexel University, Philadelphia, PA, November 2010

**Yu, Le**, Automorphisms of Random Trees, 40 Years and Counting: AWM's Celebration of Women in Mathematics, Brown University, Providence, RI, September 2011

**Yu, Le, Eric Schmutz**, Automorphisms of Random Trees, Joint Mathematics Meetings, Boston, MA, January 2012



## Student Activities

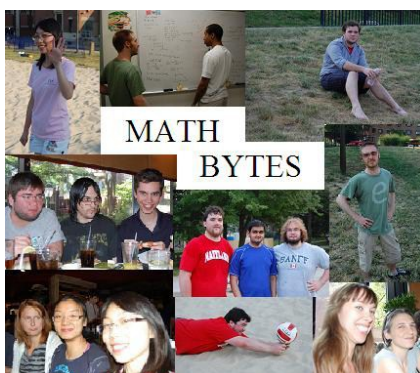
### SIAM Chapter

The Society for Industrial and Applied Mathematics is one of the largest applied mathematics and computational science organizations in the world and sponsors almost 100 student chapters around the globe. For the 2010-2011 academic year, the officers of Drexel's Student Chapter of SIAM were Caroline Shapcott, President; Daniel Jordon, Vice President; Matthew Brenneman, Treasurer; and Gulnara Abduvalieva, Secretary.

Our chapter held a biweekly seminar consisting of 15 individual talks as well as a series of Epsilon Talks (10-minute expository talks by first and second year Ph.D. students). We were thrilled to have the opportunity, in conjunction with our seminar, to host former MAA Governor Annalisa Crannell and former SIAM President Doug Arnold and to hear about their experiences as graduate students, early career mathematicians, and beyond. This year we awarded the SIAM Student Chapter Certificate of Recognition to Daniel Parry for outstanding service and contributions to the chapter.

### MATHBYTES

MathBytes is the Math Department's graduate student organization. Funding and support are provided by Drexel's Graduate Student Association, and membership is open to all students seeking an M.S. or Ph.D. in mathematics at Drexel. For the 2010-2011 academic year, MathBytes' officers were Avinash Dalal, President; Daniel Parry, Vice President; and Jeffrey Armstrong, Treasurer. This 2010-2011 academic year, MathBytes began the Fall term with a "Welcome Back" event, where current graduate students as well as new graduate students socialized. Towards the middle of the Fall term, we had a movie event where graduate students got together to see Harry Potter and the Deathly Hallows Part 1 at a theater in nearby Manayunk, PA. In the Winter term, a board game night event was held with the graduate students and the students from the undergraduate mathematics club: Math Student Organization (M.S.O.) in the Korman Center. Students played from an array of 10 games for about 4 hours. In the Spring term, a barbecue event was held with M.S.O. in the cool evening hours at the Buckley Volleyball Courts on Drexel campus. MathBytes ended the academic year with an "End of Year" event, where we celebrated the accomplishments of Timor Milgrom, Svitlana Zhuravytska, and David Kimsey for successfully finishing their Ph.D. and we wished much luck to the first year graduate students on their qualifying exam. We thank everyone who came out to the events to help make them successful, and most importantly to keep an atmosphere of togetherness. To find out more about our organization, learn about upcoming events, or see pictures of past events, please visit our website: <http://www.pages.drexel.edu/~dsomb/>



## Student Activities

### Mathematics Student Organization

The Mathematics Student Organization (MSO), also known as the “Math Club,” is a student-run organization whose mission is to promote mathematics and related fields by providing a casual and relaxed environment conducive to learning. The MSO is committed to bringing together undergraduate students with a common interest in various aspects of mathematics. The organization meets these goals by sponsoring events that include: guest speakers, fun mathematical problems and challenges, math movies and television programs, and entertaining math-related activities and games. The club also maintains a math library from which students can borrow books, novels, and periodicals about mathematics and related disciplines. The MSO website is: <http://www.pages.drexel.edu/~dsomso/>

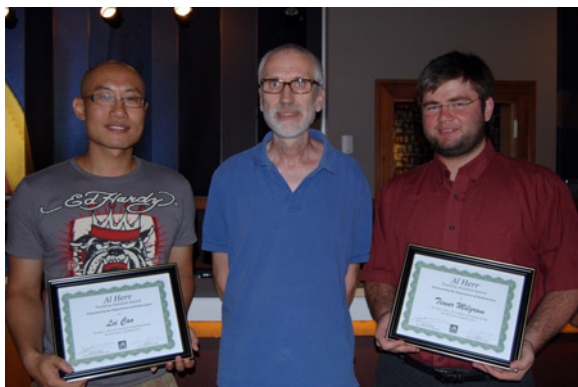
### Drexel Actuarial Science Student Association

DASSA, short for the Drexel Actuarial Science Student Association, is an undergraduate student organization dedicated to guiding aspiring actuaries. An actuarial career has consistently been rated one of the top four best jobs in the United States by the Jobs Rated Almanac, and it is part of DASSA’s mission to bring together and support its students in taking the initial steps towards pursuing this rewarding career, including working on getting an actuarial minor. In order to facilitate these early steps, DASSA sponsors a lecture/workshop series given by students in the organization and outside speakers on topics including, but not limited to, “What is an actuary?”, “The Exams: What they mean and how to navigate them,” plan of study workshops, resume critiquing, and the basics of pre- and post-graduate actuarial development programs. *We’re always looking for alumni involvement*, so please feel free to contact us at [dso-dassa@drexel.edu](mailto:dso-dassa@drexel.edu) or for more information, please visit our organization’s website at: <http://www.pages.drexel.edu/~dsodassa/>.



## Student Awards

**Lei Cao** and **Timur Milgrom**, graduate students in mathematics, were the recipients of the Al Herr Teaching Award.



Lei Cao, Robert Boyer, Timur Milgrom

**Avinash Dalal** won first place in the Graduate Sciences category at the College of Arts and Science Research Day. The title of his research is "From Pascal's Triangle to Cores of  $k$ -Schur Functions in String Theory".



Dean Donna Murasko and Avinash Dalal

## Pi Day

Pi day has become a math department tradition. An afternoon loaded with games, food, fun and farewell wishes for our undergraduate students about to leave for co-op. Each year this event is highly anticipated by all. Pi day has become a great way to wish our students all the best. Pi day 2011 saw the addition of new activity, an integration bee. Students from all majors participated and had a blast.





## Social Events

On December 7, 2010 the annual holiday reception was held at Landmark



On June 7, 2011 the annual end of year reception was held at Landmark

