



# Department of Mathematics Annual Report



Drexel University  
College of Arts & Sciences

2012 — 2013

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|--|-----------|
| Message From the Department Head   | <b>3</b>  |
| Tenured/Tenure-Track Faculty   | <b>4</b>  |
| Tenured/Tenure-Track Faculty and Teaching Faculty  | <b>6</b>  |
| Teaching Faculty, New Visiting Faculty   | <b>8</b>  |
| Adjunct Faculty, Emeritus Faculty, and Professional Staff                                | <b>9</b>  |
| Teaching Assistants and Research Assistants  | <b>10</b> |
| Department of Mathematics Photo and New Staff Profile                                    | <b>11</b> |
| Faculty Awards and Employee Service Award Recipients                                     | <b>12</b> |
| Faculty Grants   | <b>13</b> |
| Faculty Appointments / Conference Organizations  | <b>14</b> |
| Faculty Appointments / Conference Organizations/ Faculty Publications                    | <b>16</b> |
| Faculty Publications and Faculty Presentations   | <b>18</b> |
| Faculty Presentations, Editorial Positions and Special Topics Courses                    | <b>22</b> |
| Honors Day Awards  | <b>23</b> |
| Undergraduate Awards   | <b>26</b> |
| Degrees Awarded  | <b>28</b> |
| Distinguished Visitor Lecture  | <b>29</b> |
| Dean's Seminar Series  | <b>30</b> |
| Colloquium   | <b>31</b> |
| Analysis Seminar   | <b>33</b> |
| Analysis Seminar and Joint Mathematics/Computer Science Seminar                          | <b>35</b> |
| Compressive Sensing, Extensions, and Applications Seminar                                | <b>36</b> |
| Combinatorics and Algebraic Geometry Seminar   | <b>39</b> |
| PDE / Applied Mathematics Seminar  | <b>41</b> |
| SIAM Seminar   | <b>42</b> |
| Departmental Committees  | <b>43</b> |
| Mathematics Resource Center  | <b>44</b> |
| Graduate Presentations   | <b>47</b> |
| Graduate Publications, Certificate of Recognition Award and Undergraduate Research Co-op | <b>48</b> |
| Student Activities   | <b>49</b> |
| Graduate Student Award   | <b>52</b> |
| Social Events  | <b>53</b> |

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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 the many activities and accomplishments of our faculty and students. Again our department has enjoyed recognition in numerous ways. Professor and Associate Department Head Shari Moskow received an Association for Women in Mathematics Award for her extensive contributions to the association. Our graduate student Avinash Dalal received the Albert Herr Teaching Assistant Award for his excellence in teaching and Daniel Jordan 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. Andrew Zigerelli is the proud recipient of a Barry M. Goldwater Scholarship. Ryan Wasson received a 1st place poster presentation award at the College of Arts and Sciences Research Day, and Andrew Zigerelli a 2nd place poster award. At the annual honors day last spring, Colleen Sancherico and Philip Fehlinger won the Robert J. Bickel Award; Faith Hutchinson, Chad Conrad, Eric Collins, Steven Burak and Yu Zhao won the Harry Muchnic award; and Andrew Zigerelli won the Frank Williams prize. Finally, Devin Scott and Lu Lin received First and Second Senior Honors, respectively. Kudos to all!

As always we welcomed several new department members. Jean-Luc Bouchot joined our department as Postdoctoral Associate working with Simon Foucart, and Parul Laul joined our department as a Visiting Assistant Professor. Our new staff member Sobha Philip took over as Coordinator of the Math Resource Center and Paige Reinertsen was promoted to Undergraduate Program Coordinator. Another change was that Associate Professor David Ambrose joined the front office as Associate Department Head starting of July 1, 2013, replacing Professor R. Andrew Hicks who expressed the desire to spend more time on his research.

This year's distinguished lecture series brought to campus Professor Alan Edelman, Professor of Applied Mathematics at M.I.T., an expert in random matrix theory. In his lecture aimed at a general audience, he explained the versatility of random matrix theory.

We hope that you are as excited about our department as we are. We greatly appreciate your feedback and your involvement as it helps enormously 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) Associate 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.



**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) Associate 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, catadioptics.



**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) Associate Professor. Operator theory, systems theory, complex analysis,  $C^*$ -algebras and harmonic analysis.



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

## Tenured/Tenure-Track Faculty



**Jennifer Morse, Ph.D.** (University of California, San Diego) 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) Associate 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

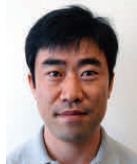


**Robert Immordino, M.S.** (Drexel University) Assistant Teaching Professor

## Teaching Faculty



**Huilan Li, Ph.D.** (York University) Assistant Teaching Professor



**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.



**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



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



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



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

## Teaching Faculty



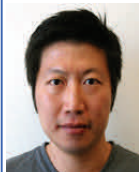
**Kenneth Swartz, Ph.D.** (Harvard University) Assistant Teaching Professor.  
Applied Probability and Statistics



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



**Richard White, M.S.** (St. Joseph's University) Assistant Teaching Professor.



**Dennis G. Yang, Ph.D.** (Cornell University) Assistant Teaching Professor

## New Visiting Faculty



**Jean-Luc Bouchot**  
Visiting Assistant Professor

Jean-Luc earned a Master's degree in applied mathematics and computer science from the French national polytechnic institute in Toulouse (INP-ENSEEIH). While writing his thesis he was also developing artificial intelligence software for Deutsche Telekom in Darmstadt, Germany. After that he was a research assistant within the department of knowledge-based mathematical systems at the Johannes Kepler university of Linz, Austria, where he completed his doctoral degree in applied and computational mathematics about structures and irregularities in image processing in 2012. He is now working on improving analysis of microbial mixtures by sparse representation and is interested in mathematical signal and image analysis.



**Parul Laul**  
Visiting Assistant Professor

Parul Laul completed her M.S. from the University of Toronto in 2006 and her Ph.D. from the University of North Carolina, Chapel Hill in 2011. Before joining Drexel, she was a post-doctoral fellow at the University of Cambridge. Her research interests are Partial Differential Equations and General Relativity.



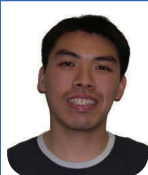
## Adjunct Faculty

**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, Ph.D.** (Drexel University)  
**Leo Lampone, Ph.D.** (Drexel University)  
**George Watson, M.S.** (Purdue 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



**C. Gene Phan**  
 Computer  
 Specialist



**Mindy Gilchrist**  
 Graduate  
 Program  
 Coordinator



**Paige Reinertsen**  
 Administrative  
 Coordinator



**Sobha Philip**  
 Manager,  
 Math Resource  
 Center  
 (Starting:  
 March 25, 2013)



**Byron Greene**  
 Manager, Math  
 Resource Center  
 (Until February 12,  
 2013)



**Kenneth Hemphill**  
 Budget  
 Coordinator

## Teaching Assistants and Research Assistants



**Gulnara Abduvalieva**



**Jeffrey Armstrong**



**Charles Burnette**



**Jingmin Chen**



**Avinash Dalal**



**Timothy Faver**



**Phillip Gaudreau**



**Timothy Hayes**



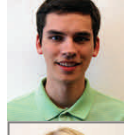
**Derek Heilman**



**Daniel Jordon**



**Kimberly Kilgore**



**Michael Minner**



**Amanda Parshall**



**Daniel Parry**



**Sarah Rody**



**Scott Rome**



**Patrick Shields**



**David Sulon**



**Xin Shao**



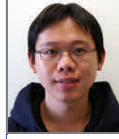
**Xuezhi Tang**



**Kelly Toppin**



**Jonah Smith**



**Chung Wong**



**Le Yu**



**Trevor Zaleski**

## Department of Mathematics



**Top Row:** Ken Hemphill, Jim Donnelly, Daryl Falco, Hugo Woerdeman, Richard White, Robert Immordino, David Ambrose, Shari Moskow, Ron Perline

**Rear Row Standing:** Patrick Sheilds, Trevor Zaleski, Jason Aran

**Front Row Standing:** Alex Dolgopolsky, Adam Rickert, Jingmin Chen, Charles Burnett, Sarah Rody, Okasana Odintsova, Michael Minner, Mindy Gilchrist, Timothy Faver, Xuezhi Tang, Thomas Yu, Phillip Gaudreau, Yixin Guo, Li Sheng **Sitting:** Kenneth Swartz, Judy Smith, Jeanne Steuber, Paige Reinertsen, Chung Wong, Gulnara Abduvalieva, Kelly Toppin. Scott Rome, Andrew Hicks

**Front Row Sitting:** Jeffrey Armstrong, Jonah Smith, Amanda Parshall, Jean-Luc Bouchot, Daniel Jordon, Patricia Russell, David Scheinker

## New Staff Profile

### Sobha Philip Math Resource Center Manager



Sobha was working as an adjunct faculty at Community College of Philadelphia in the Math, Science & Engineering Department before joining Drexel University. She has spent more than twenty years in education. She worked at M.D. Anderson Cancer center, Houston, TX in the Radiation Dosimetry Department and also at Fox Chase Cancer Center, Philadelphia, PA. But her passion for teaching brought her back to education. She has earned a Master's degree in Physics and a Bachelor's in Education (Mahatma Gandhi University).

## Faculty Awards

### Dr. Shari Moskow Receives Inaugural AWM Service Award



Dr. Shari Moskow, professor and associate department head of mathematics, was selected as one of ten recipients to receive the Association for Women in Mathematics (AWM) inaugural Service Award. Founded in 1971, the AWM is an international organization that comprises more than 3000 members worldwide. The association encourages females to study and pursue careers in the mathematical sciences, while promoting gender equality and equal opportunities for women. Moskow received her Ph.D. in applied mathematics from Rutgers University, and her B.S. degree in mathematics from Pennsylvania State University. Her research interests include applied partial differential equations and numerical analysis, focusing on homogenization theory, inverse problems, and related asymptotic and numerical methods.

