DREXEL UNIVERSITY
College of
Arts and Sciences

# Department of Mathematics

# Annual Report 2015-16

# MATHEMATICS DEPARTMENT

## DEGREES OFFERED

**Mathematics BS, BA, MS, PhD**

### Accelerated Degree Programs

**BS/MS Mathematics**

### Dual Degree Bachelor's Program

**BS/MS Mathematics**

# Table of Contents

# Message from the Department Head

Dear Alumni, Department Members and Friends,

We are happy to present the department's 2015-2016 annual report which highlights the accomplishments and activities of our faculty, staff and students.

This year was one of great accomplishments and happenings for our department. Faculty members David Ambrose and Jason Aran received the University Award for Pedagogy and Assessment for their hard work remaking precalculus. Professor Hugo Woerdeman published a comprehensive text book entitled "Advanced Linear Algebra". Professors Ambrose, Simpson, Song, Wright and I ran a large summer school here at Drexel on Stochastic Differential Equations. We brought in Distinguished Speaker, Allen Knutson, who taught us all about juggling.
I am also proud to say that over this year we graduated 29 math majors, 30 math minors, 4 master's students, and 5 PhD students. We also celebrate the accomplishments of Justin Smith with his retirement, and the retirement and accomplishments of long time department member Pat Henry.

Perhaps most noticeably, we have also survived coexisting with the initial stages of Korman construction. Many of us have had to move offices, but on the bright side we have a nice new lounge and kitchen, and look forward to even nicer space when it's all finished. Please come by to visit and join us for coffee.

Thank you and Best Wishes,

Shari Moskow
Professor and Department Head

# Tenure / Tenure Track Faculty

**David M. Ambrose, Ph.D. (Duke University) Associate Professor-Associate Department Head.**
Applied Analysis and Scientific Computing for Non– linear Systems of Partial Differential Equations, especially free-surface problems in fluid dynamics.

**Jonah Blasiak, Ph.D. (University of California, Berkley). Assistant Professor**.
Algebraic Combinatorics. Theory and Complexity Theory.

**Robert P. Boyer, Ph.D. (University of Pennsylvania) Professor—Associate Department Head.**
Functional analysis, $C^*$ -Agebras 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.

**Pavel Grinfeld, Ph.D. (Massachusetts Institute of Technology) Associate Professor.**
Application of the Differential Calculus of moving surfaces and Variational Calculus with heavy emphasis on computation, to problems in Bioengineering, Low temperature Physics, Quantum Mechanics and Elasticity.

**Yixin Guo, Ph.D. (University of Pittsburg) Associate Professor.**
Biomathematics, Dynamical Systems, Ordinary and Partial Differential Equations and Math Education.

**R. Andrew Hicks, Ph.D. (University of Pennsylvania) 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 Dynamical Systems, Mathematical Neuroscience.

# Tenure / Tenure Track Faculty

**Jennifer Morse, Ph.D. (University of California, San Diego). Professor.**
Undergraduate Advisor. Algebraic and Tableaux Combinatorics, Discrete Math, Symmetric and Special Functions, Basic Hyper Geometric Series.

**Shari Moskow, Ph.D. (Rutgers University) Professor—Department Head.**
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, Modeling of Non-linear Optical Phenomena, 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.**
Probabilistic Combinatorics.

**Li Sheng, Ph.D. (Rutgers University). Associate Professor.**
Discrete optimization, Operations Research, Graph Theory and its Applications , Biostatistics.

**Gideon Simpson, Ph.D. (Columbia University). Assistant Professor.**
Partial Differential Equations, Computing and Applied Mathematics.

**Justin R. Smith, Ph.D. (Courant Institute, New York University). Professor.**
Homotopy Theory, Operad Theory, Quantum Mechanics, Quantum Computing.

**Xiaoming Song, Ph.D. ( University of Kansas). Assistant Professor**

Stochastic Calculus, Large Deviation Theory, Theoretical Statistics, Data Network Modeling and Numerical Analysis

# Tenure / Tenure Track Faculty

**Hugo J. Woerdeman, Ph.D. (Vrije University, Amsterdam). Professor.**
Matrix and Operator Theory, Systems Theory, Signal and Image Processing and Harmonic Analysis, Multivariable Interpolation and Factorization Problems and Matrix Theory Problems arising in Quantum Computing.

**J. Douglas Wright, Ph.D. (Boston University). Associate Professor.**
Partial Differential Equations, particularly the behavior of non-linear waves in systems arising in Hydrodynamics, Optics and Cell Biology.

**Thomas Yu, Ph.D. (Stanford University). Professor.**
Multiscale Mathematics, Wavelets, Applied Harmonic Analysis, Subdivision Algorithms, Non-linear Analysis, Applied Differential Geometry and Data Analysis.

# Teaching Faculty

**Jason Aran, MS (Drexel University) Assistant Teaching Professor**.

**Daryl Falco, MS (Drexel University). Assistant Teaching Professor.** Discrete Mathematics and Automata Theory.

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

**Carlo Fazioli, Ph.D. (University of Illinois). Assistant Teaching Professor.** Computational Fluid Dynamics, Free Problems.

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

# Teaching Faculty

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

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

**Hwan Yong Lee, Ph.D. (University of Utah). Assistant Teaching Professor.** Electromagnetic Wave Propagation in Composite Media, Optimization and Inverse Problems.

**Marna A. Mozeff, MS (Drexel University). Associate Teaching Professor.**

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

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

**Dimitrios Papadopoulos, MS (Drexel University). Instructor.**

**Patricia Henry Russell, MS (Drexel University). Teaching Professor.** Probability and Satistics.

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

# Teaching Faculty

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

**Vaishalee Wadke, MS (Columbia University). Instructor.**

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

**Dennis G. Yang, Ph.D. (Cornell University). Assistant Teaching Professor.** Dynamical Systems, Neuro Dynamics.

# Visiting Faculty

**Ryan Kaliszewski, Ph.D. (University of North Carolina at Chapel Hill). Visiting Assistant Professor.** Algebraic Combinatorics and Algebraic Geometry –specifically positivity results for generating polynomials.

**Taoufik Meklachi Ph.D. (University of Houston). Visiting Assistant Professor.** Determinantal representations of stable polynomials and compressive sensing.

# Adjunct Faculty

1. John P. Coppola, MS., Widener University
2. Harold D. Gilman, MS., Temple University
3. June K. Gordon, MS., Drexel University
4. Boris L. Kheyfets, Ph.D., Drexel University
5. Elana M. Koublanova, Ph.D., Leningrad State University
6. Wanda M. Kunkle, Ph.D., Drexel University
7. Leo W. Lampone, Ph.D., Drexel University
8. Yun Yoo, Ph.D., Drexel University
9. Sergio Zefillipo, MA., Villanova University
10. Yihong Zhang, Ph.D., University of Alabama
11. Kumar S. Virbhadra, Ph.D., Physical Research Laboratory, India

# Emeritus Faculty

1. Loren N. Argabright, Ph.D., University of Washington—Professor Emeritus
2. Robert C. Busby, Ph.D., University of Pennsylvania—Professor Emeritus
3. Ewaugh F. Fields, Ed.D., Temple University—Dean Emeritus—Professor Emeritus
4. William M.Y. Goh, Ph.D., Ohio State University— Associate Professor Emeritus
5. Charles J. Mode, Ph.D., University of California at Davis—Professor Emeritus
6. Chris Rorres, Ph.D., Courant Institute, New York University—Professor Emeritus
7. Jet Wimp, Ph.D., University of Edinburgh—Professor Emeritus
8. Patricia Henry Russel, MS; Drexel University—Professor Emeritus

# Professional Staff

Amy Tiernan
Program Assistant (MRC)

C. Gene Phan
Computer Specialist

Kenneth Hemphill
Budget Coordinator

Sobha Philip
Graduate Program Manager (MRC)

Paige Chmielewski
Undergraduate Program Coordinator

# Remembrance

**Malinda Gilchrist**
Graduate Program Coordinator

*"Death leaves a heartache*
*No one can heal.*
*Love leaves a memory*
*No one can steal"*