## Employee Service Award Recipients

The Drexel University Employee Service Awards Ceremony was held on December 14, 2012 at the Sheraton Philadelphia City Center Hotel. The following members of the Drexel Mathematics department were recognized for their service at Drexel University.

### **Five Year Award Recipients**

Byron Greene • J. Douglas Wright • Michael Daniel  
Paige Reinertsen • Shari Moskow

### **Ten Year Award Recipient**

Georgi Medvedev

### **Thirty Year Award Recipient**

Marci Perlstadt

## Faculty Grants

**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

**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, Hamiltonian 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

**Guo, Yixin**, National Science Foundation, DMS 1226180, Closed-loop Deep Brain Stimulation, Synchrony breaking and Chimera State, 2012 to 2015, \$164,996

**Hicks, R. Andrew**, National Science Foundation, DMS 0908299, Distributions for Optical Design, 2009-2012, \$264,000

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

**Hitczenko, Pawel**, National Science Foundation, Probability and Analysis, 2012 – 2013, \$25,500

**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**, Combinatorics of Macdonald polynomials and affine Schubert calculus, Simons Fellows in Mathematics, 2012-2013, \$63,824

## Faculty Grants

**Moskow, Shari**, National Science Foundation, DMS 1108858, Collaborative Research: Direct Reconstruction Methods for Optical Tomography and Related Inverse Problems, 2011-2014, \$289,998

**Moskow, Shari**, National Science Foundation, DMS 1153905, Timed for a Successful Career: NSF/AWM Travel Grants for Women in the Mathematical Sciences 2011-2014, \$492,399

**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 Multivariable 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

**Yu, Thomas**, National Science Foundation, DMS 1115915, Topics in Geometric and Multiscale Numerical Methods, 2011-2014, \$230,827

**Yu, Thomas**, National Science Foundation, DMS 0915068, Multiscale Modeling and Approximation in Novel Geometric and Nonlinear Settings, 2009-2012, Amount: \$175,000

## Faculty Appointments / Conference Organizations

**Ambrose, David**, Co-organizer, Minisymposium for SIAM Conference on Nonlinear Waves and Coherent Structures, Seattle, Washington, June 13-16, 2012

**Ambrose, David**, Session co-organizer, The 9th AIMS Conference on Dynamical Systems, Differential Equations and Applications, Orlando, Florida, July 1 - 5, 2012

**Ambrose, David**, Session Co-organizer, IMACS Nonlinear Waves conference

**Dong, Bo**, Special session on finite element methods in AMS 2012 Spring Southeastern Section Meeting

## Faculty Appointments / Conference Organizations

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

**Hitczenko, Pawel**, Committee member of the Open Mind Award 2012 (an award for a young Polish combinatorialist), June-September 2012

**Kaliuzhnyi-Verbovetskyi, Dmitry**, Organizer, special session on Noncommutative and Free Analysis at the Joint Mathematical Meetings, Baltimore, MD, January 15-18, 2014

**Medvedev, Georgi**, Co-organized special session 'Stochastic Networks and Applications to Neuroscience', AIMS Conference of Differential Equations and Dynamical Systems, Orlando, FL, July 2012

**Medvedev, Georgi**, Organizer of special session, "Stochastic Networks with Applications to Neuroscience," AIMS meeting on Differential Equations and Dynamical Systems, July 2013

**Morse, Jennifer**, Executive Officer, Formal Power Series and Algebraic Combinatorics, Paris, France 2013

**Moskow, Shari**, Organizer, Conference on Applied Analysis and Mathematical Biology, 80th birthday conference for Robert Gilbert, University of Delaware, Newark, DE, August 8-9, 2012

**Moskow, Shari**, Organizer, "Applied Analysis for the Material Sciences", 60th birthday conference for Michael Vogelius, Luminy, France, May 27-31, 2013

**Moskow, Shari**, Organizer of minisymposium, International Conference on Novel Directions in Inverse Scattering, Honoring David Colton, August 2013

**Moskow, Shari**, Co-organizer of minisymposium, Hybrid Inverse Problems, AIMS conference series on Dynamical Systems and Differential equations, Spain, July 2014

**Naber, Greg**, Scientific Advisory Committee, International Conference on Mathematical Sciences, Bolu, Turkey, December 28-31, 2012

**Sheng, Li**, Student Travel Award Chair, the IEEE International Conference on Bioinformatics and Biomedicine (BIBM2012), Philadelphia, PA, Oct 4-7, 2012

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

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

## Faculty Appointments / Conference Organizations

**Woerdeman, Hugo**, Member of the Organizing Committee, 2013 International Linear Algebra Society (ILAS) in Providence, RI, June 2013

**Yu, Thomas**, Co-organizer of minisymposium, "Geometric Approximation," the 14<sup>th</sup> International Conference in Approximation Theory, San Antonio, TX April 2013

## Faculty Publications

Alpay, D., **Andrey Melnikov** and V. Vinnikov, "Schur algorithm in the class  $SI$  of  $J$ -contractive functions intertwining solutions of linear differential equations," *Integral Equations Operator Theory*, 74(3), p. 313-344, 2012

Arridge, S., **Shari Moskow** and J. C. Schotland, "Inverse Born series for the Calderon problem," *Inverse Problems*, 28(3), p. 35003-35018, 2012

**Ambrose, David** and M. Siegel, "A non-stiff boundary integral method for 3D porous media flow with surface tension," *Mathematics and Computers in Simulation*, 82(6), p. 968-983, 2012

**Ambrose, David**, J. L. Bona, and D. P. Nicholls, "Well-posedness of a model for water waves with viscosity," *Discrete and Continuous Dynamical Systems Series B*, 17, p. 1113-1137, 2012

**Ambrose, David**, G. Simpson, **J. Douglas Wright** and **Dennis Yang**, "Ill-posedness of degenerate dispersive equations," *Nonlinearity*, 25(9), p. 2655-2680, 2012

Banderier, C. and **Pawel Hitczenko**, "Enumeration and asymptotics of restricted compositions having the same number of parts," *Discrete Applied Mathematics*, 160, p. 2542-2554, 2012

Bandlow, J. and **Jennifer Morse**, "Combinatorial expansions in  $K$ -theoretic bases," *Electronic Journal of Combinatorics*. 19(4), 2012

**Boyer, Robert** and **Daniel Parry**, "On the zeros of plane partition polynomials," *Electronic Journal of Combinatorics*, 18(2), 2012

**Dalal, Avinash** and **Jennifer Morse**, "The ABCs of affine Grassmannians and Hall-Littlewood polynomials," *Discrete Mathematics and Theoretical Computer Science*, p. 945-956, 2012

**Grinfeld, Pavel**, "A better calculus of moving surfaces," *Journal of Geometry and Symmetry in Physics*, 26, p. 61-69, 2012

**Grinfeld, Pavel**, and G. Strang, "Laplace eigenvalues on regular polygons: A series in  $1/N$ ," *Journal of Mathematical Analysis and Applications* 385(1), p.135-149, 2012



## Faculty Publications

**Grinfeld, Pavel**, “Small Oscillations of a Soap Bubble,” *Studies in Applied Mathematics*, 127 (1), p. 30-39, (2012)

**Guo, Yixin**, “Existence and Stability of Traveling Fronts in a Lateral Inhibition Neural Network,” *SIAM Journal on Applied Dynamical Systems*, 11(4), p. 1543–1582, 2012

Haglund, J., **Jennifer Morse**, and M. Zabrocki, “A compositional shuffle conjecture specifying touch points of the Dyck path,” *Canadian Journal of Mathematics*, 64, p. 822-844, 2012

Joonmo, K. and **Li Sheng**, “A Note on Balanced Howell Rotations for Twin Prime Power Type,” *Discrete Mathematics, Algorithms and Applications*, 4(4), p. 1250056-1250061, 2012

**Kaliuzhnyi-Verbovetskyi, Dmitry** and V. Vinnikov, “Noncommutative rational functions, their difference-differential calculus and realizations,” *Multidimensional Systems and Signal Processing*. 23(1-2), p. 49-77, 2012

Kilgore, K., **Shari Moskow**, and J. C. Schotland, “Inverse Born series for scalar waves.” *Journal Computational Mathematics*, 30(6), p. 601-614, 2012

Koyuncu, S. and **Hugo J. Woerdeman**, “The Inverse of a Nonsymmetric Two-level Toeplitz Operator Matrix,” *Linear Algebra and its Applications*, 437(9), p. 2142–2158, 2012

Koyuncu, S. and **Hugo J. Woerdeman**, “The Inverse of Positive Definite Two-level Toeplitz Operator Matrices”, *Operator Theory: Advances and Applications (218), A Panorama of Modern Operator Theory and Related Topics*, p. 387–401, 2012

**Medvedev, Georgi** and S. Zhuravytska, “Shaping bursting by electrical coupling and noise,” *Biological Cybernetics*, 106(2) p. 67-88, 2012

**Medvedev, Georgi**, “Stochastic stability of continuous time consensus protocols,” *SIAM J. Control Optim.*, 50(4), p. 1859-1885, 2012.

**Medvedev, Georgi** and S. Zhuravytska, “The geometry of spontaneous spiking in neuronal networks,” *Journal Nonlinear Science*, 22(5), p. 689-725, 2012

**Medvedev, Georgi** and S. Zhuravytska, “Shaping bursting by electrical coupling and noise,” *Biological Cybernetics*, 106, p. 67-88, 2012.

**Morse, Jennifer**, “Combinatorics of the K-theory of affine Grassmannians,” *Advances in Math*, 229 p. 2950-2984, 2012

## Faculty Publications

**Grinfeld, Pavel**, Small Oscillations of a Soap Bubble, *Studies in Applied Mathematics*, 127(1) p.30-39 (2012)

**Morse, Jennifer** and A. Schilling, "A combinatorial formula for fusion coefficients," *Discrete Mathematics and Theoretical Computer Science Proceedings*, p. 735-744, 2012

**Odintsova, Oksana**, "Web Platform as a Modern Management Tool in Education," *Bulletin of the Krasnoyarsk State Pedagogical University*, 4(22), p. 19-21, 2012

Rodman, L. and **Hugo J. Woerdeman**, "Positive completion problems over  $C^*$ -algebras," *Operator Theory: Advanced Applications (222)*, *Mathematical Methods in Systems, Optimization, and Control*, p. 279–293, 2012

Xie, G. and **Thomas Yu**, "Invariance Property of Proximity Condition in Nonlinear Subdivision," *Journal of Approximation Theory*, 164(8), p. 1097-1110, 2012

## Faculty Presentations

**Ambrose, David**, Two Existence Problems in Interfacial Fluid Dynamics, Math and Its Applications Seminar, University of Illinois Chicago, IL, February 2012

**Ambrose, David**, Two Existence Problems in Interfacial Fluid Dynamics, Colloquium/Seminar in Applied Mathematics, Fields Institute, Toronto, Ontario, Canada, March 2012

**Ambrose, David**, Some Analytical Results for Equations with Degenerate Dispersion, PDE/Analysis Seminar, McMaster University, Hamilton, Ontario, Canada, March 2012

**Ambrose, David**, Free surface problems in fluid dynamics, Colloquium, Air Force Institute of Technology, WPAFB, OH, May 2012

**Ambrose, David**, Traveling and Time-Periodic Vortex Sheets with Surface Tension, SIAM Nonlinear Waves and Coherent Structures Conference minisymposium on Water Wave Bifurcations, June 2012

**Ambrose, David**, Interfacial Darcy Flow With and Without Surface Tension, PDE Seminar, Ohio State University, Columbus, Ohio, November 2012

**Ambrose, David**, Well-posedness and ill-posedness in equations with degenerate dispersion, PDE Seminar, Boston University, Boston, MA, November 2012.

**Ambrose, David**, Traveling and Time-Periodic Vortex Sheets with Surface Tension, Applied Mathematics Seminar, University of Bath, Bath, United Kingdom, December 2012

## Faculty Presentations

**Ambrose, David**, Two Existence Problems in Interfacial Fluid Dynamics, Math and Its Applications Seminar, University of Illinois Chicago, IL, February 2012

**Ambrose, David**, Two Existence Problems in Interfacial Fluid Dynamics, Colloquium/Seminar in Applied Mathematics, Fields Institute, Toronto, Ontario, Canada, March 2012

**Ambrose, David**, Some Analytical Results for Equations with Degenerate Dispersion, PDE/Analysis Seminar, McMaster University, Hamilton, Ontario, Canada, March 2012

**Ambrose, David**, Free surface problems in fluid dynamics, Colloquium, Air Force Institute of Technology, WPAFB, OH, May 2012

**Ambrose, David**, Traveling and Time-Periodic Vortex Sheets with Surface Tension, SIAM Nonlinear Waves and Coherent Structures Conference minisymposium on Water Wave Bifurcations, June 2012

**Ambrose, David**, Interfacial Darcy Flow With and Without Surface Tension, PDE Seminar, Ohio State University, Columbus, Ohio, November 2012

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**Ambrose, David**, Traveling and Time-Periodic Vortex Sheets with Surface Tension, Applied Mathematics Seminar, University of Bath, Bath, United Kingdom, December 2012

**Boyer, Robert P.**, Asymptotics for Polynomials from Integer Partitions, AMS Meeting Number Theory session, Boston, MA, January 2012

**Boyer, Robert P.**, Invited, Polynomial Versions of Integer Partitions and Their Zeros, Experimental Math Seminar, Rutgers University, New Brunswick, NJ, February 2012

**Hitczenko, Pawel**, Perpetuity property of the Dirichlet distribution, Probability Seminar, Warsaw University of Technology, Warsaw, Poland, May 2012

**Hitczenko, Pawel**, Perpetuity property of the Dirichlet distribution, XII Polish Conference on Probability, May-June 2012

**Hitczenko, Pawel**, Gaps in discrete random samples, Probability Seminar, Warsaw University of Technology, Warsaw, Poland, November 2012

**Hitczenko, Pawel**, Some properties of random staircase tableaux, DIMACOS'12, Beirut, Lebanon, November 2012

## Faculty Presentations

**Hitczenko, Pawel**, Maxima and tail behavior of perpetuities, Mathematical Statistics Seminar, Polish Academy of Sciences, Warsaw, Poland, November 2012

**Hitczenko, Pawel**, Gaps in discrete random samples, Probability Seminar, Warsaw University, Warsaw, Poland, December 2012

**Kaliuzhnyi-Verbovetskyi, Dmitry**, Noncommutative functions and fixed point theorems, Joint Mathematics Meetings, AMS—MAA, Boston, MA, January 2012

**Kaliuzhnyi-Verbovetskyi, Dmitry**, Noncommutative analytic functions, Great Plains Operator Theory Symposium, Houston, TX, May-June 2012

**Kaliuzhnyi-Verbovetskyi, Dmitry**, Noncommutative Functions, minicourse Noncommutative Multidimensional Linear Systems, Analytic Function Theory, and Real Algebraic Geometry in the Noncommutative Setting at the International Symposium MTNS 2012, Melbourne, Australia, July 2012

**Kaliuzhnyi-Verbovetskyi, Dmitry**, The Bessmertnyi class: old and new results, at the International Workshop in Operator Theory and Applications special session Operator, Function Theory, Linear Systems, Sydney, Australia, July 2012

**Kaliuzhnyi-Verbovetskyi, Dmitry**, Noncommutative fixed point theorem, Operator Theory and Systems Theory seminar, Ben-Gurion University of the Negev, Be'er-Sheva, Israel, November 2012

**Kaliuzhnyi-Verbovetskyi, Dmitry**, Norm-constrained determinantal representations of multivariable polynomials, Operator Theory and Systems Theory seminar, Ben-Gurion University of the Negev, Be'er-Sheva, Israel, December 2012

**Medvedev, Georgi**, The Geometry of Spontaneous Spiking in Neuronal Networks, Frontiers in Applied Computational Mathematics, New Jersey Institute of Technology, Newark, NJ, May 2012

**Medvedev, Georgi**, Noise-Induced Dynamics in Electrically Coupled Neuronal Networks, SIAM Discrete Mathematics minisymposium on Algebraic and Combinatorial Approaches to Neural Networks, June 2012

**Medvedev, Georgi**, Shaping bursting by electrical coupling and noise, AIMS Conference on Dynamical Systems, Differential Equations, and Applications special session on Multiple Time Scale Dynamics with a View Towards Biological Applications, Orlando, FL, July 2012

**Medvedev, Georgi**, The geometry of spontaneous spiking in neuronal networks, AIMS Conference on Dynamical Systems, Differential Equations, and Applications special session on Stochastic Networks with Applications to Neuroscience, Orlando, FL, July 2012

## Faculty Presentations

**Medvedev, Georgi**, The geometry of spontaneous spiking in neuronal networks, AMS Fall Eastern Section Meeting, Rochester Institute of Technology, Rochester, NY, September 2012

**Moskow, Shari**, Scattering and Resonances of thin high contrast photonic structures, LA Louisiana State University, Baton Rouge, May 2012

**Moskow, Shari**, Local Inversions in Ultrasound Modulated Optical Tomography, Conference in Honor of Gunther Uhlmann's 60th, UC Irvine, Irvine, CA, June 2012

**Moskow, Shari**, Inverse Born series for the Calderon Problem, AIMS Conference Series on Dynamical Systems and Differential Equations, Orlando, FL, July 2012

**Moskow, Shari**, Scattering and Resonances of thin high contrast dielectric structures, Conference on Applied Analysis and Biology, University of Delaware, Newark, DE, August 2012

**Moskow, Shari**, Inverse Born series for optical tomography and related inverse problems, Oberwolfach workshop: Computational Inverse Problems, October 2012

**Moskow, Shari**, Inverse Born series for optical tomography and related inverse problems ACMS colloquium, University of Pennsylvania, November 2012

**Naber, Greg**, Keynote Speaker, Gauge Fields and Geometry, Black Hills Research Symposium, Black Hills State University, Spearfish, SD, March 2012

**Naber, Greg**, Colloquium, Yang-Mills to Seiberg-Witten via TQFT, Departments of Mathematics and Physics, Black Hills State University, Spearfish, SD, March 2012

**Woerdeman, Hugo J.**, The truncated matrix valued K-moment problem on  $\mathbb{R}^d$ ,  $\mathbb{C}^d$  and  $\mathbb{T}^d$ , Annual Meeting of the American Mathematical Society, Boston, MA, January 2012

**Woerdeman, Hugo J.**, Norm-constrained determinantal representations of multivariable polynomials, Inaugural Lecture in the Lecture Series Dedicated to the memory of Mihály Bakonyi, Georgia State University, Atlanta, GA, September 2012

**Woerdeman, Hugo J.**, Norm constrained determinantal representations for multivariable polynomials, Workshop on Structured Numerical Linear and Multilinear Algebra Problems: Analysis, Algorithms, and Applications, Leuven, Belgium, September 2012

**Wright, J. Douglas**, Well-posedness issues for degenerate dispersive equations, Special Session on "Nonlinear Dispersive Equations" at the Spring Eastern Sectional of the AMS at George Washington University, Washington, DC, March 2012