# Teaching & Research Assistants

Myles Akin

Charles Burnette

Joshua Carmichael

Yuyue Chen

Andrew Eshelman

Timothy Faver

Benjamin Grossmann

Timothy Hayes

Joshua Jackson

Felix Jones

Shunlian Liu

Amanda Lohss

# Teaching & Research Assistants

Michael Minner

Alexander Onderdonk

Taylor Pangburn

Archana Patel

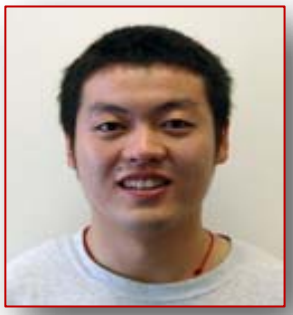
Sarah Rody

Patrick Shields

Leonard Stevenson

David Sulon

Daniel Summers

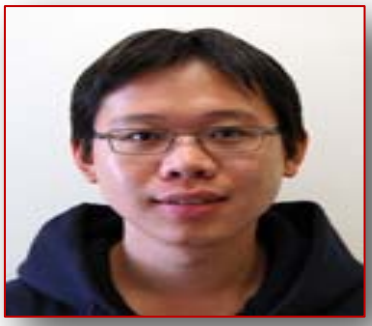


Xuezhi Tang

James Thomas

Kelly Toppin

# Teaching & Research Assistants



Chung Wong

Aleksandr Yaroslavskiy

# MS Degree Awarded

**Akin, Greyson Myles**

**Chen ,Yuyue**

**Machen, Benjamin Leland**

**Patel, R Archana**

**Zaleski, J Trevor**

# Faculty Grants

Ambrose, David National Science Foundation, DMS 1016267, Collaborative Research: Efficient Surface-Based Numerical Methods for 3D Interfacial Flow with Surface Tension, 2010-2015, $269,989

Ambrose, David National Science Foundation, DMS 1515849, Dynamics of Dispersive PDE, 2015-2018, $269,987

Blasiak, Jonah National Science Foundation, DMS 14071174, Quantizing Schur Functors, 2012-2015, $120,000

Guo, Yixin National Science Foundation, DMS-1226180, Closed-loop Deep Brain Stimulation, Synchrony breaking and Chimera State, 2012-2016, $164,996

Hicks, R. Andrew Virginia Tech Transportation Institute, Advanced System Testing utilizing a Data Acquisition System, 2015, $30,273.50

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

Kaliuzhnyi-Verbovetskyi, Dmitry US-Israel Binational Science Foundation, Grant 2010432, Non-commutative function theory and its applications, 2011-2015, $88,000

Medvedev, Georgi National Science Foundation, DMS 1412096, Dynamics of Large Networks, 2014-2017, $150,000

Morse, Jennifer National Science Foundation, Combinatorics in algebra, geometry, and physics. 2013-2016, $290,000

Moskow, Shari National Science Foundation, DMS 1411721, Nonlinear spectral problems in electromagnetics: asymptotics and inversion, 2014-2017, $191,670

Simpson, Gideon National Science Foundation, DMS 1409018, Computational and Analytical Challenges in Nonlinear Dispersive Wave Equations, 2014-2017, $146,118

Simpson, Gideon United States Department of Energy, DE-SC0012733, Theory and Computation for Mescopic Materials Modeling, 2014-2017, $88,715.20

# Faculty Grants

Song, Xiaoming American Mathematical Society-Simons Travel Grants, $4,000, 2015-2017

Song, Xiaoming National Science Foundation-Association for Women in Mathematics Summer Travel Grant, $3,500, 2015

Woerdeman, Hugo and CoPI's Anatolii Grinshpan, Dmitry Kalyuzhniy-Verbovetskyi National Science Foundation, DMS 0901628, Decompositions for Mulivariable Schur-class Functions, Christoffel-Darboux Type Formulas, and Related Problems, 2009-2015, $475,578

Woerdeman, Hugo Simons Foundation, Collaborative grant, The multivariable Schur class and determinantal representations, 2015-2020, $35,000

Wright, J. Douglas National Science Foundation, DMS 1511488, Wave propagation in heterogeneous nonlinear dispersive systems, 2015-2018, $340,446

Yu, Thomas National Science Foundation, DMS 1115915, Topics in Geometric and Multiscale Numerical Methods, 2011-2015, $230,825

Yu, Thomas National Science Foundation, DMS 1522337, New Developments in Geometric and Multiscale Numerical Methods, 2015-2018, $230,000

# Faculty Appointments & Conference Organizations

Ambrose, David, Shari Moskow, Gideon Simpson, Xiaoming Song, J. Douglas Wright organizers, 2016 Gene Golub SIAM Summer School, July-August 2016

Ambrose, David co-chair of the SIAM Conference on Nonlinear Waves and Coherent Structures, Philadelphia, PA, August 2016organizing committee, The 2016