## Faculty Presentations

**Wright, J. Douglas**, Well-posedness issues for degenerate dispersive equations, Special Session on “Nonlinear Dynamical Systems and Applications” at the Spring Central Sectional of the AMS at the University of Kansas, Lawrence KS, April 2012

**Yang, Dennis G.**, Ill-Posedness Due to Degenerate Dispersion, 2012 SIAM Conference on Nonlinear Waves and Coherent Structures mini symposium on Effects of Degeneracy in Dispersive LDE and PDE, Seattle, WA, June 2012

## Editorial Positions

**Ambrose, David**, Associate Editor, *Journal of Mathematical Analysis and Applications*

**Medvedev, Georgi**, Editorial Board, *Discrete and Continuous Dynamical Systems B*

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

**Morse, Jennifer**, Managing editor, *Journal of Combinatorics* (2013—present)

**Woerdeman, Hugo**, Editor, *International Journal of Information and System Sciences*

**Woerdeman, Hugo**, Guest Editor, *Linear Algebra and its Applications*

## Special Topics Courses

### Winter Quarter 12-13

MATH 279 001 Skepticism - David Scheinker

MATH 680 001 Math of Genome Analysis - Simon Foucart

MATH 680 002 Dynamical Systems I - Georgi Medvedev

MATH 680 003 Tensor Analysis – Pavel Greenfield

### Spring Quarter 12-13

MATH 680 001 Logic and Computation - R. Andrew Hicks

MATH 680 002 Dynamical Systems II - Georgi Medvedev

MATH 680 003 Topics in Algebra - Justin Smith

## Honors Day Awards

The Drexel University College of Arts and Sciences Honors Day was held on Thursday, May 23, 2013 in Behrakis Hall.

This year's winners are:

**Frank H.M. Williams Prize:**

Andrew Zigerelli

**Bickel Award:**

Colleena Sanchirico

Philip Fehlinger

**Muchnic Award:**

Faith Hutchinson

Chad Conrad

Erik Collins

Steven Burak

Yu Zhao



**Andrew Zigerelli** started at Drexel in 2010 as a mathematics major, and he recently added computer science as a second major this spring. He has tutored for the math resource center since his freshman year. He has enjoyed working as an undergraduate research assistant with Thomas Yu during his first two co-op cycles. Andrew has liked most of his math classes, and hopes to learn much more math in his final two years here. After Drexel, Andrew hopes to enter a Ph. D. program in mathematics.

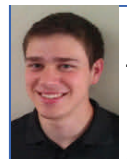


**Chad Conrad** is a junior in the Pennoni Honors College, majoring in Mathematics and minoring in Business Administration and Finance. He has a professional interest in Actuarial Science and is currently working as a co-op at Cigna. He is the treasurer of the Drexel Actuarial Science Student Association and is also involved with the Math Student Organization.

## Honors Day Awards



**Colleena Sanchirico** has always been fascinated by numbers and puzzles. She has always loved the challenge of solving things, but never considered a career in mathematics. She was going to pursue a double major in biology and psychology until she met two extraordinary professors at Camden County Community College, Joseph Diaco and Pablo Echeverria. They reignited her passion for math and made her realize how naturally she excelled at the subject. It was there that she also met her current boyfriend, a math major who has significantly contributed to her success at Drexel. Before she knew it, she was tutoring many students in various mathematics courses and was on her way to earning a Bachelor's degree in mathematics. At Drexel, her love for math grew even more after attending classes with her two favorite professors, Dr. Thomas Yu and Dr. Ron Perline. Eventually, she would also like to earn a Master's degree in mathematics because she hopes to teach students math and inspire them the way that she was inspired by her undergraduate professors.



**Erik Collins** came from Massachusetts to Drexel as a freshman Mathematics major in the fall of 2009 . He became passionate about soccer and mathematics at an early age. Erik credits his successes in both to his early education and his always loving and supportive family. Erik joined the math department initially interested in Actuarial Science, but his interests broadened to finance after his first co-op at Susquehanna International Group. This resulted in the addition of minors in Finance and Business Administration. Erik has returned to Susquehanna for his third co-op following his second co-op at CIGNA Group Insurance. Erik is excited about graduating in 2014, but he will always look back fondly on his time at Drexel and all of the experiences it has offered him.



**Faith Hutchinson** began her academic pursuits at Drexel as a sophomore in 2011 following a few years of community college exploration. Seventeen years after high school graduation and a long term career as a hairstylist, Faith's surprise interest in mathematics inspired her to study it full-time. She is pursuing her Bachelor of Science in mathematics with a minor in Judaic studies, is a Pennoni Honors Program member, and served this past year as president of the Mathematics Student Organization. Faith's favorite math subject so far is linear algebra, and she is currently delving deeper into the subject through an REU co-op with Dr. Hugo Woerdeman. She will graduate in 2015 and plans to pursue a graduate program of study.



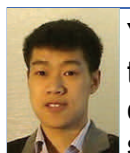
## Honors Day Awards



**Phil Fehlinger** had an interest in math from an early age. In high school an interest for politics and public policy developed; thus, he chose to enter Drexel as an Economics major. However, his passion for politics and public policy faded, so he decided to change his major to Mathematics. This was the best decision of his college career. He now thoroughly enjoys learning math and the challenge it presents in understanding abstract concepts. He is grateful for the fun and knowledgeable professors in the Math Department. Phil Fehlinger is also an active member of his local church, Sovereign Grace Church in Marlton. He leads a small group for college-age students, and helps out with the junior and senior high groups as well. His desire is to stay involved in this local church after graduation and pursue a master's degree.



**Steven Burak** knew since high school that he loved mathematics and wanted to study how to apply it. Being a local university with a reputable math program, Drexel was the clear choice for him. At Drexel, Steve has thoroughly enjoyed studying the material for many of his classes and learning from many of his professors. In addition to pursuing applied mathematics, Steve enjoyed the privilege of being the president of Drexel Students for Christ on campus. He is now a full-time actuary at a property and casualty insurance company and is getting married in July of 2013.



**Yu Zhao** started at Drexel University in 2012 as a math and computer science major. Before transferring to Drexel, he was studying Math, computer science and economics at a liberal arts college. During his first two years in college, he developed a strong interest in probability and statistics through studying actuarial exams. After passing the first four of the actuarial exams, he learned that the mathematics from the exams can be applied to a wide variety of fields such as computer science and mathematical finance. Starting from his junior year in college, he began taking advanced math and computer science classes. So far, his favorite classes are Analysis, probability and theory of computation. He plans to take more theoretical math and computer science classes before graduation and then pursue a PHD in a quantitative field.

## Undergraduate Awards

# MATHEMATICS MAJOR RECEIVES GOLDWATER SCHOLARSHIP



Mathematics and computer science major **Andrew Zigerelli** was one of four Drexel students to take home the Barry M. Goldwater Scholarship this year. Established by Congress in 1986, the scholarship is awarded to the country's top undergraduate students in science, technology, engineering and mathematics.

**Q: What made you want to become a math major?**

A: When I came to college, I just picked my favorite subject. I was always more interested in the ideas and problems in math than other subjects.

**Q: Who or what inspired you to apply for the Goldwater Scholarship?**

A: I've received emails every year since I was a freshman from the Drexel Fellowships Office encouraging me to apply for scholarships, especially this one. I applied the first year I was eligible.

**Q: What research had you done previously that helped you secure the award?**

A: I worked with Dr. Thomas Yu and his graduate student Jingmin Chen in the math department. His work involves something called subdivision surfaces, which are traditionally used in computer-aided geometric design, so something like Pixar. However, our project used these surfaces to help explore a model in physics explaining the membrane shape of our body's cells.

**Q: Are there any Drexel professors you look up to as mentors? If so, who and why?**

A: The math department as a whole has been very helpful. Most professors that I have had were very accessible, and the graduate students are always there to help as well. Specifically, Dr. Yu is very willing to discuss and explain different concepts, even if the topic has nothing to do with our project. He also offers solid academic advice.

**Q: What was the Goldwater application process like?**

A: The application process was pretty long. Every university has a limit of four applicants, so there was an internal application process so that Drexel could select their own applicants. The largest part of the actual application involved multiple essays. The Fellowships Office set up a committee of professors from different departments on campus to assist us. The committee was extremely helpful; the Fellowships Office definitely knows what they are doing.

**Q: What have some of your favorite Drexel courses been thus far (mathematics or otherwise)?**

A: I enjoyed most of my math and computer science courses. I think I still need to learn a lot more before I can consider a favorite.

**Q: What are your plans after graduation?**

A: I want to attend graduate school after Drexel. I'm still narrowing down my interests, so I'm not sure where I want to go just yet.

**Andrew Zigerelli** was among the total 271 undergraduate students in math and science fields who won the scholarship from the Barry M. Goldwater Scholarship and Excellence in Education Program.

## Undergraduate Awards

# 2013 CoAS Research Day Awards

### Undergraduate Natural & Physical Sciences - Poster Presentations

**1st Place:** Ryan Wasson, Mathematics. "The Normal Defect of Some Classes of Matrices."  
Advisor: Dr. Hugo Woerdeman. (Co-Author: Dr. Hugo Woerdeman)

**2nd Place:** Andrew Zigerelli, Mathematics. "A Computational Application of Subdivision Surfaces to Biophysics." Advisor: Dr. Thomas P.Y. Yu. (Co-Authors: Jingmin Chen, Sara Grundel, Robert Kusner, Thomas Yu)



← Hugo Woerdeman, Ryan Wasson



Ryan Wasson, Dean Murasko →

## Bachelor of Science Degrees Awarded

### Mathematics Majors

Carrie Bellafronte  
Chelcy M Strain  
Christian Bone  
Derek J DeMauro  
Devin M Scott  
Hongvan Nguyen  
Isma M Terrence  
Jianyang Ye  
Jimson C Cuenta  
Kelvin L Lam  
Linh T Nguyen  
Lu Lin  
Mark Paul Kondrla Jr.  
Michael McGilloway  
Nathaniel P Gosselin  
Nicholas S Mayo  
Nzambu Muinde  
Ryan Douglas Wasson  
Steven Michael Burak  
Thuy T Truong  
YingYing Zhu  
Zhengyang He

### Mathematics Minors

Aleksandr Karagodov  
Bradley S Daniel  
Brendan R Elias  
Charles W Hicks  
Daniel K Collins  
Ian A Vaughan  
Kristine N Falzarano  
Mark C Welser  
Mary K Chessey  
Mateusz K Stankiewicz  
Matthew J Hinkle  
Matthew J Teter  
Nathan Thiem  
Pareshkumar Chandrakant Brahmbhatt  
Robert M Brown  
Sheng Lan Zhang  
Srajan Mani Rastogi  
Valentine I Anyiam  
Wendy B Harris  
Yevgeniy A Sokolov

## Masters of Science Degrees Awarded

Jingmin Chen  
Michael Minner  
Philip Gaudreau

## Doctor of Philosophy Degree Awarded

**Le Yu** presented and defended with success her Ph.D thesis entitled “Automorphisms of Random Trees.” Her Ph.D advisor was Professor Eric Schmutz . Conferred: December 2012

**Daniel Jordon** presented and defended with success his Ph.D thesis entitled: “Spectral Properties of Differential Operators with Vanishing Coefficients. His Ph.D advisor was Professor Douglas Wright. Conferred: June 2013

**Kimberly Nolan** presented and defended with success her Ph.D thesis entitled “Forward and Inverse Born Series for Diffuse, Scalar, and Electromagnetic Waves.” Her Ph.D advisor was Professor Shari Moskow. Conferred: June 2013

**Derek Heilman** presented and defended with success his Ph.D thesis entitled: “Combinatorial aspects of generalizations of Schur functions.” His Ph.D advisor was Professor Jennifer Morse. Conferred: June 2013

## Distinguished Speaker Series

THE DEPARTMENT OF MATHEMATICS  
DISTINGUISHED SPEAKER SERIES



**DR. ALAN EDELMAN**  
Professor of Applied Mathematics  
Massachusetts Institute of Technology



### RANDOM MATRICES, NUMERICAL COMPUTATION AND APPLICATIONS

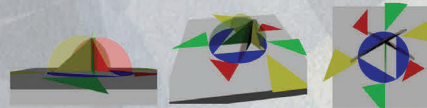
**FRIDAY, MAY 10, 2013**  
**2:00 PM - 3:00 PM**  
**PAUL PECK ALUMNI CENTER**  
GENERAL TALK WITH REFRESHMENTS AFTERWARDS

This talk is about random matrix theory. Linear Algebra and maybe a little probability are the only prerequisites. Random matrix theory is now finding many applications. Many more applications remain to be found.

It is truly "matrix statistics," when traditional statistics has been primarily "scalar" and "vector" statistics. The math is so much richer, and the applications to computational finance, HIV research, the Riemann Zeta Function, and crystal growth, to name a few, show how important this area is. I will show some of these applications, and invite you to find some of your own.

### HERMITE, LAGUERRE AND JACOBI

**THURSDAY, MAY 9, 2013**  
**3:00 PM - 4:00 PM**  
**KORMAN CENTER, ROOM 245**  
TECHNICAL TALK

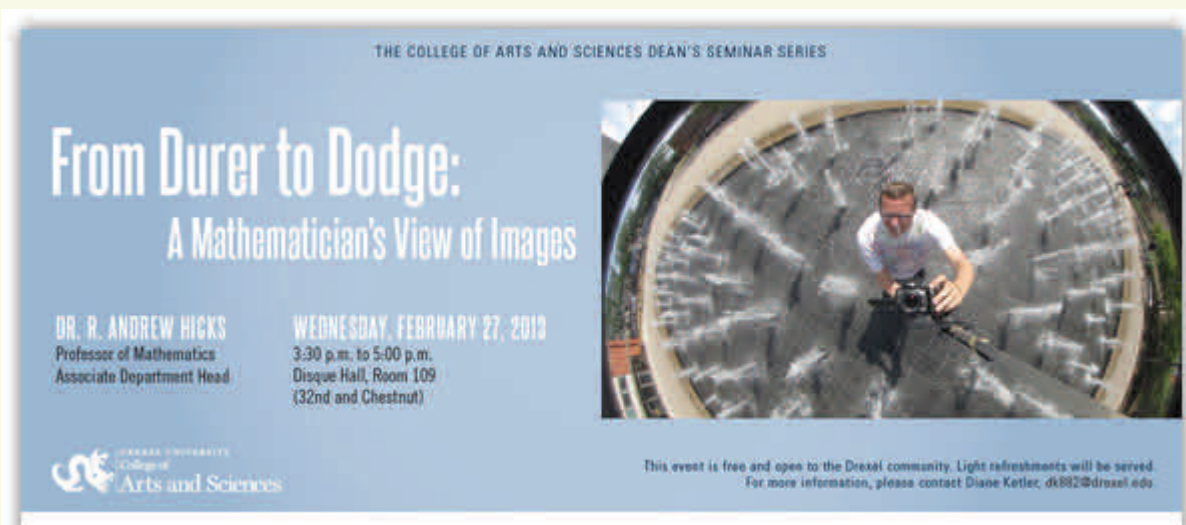


DREXEL UNIVERSITY  
College of  
Arts and Sciences



## Dean's Seminar Series

# From Durer to Dodge: a Mathematician's View of Images



The College of Arts and Sciences Dean's Seminar Series presents

## From Durer to Dodge: a Mathematician's View of Images

**DR. R. ANDREW HICKS**

Professor of Mathematics & Associate Department Head

**Wednesday, February 27, 2013**

3:30 p.m to 5:00 p.m.

Disque Hall, Room 109 (32nd & Chestnut)

Even though we live in a 3-dimensional world, *images* of that world appear as 2-dimensional objects. While this disconnect between reality and rendition results in a loss of information, there are a number of ways to enhance image quality to better depict our world. Humans struggled with this issue when trying to find the "right" way to represent the Earth as an image. Though perspective imaging initially appeared to be the answer, it turned out this was merely a choice—not the rule—just as there are choices when one creates a map of the globe.

In this presentation, Dr. R. Andrew Hicks will discuss his work in creating images with curved mirrors that conform to the demands of designers. In particular, he'll focus on applications, like his patented blind-spot-free driver's side mirror, which earned him a mention on Jay Leno's "Tonight Show!"

## Colloquium

**October 10**

Jonathan Goodman  
New York University

Time-Stepping Methods for Stochastic Differential Equations

**October 24**

Benjamin Webb  
Rockefeller University

Stability and Restrictions of Time-Delayed Dynamical Networks

**November 14**

Michael Siegel  
New Jersey Institute of Technology  
Elastic Capsules in Viscous Flow

**December 5**

Walter Craig  
McMaster University

Vortex Filament Interactions and Hamiltonian PDEs

**January 23**

Georgi Medvedev  
Associate Professor, Drexel University

The geometry of spontaneous spiking in neuronal networks

**February 27**

Peter Soendergaard  
Acoustics Research Institute, Vienna

The Linear Time-Frequency Analysis toolbox: Mathematics and applications Abstract

## Colloquium

**March 6**

Joel Langer  
Case Western University  
A short look at the long history of the lemniscate of Bernoulli

**March 13**

Sinan Gunturk  
Courant Institute, NYU  
Quantization Alternatives for Compressive Sensing

**April 10**

Jacek Wesolowski  
Warsaw University of Technology  
Generators of Quadratic Harnesses Through Polynomial Flows

**May 6**

Hans Feichtinger,  
University of Vienna  
Group Representation Methods for Efficient Numerical Algorithms in Gabor Analysis"

**May 8**

Ryan Hynd  
University of Pennsylvania  
Plateau's rotating drops and rotational figures of equilibrium

**May 15th**

Michael E. Gage  
University of Rochester  
WebWork

**May 22**

Per-Olof Persson  
University of California, Berkeley  
High-Order Discontinuous Galerkin Methods for Conservation Laws



## Analysis Seminar

**October 5**

Hugo Woerdeman

Norm-constrained determinantal representations of multivariable polynomials.

**October 12**

Gulnara Abduvalieva

Fixed-point theorems for noncommutative functions.

**October 19**

Andrey Melnikov

Construction of a Sturm-Liouville vessel using Gelfand-Levitan theory.  
Solution of the Korteweg-de Vries equation on the half-line.

**October 26**

Nikolai Vasilevski

Two-dimensional singular integral operators via poly-Bergman spaces,  
and Toeplitz operators with pseudodifferential symbols.

**November 2**

Daniel Parry

On the Roots of the Plane Partition Polynomials

**November 9**

Ryan Wasson

The normal defect for some classes of matrices

**November 16**

David Scheinker

Functions of several complex variables and determinantal representations

**November 30**

Thomas Yu

Willmore conjecture and the Canham-Helfrich Model

**December 7**

Jim Haglund

The monotone column permanent theorem.

**January 18**

Luke Oeding

Relations among principal minors

**January 25**

Brandan Farrell

From Classical Random Matrix Theory to Discrete Uncertainty Principles.