Blasiak, Jonah scientific committee member, Mid-Atlantic Algebraic Geometry and Combinatorics Workshop, Philadelphia, PA, April 2015

Grinfeld, Pavel co-organizer of minisymposium, "Applied Mathematics Open Online: Julia, Python, Sage, OpenCourseWare, Mobile," at International Congress on Industrial and Applied Mathematics, Beijing, China, August 2015

Guo, Yixin co-organizer of mini-symposium, "Mathematical Modeling of Basal Ganglia" at the SIAM Conference on Applications of Dynamical Systems, Snow Bird, UT, May 2015

Hitczenko, Pawel program committee member, Analytic Algorithmics and Combinatorics, San Diego, California, January 2015

Hitczenko, Pawel scientific program committee member, Lebanese International Conference on Mathematics and Applications, Beirut, Lebanon, May 2015

Morse, Jennifer executive officer, Formal Power Series and Algebraic Combinatorics. Daejon, South Korea July 2015

Morse, Jennifer executive officer, Formal Power Series and Algebraic Combinatorics. London, England, July 2015

Morse, Jennifer scientific committee member, Mid-Atlantic Algebraic Geometry and Combinatorics Workshop, Philadelphia, PA, April 2015

Moskow, Shari co-organizer, Institute of Mathematics and its Applications, Special Year on Optics and Photonics, University of Minnesota, Minneapolis, MN, 2016-2017

Moskow, Shari co-organizer, IMA workshop on Inverse Problems in Optics, University of Minnesota, Minneapolis, MN, February 2017

Moskow, Shari organizer, NSF-SIAM workshop on Optics and Photonics, Boston, MA July 2016

# Faculty Appointments & Conference Organizations

Simpson, Gideon co-organizer, "Coherent Structures in Hamiltonian PDE," SIAM Conference on Analysis of Partial Differential Equations, Scottsdale, AZ, December 2015

**Woerdeman, Hugo J.** vice president of steering committee, International Workshop on Operator Theory and its Applications, Tbilisi, Georgia, July 2015

Woerdeman, Hugo J. chair, International Linear Algebra Society (ILAS) Institutional Membership Committee

Yang, Dennis co-organizer of the minisymposium "Dynamics of Neural Networks with General Connectivity and Nonlinearity" at the SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah, May 2015.

# Faculty Publications

Abduvalieva, Gulnara and Dmitry Kaliuzhnyi-Verbovetskyi, Implicit/inverse function theorems for free noncommutative Functions, Journal of Functional Analysis, 269(9), p. 2813-2844, 2015

Acan, H., Pawel Hitczenko, On the covariance of outdegrees in random plane recursive trees, Journal of Applied Probability, 52, p. 904-907, 2015

Ambrose, David, and Gideon Simpson, Local existence theory for derivative nonlinear Schrodinger equations with non-integer power nonlinearities. SIAM Journal on Mathematical Analysis, p. 472241-2264, 2015

Ambrose, David, M. Kondrla, and M. Valle, Computing time-periodic solutions of a model for the vortex sheet with surface tension, Quarterly of Applied Mathematics, 73, p. 317-329, 2015

Ambrose, David, J.P. Kelliher, M.C. Lopes Filho, and H.J. Nussenzveig Lopes, Serfati solutions to the 2D Euler equations on exterior domains. Journal of Differential Equations, 259, p. 4509-4560, 2015

Ball, J.A. and Dmitry Kaliuzhnyi-Verbovetskyi, Schur-Agler and Herglotz-Agler classes of functions: positive-kernel decompositions and transfer-function realizations. Advances in Mathematics, 280, 121–187, 2015

Ball, J.A. Dmitry Kaliuzhnyi-Verbovetskyi, C. Sadosky, and V. Vinnikov, Scattering systems with several evolutions and formal reproducing kernel Hilbert spaces. Complex Analysis and Operator Theory, 9(4), p. 827–931, 2015

Binder, A., T. Lelievre, and Gideon Simpson, A Generalized Parallel Replica Dynamics, Journal of Computational Physics, 284, p. 595-616, 2015

# Faculty Publications

Blasiak, Jonah, Nonstandard braid relations and Chebyshev polynomials, Journal of Algebra, 423, p. 375–404, 2015

Blasiak, Jonah, K. Mulmuley, and M. Sohoni, Geometric Complexity Theory IV: nonstandard quantum group for the Kronecker problem, Memoirs of the American Mathematical Society, 235(1109),160 pp., 2015.