## Analysis Seminar

### **February 1**

Andrey Melnikov

Solution of the Boussinesq equation using evolutionary vessels

### **February 8**

Gideon Simpson

Numerical Analysis of Parallel Replica Dynamics

### **February 15**

Marek Swoboda

Definition of health

### **February 22**

Ron Perline

A dynamical approach to finding static equilibria

### **March 1**

Andrey Melnikov

Proof of existence of a local solution of a KdV equation on the line with analytic initial potential

### **April 12**

Hugo Woerdeman

Bivariate real-zero polynomials

### **April 19**

Anatolii Grinshpan

Determinants of zero/one matrices

### **April 26**

Claude Brezinski

The life and the work of André Louis Cholesky

Michela Redivo-Zaglia

Padé-type rational and barycentric interpolation

## Analysis Seminar

**May 3**

Valerie Girardin

Escort Distributions Minimizing the Kullback-Leibler Divergence for a Large Deviations Principle and Tests of Entropy Level.

**May 17**

Pawel Hitczenko

Weighted random staircase tableaux, asymmetric exclusion process, and generalized Eulerian polynomials.

**May 24**

Yuri Maistrenko

Chimera states for repulsively coupled phase oscillators

**May 31**

Ilya Spitkovsky

On some properties of the field of values generating function

**June 7**

Jingmin Chen

Curvature Integrability of Loop Surfaces.

## Joint Mathematics/Computer Science Seminar

**February 27**

Peter Soendergaard

Acoustics Research Institute, Vienna

The Linear Time-Frequency Analysis toolbox: Mathematics and applications

**May 6**

Dr. Hans Feichtinger

University of Vienna

Group Representation Methods for Efficient Numerical Algorithms in Gabor Analysis

## Compressive Sensing, Extensions, and Applications Seminar

### October 2

Simon Foucart  
Drexel University

One-bit compressed sensing with non-Gaussian measurements  
(Albert Ai, Alex Lapanowski, Yaniv Plan, and Roman Vershynin)

### October 9

Michael Minner  
Drexel University

Remote sensing via  $l_1$ -minimization  
(Max Hugel, Holger Rauhut, and Thomas Strohmer)

### October 16

Hugo Woerdeman  
Drexel University

Linear System Identification via Atomic Norm Regularization  
(Parikshit Shah, Badri Narayan Bhaskar, Gongguo Tang, and Benjamin Recht)

### October 23

Michael Minner  
Drexel University

On the Power of Adaptivity in Sparse Recovery  
(Piotr Indyk, Eric Price, and David Woodruff)

### November 6

Jean-Luc Bouchot  
Drexel University

Compressed sensing with cross validation  
(Rachel Ward)

### November 13

Simon Foucart  
Drexel University

Towards a mathematical theory of super-resolution  
(Emmanuel Candès and Carlos Fernandez-Granda)

### November 20

Simon Foucart.  
Drexel University

Towards a mathematical theory of super-resolution  
(Emmanuel Candès and Carlos Fernandez-Granda)

### December 4

Jean-Luc Bouchot  
Drexel University

Error Estimates for Orthogonal Matching Pursuit and Random Dictionaries  
(Paweł Bechler and Przemysław Wojtaszczyk)

## Compressive Sensing, Extensions, and Applications Seminar

### January 22

Simon Foucart  
Drexel University

Robust 1-Bit Compressive Sensing via Binary Stable Embeddings of Sparse Vectors  
(Laurent Jacques, Jason Laska, Petros Boufounos, and Richard Baraniuk)

### January 29

Jean-Luc Bouchot  
Drexel University

IsoLasso: A LASSO Regression Approach to RNA-Seq Based Transcriptome Assembly  
(Wei Li, Jianxing Feng, and Tao Jiang)

### February 5

Pawel Hitczenko  
Drexel University

Suprema of chaos processes and the restricted isometry property  
(Felix Krahmer, Shahar Mendelson, and Holger Rauhut)

### February 12

Hugo Woerdeman  
Drexel University

Dynamical sampling: Time-space trade-off  
(Akram Aldroubi, Jacqueline Davis, and Ilya Krishtal)

### February 19

Michael Minner  
Drexel University

Stable optimizationless recovery from phaseless linear measurements  
(Laurent Demanet and Paul Hand)

### February 26

Simon Foucart  
Drexel University

General foundations of high-dimensional model representations  
(Herschel Rabitz and Omer Alis)

### March 5

Jean-Luc Bouchot  
Drexel University

Direct inference of protein-DNA interactions using compressed sensing methods  
(Mohammed AlQuraishi and Harley McAdams)

### March 12

Michael Minner  
Drexel University

Sharp RIP bound for sparse signal and low-rank matrix recovery  
(Tony Cai and Anru Zhang)

## Compressive Sensing, Extensions, and Applications Seminar

**April 16**

Simon Foucart  
Drexel University

Hard thresholding pursuit and variations: number of iterations

**April 23**

Michael Minner  
Drexel University

Accurate detection of moving targets via random sensor arrays and Kerdock codes  
(Thomas Strohmer and Haichao Wang)

**April 30**

Hugo Woerdeman  
Drexel University

Logarithmic barriers for sparse matrix cones  
(Martin Andersen, Joachim Dahl, Lieven Vandenberghe)

**May 7**

Ben Adcock  
Purdue University

Breaking the coherence barrier in compressed sensing

**May 14**

Athina Petropulu  
Rutgers University

MIMO radar using matrix completion ideas

**May 21**

Jean-Luc Bouchot  
Drexel University

Compressive sensing of analog signals using discrete prolate spheroidal sequences  
(Mark Davenport, Michael Wakin)

**May 28**

Simon Foucart  
Drexel University

Simultaneously structured models with applications to sparse and low-rank matrices  
(Samet Oymak, Amin Jalali, Maryam Fazel, Yonina Eldar, Babak Hassibi)

**June 4**

Pawel Hitczenko  
Drexel University

Global testing under sparse alternatives: ANOVA, multiple comparisons  
and the Higher Criticism  
(Ery Arias-Castro, Emmanuel Candès, Yaniv Plan)

## Combinatorics and Algebraic Geometry Seminar

### September 11

A set of generators for the Hecke ring of  $(S_{2n}, B_n)$   
Mahir Can, Tulane University and Yale University

### September 18

Radmila Sazdanovic  
University of Pennsylvania  
Categorification of the polynomial ring

### September 27

Mirko Visontai  
KTH  
On the roots of generalized Eulerian polynomials

### October 11

Mike Zabrocki,  
York University  
Current Progress on the Shuffle Conjecture

### November 1

Chris Berg  
LACIM  
Strong Schur functions and down operators for the affine nilCoxeter algebra

### November 13

Elizabeth Niese  
Marshall University  
A recursion for combinatorial Macdonald polynomials

### November 20

Mikhail Mazin,  
SUNY Stonybrook  
Semigroups and symmetry of generalized  $q, t$ -Catalan numbers

### November 29

Chris Manon  
George Mason University  
The combinatorial commutative algebra of conformal blocks

## Combinatorics and Algebraic Geometry Seminar

**December 6**

Eugene Gorsky,  
SUNY Stonybrook

Cherednik algebras,  $q,t$ -Schroder numbers and Khovanov-Rozansky homology

**December 11**

Ryan Vinroot

The College of William and Mary

Real-valued characters of finite reductive groups

**February 7**

Mirko Visontai

KTH

Logarithmic mesh of the  $q$ -Eulerian polynomials

**February 21**

Andrei Negut

Columbia University

Hilbert schemes and Knot Invariants

**February 28**

Hwancheol Yoo

KIAS

Diagrams, balanced labellings and affine Stanley symmetric functions

**March 21**

Jang Soo Kim

University of Minnesota

Dyck Tilings and related topics



## **PDE/Applied Mathematics Seminar**

**October 1**

Ryan Hynd  
University of Pennsylvania  
Infinity Ground States

**October 8**

Chris Chong  
University of Massachusetts Amherst  
Modulation Equations in Nonlinear Lattices

**October 18**

Christian Poetsche  
Alpen-Adria-Universitat Klagenfurt, Austria  
Towards a Nonautonomous Bifurcation Theory

**November 15**

Mark Kjerland  
UIC  
Linear Response Closure Approximation for Multiscale Systems

**November 19**

Martina Chirilus-Bruckner  
Brown  
On the Existence of Breathers in Nonlinear Wave Equations: An Approach via Inverse Spectral Theory

**January 14**

Roy Goodman  
NJIT  
Complex Low-dimensional Dynamics in Nonlinear Schrodinger systems

## SIAM Seminar

**October 11**

Daniel Jordon  
Drexel University  
Ill-posedness of a Linearized Compacton Equation

**November 8**

Kimberly Kilgore Nolan  
Drexel University  
Optical Touch Sensing: Practical Bounds for Design and Performance

**November 15**

Marc Kjerland  
University of Illinois at Chicago  
Linear Response Closure Approximation for Multiscale Systems

**November 29**

Eric Stachura  
Temple University  
Spectral Properties of Singular Integral Operators in Two Dimensions

**December 6**

Timothy Hayes  
Drexel University  
Coding Theory and Algebraic Geometry

**January 17**

Avinash Dalal  
Drexel University  
Properties of  $k+1$ -Cores

**January 31**

Chung Wong  
Drexel University  
On the Pointwise Limits of Bivariate Lagrange Projectors

**February 14**

Jonah Smith  
Drexel University  
Elliptic Functions, Elliptic Curves, and Cryptography

**March 7**

Scott Rome  
Drexel University  
An Inversion Method for the Time Harmonic Maxwell's Equation with a Dielectric Scatterer

**May 2**

Jeffrey Armstrong  
Drexel University  
A-infinity algebras and their modules

## Departmental Committees

### Tenure and Promotion

Schmutz, Chair  
All tenured faculty members

### Graduate Program (including Assessment)

Medvedev, Chair  
Ambrose  
Clarke  
Moskow  
Yu (spring)  
Graduate Advisor: Wright  
Qualifying Exam: Moskow, Foucart

### Undergraduate Program (including Assessment)

Perline, Chair  
Boyer  
Hicks  
Rickert  
Sheng  
Undergraduate Advisor: Mozeff

### Teaching Faculty Promotion

Perlstadt, Chair  
Dolgopolsky  
Donnelly  
Mozeff  
Odintsova  
Rickert  
Russell  
Sheng  
Smith (Justin)