Robert Boyer and Daniel Parry, Plane Partition Asymptotics, The Ramanujan Journal, 37(3), p. 573–588, 2015

Cakoni, F., Shari Moskow, Scott Rome, "The perturbation of transmission eigenvalues for inhomogeneous media in the presence of small penetrable inclusions," Inverse Problems and Imaging 9(3), p. 725-748, 2015

Clarke, Patrick, J. Guffin, On the existence of affine Landau-Ginzburg phases in gauged linear sigma models, Advances in Theoretical and Mathematical Physics, 19(4), p. 725-745, 2015

Guo, Yixin and Kelly Toppin, Computational Models of Closed–loop DeepBrain Stimulation, Validating Neuro-Computational Models of Neurological and Psychiatric Disorders, 14, p. 71-106, 2015

Morse, Jennifer, and A. Schilling, Crystal approach to affine Schubert calculus, International Mathematics Research Notices, p. 1-56, 2015

Morse, Jennifer, and A. Schilling, Affine charge and the k-bounded Pieri rule, DMCTS proceedings FPSAC'15, p. 405-416, 2015

Moskow, Shari, "Nonlinear eigenvalue approximation for compact operators," Journal of Mathematical Physics, 56(11), 2015

Medvedev, Georgi and X. Tang, Stability of twisted states in the Kuramoto model on Cayley and random graphs, Journal of Nonlinear Science, 25(6), p.1169-1208, 2015

Medvedev, Georgi and X. Tang, Synchronization of coupled chaotic maps, Physica D, 304-305, p. 42-51, 2015

Pinski, F. J., Gideon Simpson, A. M. Stuart, and H. Weber, Kullback--Leibler Approximation for Probability Measures on Infinite Dimensional Spaces, SIAM Journal of Mathematical Analysis, 47(6), 4091–4122, 2015

Smith, Justin, Steenrod Coalgebras, Topology and its Applications, 185-186, p. 93-123, 2015

# Faculty Presentations

Akin, Myles, Rhonda Dzakpasu, and Yixin Guo, "Graph theoretical comparison of functional connectivity between cLTP treated and untreated microelectrode arrays," The 24th Annual Computational Neuroscience Meeting, Prague, July 2015

Ambrose, David, "Analytical issues for computation of free-surface flows," Free Surface and Geophysical Flows, Rennes, France, January 2015

Ambrose, David, "Nonexistence of small doubly periodic coherent structures" SIAM Conference on Analysis of PDE, minisymposium on Coherent Structures in Hamiltonian PDE, December 2015

Blasiak, Jonah, "Noncommutative Schur functions," Algebra, Geometry, and Combinatorics Day, University of Michigan, Ann Arbor, MI, October 2015

Grinfeld, Pavel, "The Moving Surface Analogs of Classical Equations of Applied Mathematics," department of Mathematics, Bryn Mawr College, Haverford, PA September 2015

Guo, Yixin, "Local Inference of Gene Regulatory Networks from Time Series Data," The SIAM Conference on Applied Dynamical Systems, Snow Bird, May 2015

Guo, Yixin, "Traveling Patterns in Lateral Inhibition Neural Networks," The SIAM Conference on Applied Dynamical Systems, Snow Bird, May 2015

Guo, Yixin, "Traveling pulses in a neural network with asymmetric coupling and non-saturating gain," American Mathematical Society sectional meeting, Rutgers University, New Brunswick, NJ, November 2015

Guo, Yixin, Modeling Thalamocortical Relay Neuron, Parkinsonian Network, and Deep Brain Stimulation" department of Mathematics, Bryn Mawr College, Bryn Mawr, PA, October 2015

Hitczenko, Pawel, "On the asymptotic distribution of symbols in random weighted staircase tableaux," Discrete Mathematics Days and Ontario Combinatorics Workshop, Ottawa, Canada, May 2015

Hitczenko, Pawel, "On the game of memory and the preferential attachment graphs," Combinatorial probability, Conference in honor of Svante Janson's 60th Birthday, Krusenberg, Sweden, June 2015

Hitczenko, Pawel, "Some recent results on perpetuities," International Conference on Probability and Stochastic Analysis, Shanghai, China, July 2015

# Faculty Presentations

Hitczenko, Pawel, "On random trees obtained from permutation graphs," 17th International Conference on Random Structures and Algorithms, Pittsburgh, PA, July 2015

Kaliszewski, Ryan, "Combinatorial Fillings and a Proof of the Hook-Length Formula," Central Michigan Algebra and Combinatorics Seminar, Mount Pleasant, MI, March 2015

Kaliszewski, Ryan, "Combinatorial Fillings and a Proof of the Hook-Length Formula," York University Applied Algebra Seminar, Toronto, Ontario, Canada, February 2015

Kaliuzhnyi-Verbovetskyi, Dmitry, "Implicit/inverse function theorems for free noncommutative functions," Joint Mathematical Meetings, San Antonio, TX, January 2015

Kaliuzhnyi-Verbovetskyi, Dmitry, "Contractive determinantal representations of stable polynomials," International Workshop on Operator Theory and Applications 2015, Tbilisi, Georgia, July 2015

Medvedev, Georgi, "Dynamical systems on dense graphs and graph limits," Mathematical Biology Seminar, University of Illinois at Urbana-Champaign, Champaign, IL, April 2015

Medvedev, Georgi, Groups and interactions in data, networks and biology, KI-Net Workshop, Carnegie Mellon University, Pittsburg, PA, May 2015

Medvedev, Georgi, "Graph Limits and Dynamics of Large Networks," EquaDiff2015, Lyon, France, July 2015

Medvedev, Georgi, "Graph Limits and Dynamics of Large Networks," Nonlinear Dynamics Seminar, Free University of Berlin/WIAS, July 2015

Medvedev, Georgi, "Graph Limits and Dynamics of Large Networks," joint Center for Scientific Computation & Mathematical Modeling and KI-Net Seminar, University of Maryland, College Park, MD October 2015

Morse, Jennifer, The Mathematics of Michelle Wachs, University of Miami, Coral Gables, FL, January 2015

Morse, Jennifer, "Combinatorics of Gromov-Witten invariants and Macdonald polynomials," Department of Mathematics Colloquium, University of Virginia, Charlottesville, VA, January 2015

Morse, Jennifer, "Colorful combinatorics of equivariant K-theory and Macdonald polynomials," AMS special session in Modern Schubert Calculus, Rutgers University, New Brunswick, NJ, November 2015

# Faculty Presentations

Morse, Jennifer, "Applications of Macdonald polynomials to Schubert calculus," Massachusetts Institute of Technology, Combinatorics Seminar, Cambridge, MA, November 2015

Moskow, Shari, "Homogenization of a Transmission Problem," Computational and Applied Mathematics Colloquium, Pennsylvania State University, State College, PA November 2015

Moskow, Shari, "Inverse Problems: Finding the equation from the solution," Undergraduate Math Seminar, Pennsylvania State University, State College, PA November 2015

Moskow, Shari, "Homogenization of a Transmission Problem," minisymposium at SIAM Conference on Analysis of Partial Differential Equations, Scottsdale, AZ, December 2015

Moskow, Shari, "Scattering and Resonances of Thin Photonic Structures," minisymposium at SIAM Conference on Analysis of Partial Differential Equations, Scottsdale, AZ, December 2015

Odintsova, Oksana, "Information Technologies in Mathematics and Mathematical Education," IV International Conference, Krasnoyarsk, Russia, November 2015

Perline, Ron, "Theory of Knowledge Class," International Baccalaureate Program, Central High School, St Joseph, MO, January 2015

Simpson, Gideon, "Petviashvilli's method for the Dirichlet problem," SIAM Sponsored Workshop On Dimension Reduction, University of Cincinnati, Cincinnati, OH, January 2015

Simpson, Gideon, "A Relative Entropy Formulation of Diffusive Molecular Dynamics," SIAM Sponsored Workshop On Dimension Reduction, Pennsylvania State University, State College, PA, March 2015

Simpson, Gideon, "A Relative Entropy Formulation of Diffusive Molecular Dynamics," Scientific and Statistical Computing Seminar, University of Chicago, Chicago, IL, April 2015

Simpson, Gideon, "A Relative Entropy Formulation of Diffusive Molecular Dynamics," DelMar Numerics Day, U.S. Naval Academy, Annapolis, MD, May 2015

Simpson, Gideon, "A Mathematical Examination of Diffusive Molecular Dynamics," Workshop on Multiscale Modeling and Analysis in Materials Science, Shanghai Jiao Tong University, Minhang Qu, China, August 2015