### Tenure-Track Faculty Search

Boyer, Chair  
Ambrose  
Foucart  
Guo  
Hitzenko

College and University Events Coordinator: Melnikov, Mozeff

Colloquium Coordinator: Ambrose (Fall), Grinfeld (Winter & Spring)

Distinguished Speaker Coordinator: Hitzenko

Library Liaison: Swartz

CoAS Undergraduate Program representative: Perline

CoAS Graduate Program representative: Medvedev

CoAS Tenure and Promotion representative: Schmutz

CoAS Research Day Representative: Sheng

University 101 representative: Perline

Math Competition coordinator: Foucart

Mathematics Student Organization faculty adviser: Falco

Placement Exam Coordinator: Aran

Problem of the month coordinator: Smith (Justin)

Pi Day coordinators: Aran, Falco, Mozeff, Rickert

COAS tutoring committee:

Immordino  
Steuber

COAS community outreach committee:

Daniel  
Grinfeld  
Medvedev

### **Fall Coordination assignments:**

Math 101: Immordino, Smith (Judy)

Math 100: Mozeff

Math 110: Schmutz

Math 121: Aran, Papadopoulos

### **Winter Coordination assignments:**

Math 101: Immordino, Mozeff

Math 102: Favocci, Steuber

Math 121: Daniel

Math 122: Aran, Papadopoulos

### **Spring Coordination assignments:**

Math 101: Wadke

Math 102: Favocci, Odintsova

Math 122: Immordino, Smith (Judy)

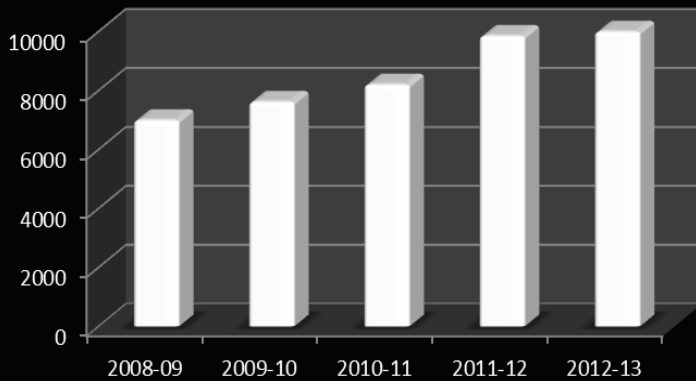
Math 122: Aran, Papadopoulos

## Mathematics Resource Center

The Math Resource Center of Drexel University offers a very comfortable learning environment to promote student achievement and success. Instruction in the Math Resource Center is very informal. Students are welcome to come to the Math Resource Center with questions whenever they need help in understanding math course work. We help students to understand the concept and encourage them to be self-confident and independent in doing math. Tutors are available to give one on one help to those might benefit from more practice, explaining a problem from a different angle or reviewing materials from the text or course. The center is open 42 hours per week, having minimum five tutors per hour. The center provides a free personalized help to all Drexel University students who have a subject code MATH, when classes are in session. The tutor list includes Teaching faculty, Teaching Assistants and Undergraduate students.

The students visit the center on a regular basis to improve their skills. Student traffic at the center is efficiently handled by the work study staff. The students can check the MRC web site to look for the availability of tutors and their hours. During 2012-2013 academic year, 9575 student visits were reported at the center. The majority of students got help in Calculus.

**Student visit- a comparison**



This graph shows that the number of students visiting the center increases

every year. The MRC is open every quarter (Fall, Winter, Spring & Summer) and provides tutoring.



NEED HELP IN MATH?

ALGEBRA    TRIGONOMETRY    SERIES

= VISIT THE MRC =

Drexel University College of Arts & Sciences  
DEPARTMENT OF  
**MATHEMATICS**

MATH RESOURCE  
CENTER  
KORMAN 249  
Monday - Thursday:  
10:00am - 7:00pm  
Friday: 10:00am - 4:00pm  
215.671.3594

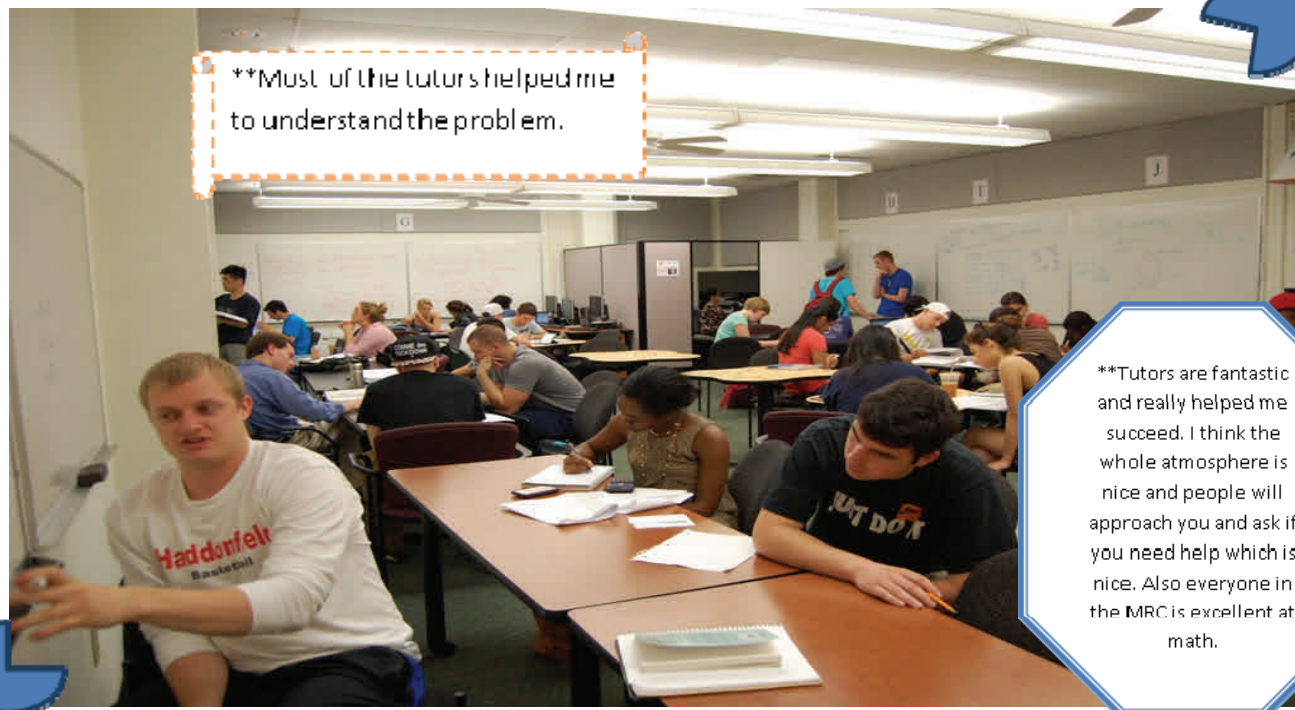
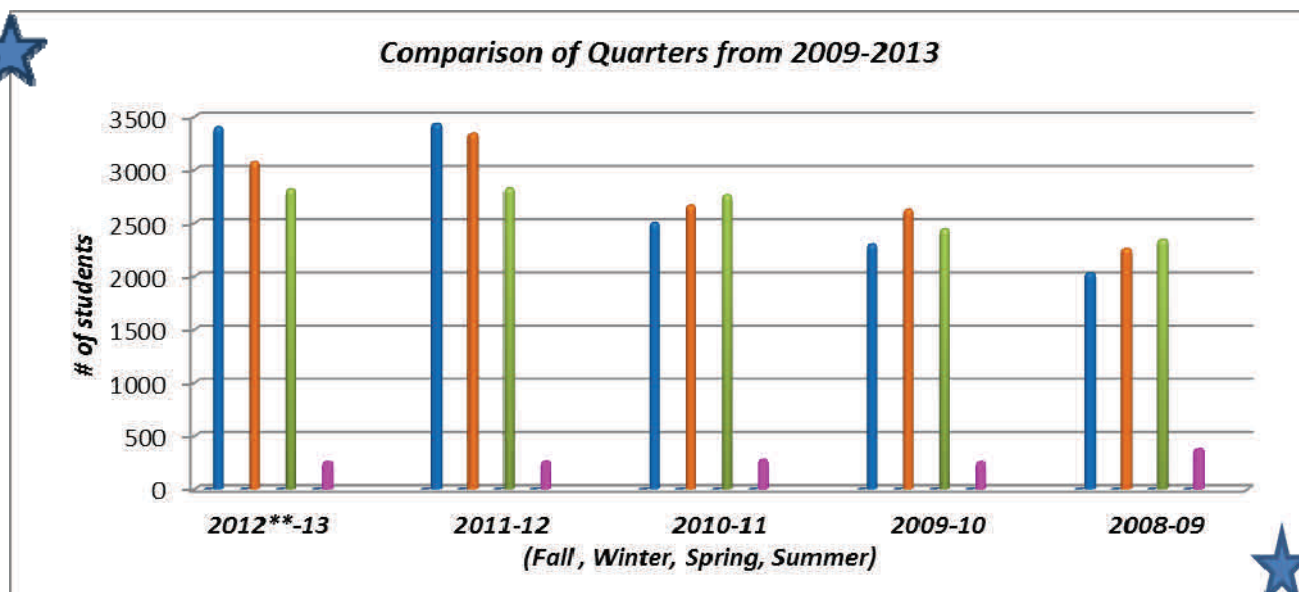
[www.drexel.edu/math/resources/undergraduate/mrc](http://www.drexel.edu/math/resources/undergraduate/mrc)

The mission of the center is to support our students in their pursuit of Mathematical studies. The tutors at the MRC will help the students to understand the course materials which they have difficulty with. This includes helping students with their homework. Students are discouraged from skipping classes for tutoring and also the tutors will not do student's assignments or tests. The teaching will be effective if student's come with specific questions. The faculty, TA's, undergraduate tutors and the students make the center active and lively.



## Mathematics Resource Center

The graph below represents the number of students visiting the MRC from 2009 to 2013, on a quarter wise basis. This graph is a true reflection that the MRC is continuing its good work in helping increasing number of students with MATH courses. \*The number of students in fall 2012 is only an estimate due to non-availability of updated data arising out of computer problem.



## Mathematics Resource Center

\*\*Thank you for having such a place,  
*because Calculus is no joke!*

\*\* Nice and  
accommodating people.  
Exhibits a quiet and  
functional atmosphere.  
Explanations of work are  
nicely drawn out on  
boards.



I love the fact that professors hold their office hours at the MRC  
and everyone is approachable and non-judgmental. Thank you!!

## Graduate Presentations

**Minner, Michael**, Compressive Sensing and Radar Imaging, Graduate Student Seminar, Temple University, Philadelphia, PA, October 2012

**Chen, Jingmin**, Subdivision Surfaces and Willmore Flow Problem, Mid-Atlantic Numerical Analysis Day, Temple University, Philadelphia, PA, November 2012

**Dalal, Avinash**, Graduate student seminar: ABC's of the affine Grassmannian, Lehigh University, Lehigh, PA, November 2012

**Minner, Michael**, Sparse Signal Recovery and Remote Sensing, Special Session on Harmonic Analysis, PDE and Geometric Measure Theory, Joint Mathematics Meeting, San Diego, CA, January 2013

**Dalal, Avinash**, SAGE Days: Multiple Dirichlet Series, Combinatorics and Representation Theory, A  $t$ -generalization for Schubert representatives of the affine Grassmannian, I.C.E.R.M, Brown University, Providence, RI, February 2013

**Abduvalieva, Gulnara**, Fixed point theorems for non-commutative functions, South Eastern Analysis Meeting (SEAM) Blacksburg, VA, March 2013

**Chen, Jingmin**, Free-form Subdivision Surfaces and the Helfrich Model, the 14th International Conference on Approximation Theory, San Antonio, TX, April 2013

**Dalal, Avinash**, Graduate Student Combinatorics Conference, On atom expansions of Macdonald polynomials, University of Minnesota, Minneapolis, Minnesota, April 2013

**Dalal, Avinash**, A  $t$ -generalization for Schubert representatives of the affine Grassmannian, Paris, France, July 2013

**Rome, Scott**, Scattering of Electromagnetic Waves by Thin High Contrast Dielectrics: Analysis of the Transversal Component, Poster Session, International Conference on Novel Directions in Inverse Scattering Honoring David Colton, University of Delaware, July 2013

**Smith, Jonah**, Spherical Vortex Filaments and Bäcklund Transformations, SIAM Annual Meeting, July 2013

## Graduate Publications

**Abduvalieva, Gulnara**, Kaliuzhnyi-Verbovetski, Dmitry S., “Fixed point theorems for non-commutative functions,” J Math, Anal, Appl. 401 (2013) no.1,436-446

**Dalal, Avinash** and Jennifer Morse. “A t-generalization for Shubert representatives of the affine Grassmannian,” DMTCS Proceeding, 2013.

Boyer, Robert and **Parry, Daniel** “On the Zeros of Plane Partition Polynomials.” The Electronic Journal of Combinatorics 18.2 (2012): P30.

## Certificate of Recognition Award



### Daniel Jordon is Awarded a Certificate of Recognition

Each year our SIAM Chapter recognizes one student for outstanding service and contributions by awarding a certificate of recognition.

## Undergraduate Research Co-op

**Zhang, Qimin** and **Gaison, Jeremy**, Research Co-op: Project title: Nonlinear effects on wave propagation in heterogeneous media.  
Funding source: DMS 1108858, PI: Shari Moskow, and DMS 1105635, PI: J. Douglas Wright

**Hutchinson, Faith**, Research Co-op: Project title: A generalized Lyapunov equation result. Funding source: DMS 0901628, PI: Hugo Woerdeman



## 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 2012-2013 academic year, the officers of Drexel's Student Chapter of SIAM were Daniel Jordon, President; Michael Minner, Vice President; Phillip Gaudreau, Treasurer; and Jeffrey Armstrong, Secretary.

Our chapter held a biweekly seminar consisting of 12 individual talks from Drexel graduate students as well as a series of Epsilon Talks (10-minute expository talks by first year Ph.D. students) and Austin Daughton, a graduate student from Temple University, was an invited speaker. This year we awarded the SIAM Student Chapter Certificate of Recognition to Daniel Jordon for outstanding service and contributions to the chapter.

### 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/>



## Student Activities

### MathBytes



MathBytes is the Mathematics Department's graduate student organization. We seek to promote interest and research in the field of mathematics and also to protect and attend to the interests and concerns of our students. Membership is open to all students pursuing a graduate degree in mathematics at Drexel. The Graduate Student Association provides funding and support for each of our events. For the

2012-2013 academic year, MathBytes' officers were Scott Rome, President; Chung Wong, Vice President; Timothy Hayes, Treasurer; Kelly Toppin, Secretary. MathBytes began the year with a Fall Social event where current members and new graduate students were able to socialize together. At the end of the fall quarter, MathBytes toured the Philadelphia Company Brewery. During the winter term, MathBytes sponsored a board game night with the help of the Drexel Graduate Student Association, complete with a buffet and friendly interdisciplinary competition. MathBytes and the Physics Graduate Student Association (PGSA) cosponsored a Volleyball event. For the second year in a row, volleyball was rained out and became a BBQ outing which served as an end of year celebration.



## Student Activities

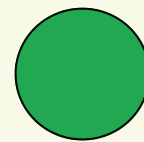
### Pi Day



On Thursday, March 14, 2013, the Math Department was proud to celebrate our 8<sup>th</sup> annual Pi Day celebration. The festivities occurred during the final week of the winter term, allowing our majors to relax and have fun before they headed into finals and then out on co-op. Pi Day always includes food, fun, games and prizes. It continues to grow in size as we expand our activities. This year's events included favorite games from years past such as Jeopardy, Bingo, and Math Taboo – all Pi-themed of course!

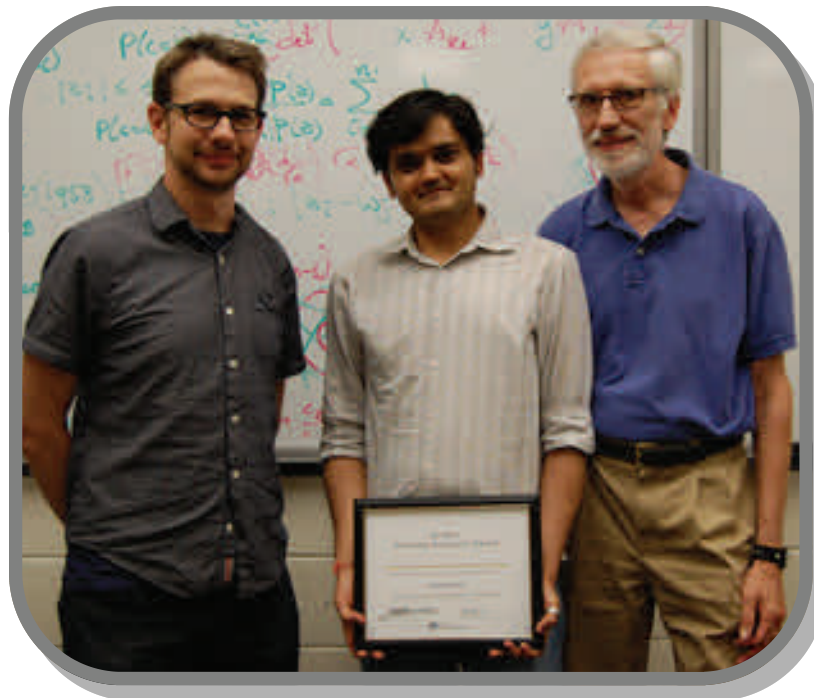
Our Integration Bee continues to grow in popularity. This mathematical take on a spelling bee has teams of students solve increasingly difficult integrals until one team is crowned Integration Champions!

A great time was had by all at our 2013 Pi Day celebration. We are already looking forward to Pi Day 2014!



## Graduate Student Award

### Avinash Dalal is Awarded the Al Herr Award



Dr. Douglas Wright, Avinash Dalal and Dr. Robert Boyer

The Albert Herr Teaching Assistant Award is presented to a Teaching Assistant of the Department of Mathematics who has excelled in teaching. This award was established in honor of Albert Herr (1935 - 1995) for the unsurpassed standards he set in the teaching of mathematics and for his lasting and distinguished service to the department from 1957 to 1993.

Avinash Dalal was the recipient of the 2013 Albert Herr Teaching Assistant Award. The award was presented by Dr. Robert Boyer and Dr. Douglas Wright at a Math department celebration, congratulations!

## Social Events

# Special Events and Happenings

## Annual Holiday Reception

*The department celebrated the holidays on December 11, 2013, in the Math Resource Center.*



## Weekly Teas

*Each Monday during the term at 3:00 pm faculty, students and staff gather to chat relax and nosh.*



## Farewell Byron

*Monday, February 11, 2013*

*Faculty, students and staff joined Hugo Woerdeman, department head in saying farewell to Byron Greene, math resource center manager.*



## Distinguished Lecturer Event

*Speaker: Dr. Alan Edelman*

*Friday, May 10, 2013*

*2:00 pm to 3:00 pm*