# Faculty Presentations

Simpson, Gideon, "A Mathematical Examination of Diffusive Molecular Dynamics," Workshop on Multiscale Modeling and Analysis in Materials Science, Fordham University, Bronx, NY, November 2015

Woerdeman, Hugo, "Undergraduate Research Projects in Linear Algebra," SIAM Conference on Applied Linear Algebra, Atlanta, GA, October 2015

Woerdeman, Hugo, "Contractive determinantal representations of stable polynomials on a matrix polyball," 5th International Conference on Matrix Analysis and Applications, Nova Southeastern University, Ft Lauderdale, Florida, December 2015

Woerdeman, Hugo, "Contractive determinantal representations of stable polynomials on a matrix polyball, Canadian Operator Symposium (COSy), University of Waterloo in Waterloo, Ontario, Canada, June 2015

Wright, J. Douglas, "Traveling waves for diatomic FPUT lattices" SIAM Conference on Analysis of Partial Differential Equations, Phoenix, AZ, December 2015

Yang, Dennis, "Asymmetric Stationary Bumps in Neural Field Models," minisymposium at SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah, May 2015.

# Editorial Positions

**Ambrose, David** division editor, Journal of Mathematical Analysis and Applications

**Hitczenko, Pawel** editorial board member Open Journal of Discrete Mathematics,

**Morse, Jennifer** managing editor, Journal of Combinatorics

**Medvedev, Georgi** editor, Discrete and Continuous Dynamical Systems –B
**Medvedev, Georgi** associate editor, Discrete and Continuous Dynamical Systems

# Drexel Authors

The Drexel University organized an event on April 27, 2016 for "Celebrating Drexel Authors" at A. J. Drexel Picture Gallery. Dr. Hugo Woerdeman from the Math department was felicitated as an Author for his book "Advanced Linear Algebra".

**Congratulations Dr. Woerdeman!!**

# Employee Service Award Recipients


The Drexel University Employee Service Awards Ceremony was held on December 18, 2015 at the Sheraton Philadelphia Center City Hotel. The following members of the Drexel Mathematics department were recognized for their service at Drexel University.

## 5 Years Award Recipients

**Dimitrios Papadopoulos**
**Guang Yang**
**Hwan Yong Lee**
**Kenneth Hemphill**
**Patrick Clarke**

## 10 Years Award Recipients

**Dmytro Kaliuzhnyi-Verbovetskyi**
**Jeanne Steuber**
**Oksana Odintsova**
**Pavel Grinfeld**
**Pok-Yin Yu**
**Raymond Favocci**

## 25 Years Award Recipients

**Adam Rickert**

## 30 Years Award Recipients

**Ronald Perline**

# Departmental Committees—2015-16

## Tenure and Promotion

**Thomas Yu (chair) :** All tenured faculty are members

## Graduate Admission Committee

**R. Andrew Hicks (chair) :** Gideon Simpson— Eric Schmutz—Jonah Blasiak

## Graduate Program Committee

**Robert Boyer (chair) :** Yixin Guo — Xiaoming Song —Hugo Woerdeman—Justin Smith

## Undergraduate Program Committee

**Dough Wright (chair Fall, Member—Winter, Spring) & David Ambrose (Chair—Winter, Spring):**
Jennifer Morse—Jason Aran—Marci Perlstadt—Li Sheng

## Teaching Faculty Promotion

**Marci Perlstadt ( Chair) :** Yixin Guo—All Teaching Faculty Associate and above are members.

## Tenure-Track Hiring Committee (If we get a person)

**Hugo Woerdeman (chair) :** Dmitry Kaliuzhnyi-Verbovetskyi—Robert Boyer—Jennifer Morse—Jonah Blasiak

## Postdoc Search Committee

**Georgi Medvedev (chair) :** Pawel Hitczenko—David Ambrose—Eric Schmutz

## Teaching Innovations Committee

**Oksana Odintsova (chair) :** Dimitri Papadopoulos—Raymond Favocci—Li Sheng

## College and University Events Coordinator

**Dimitri Papadopoulos (chair): Marna Mozeff**

## Colloquium Coordinator

**Pawel Hitczenko**

## Distinguish Speaker Coordinator

**Pavel Grinfeld**

## Library Liaison

**Kenneth Swartz**

## University 101

**Ronald Perline**

# Departmental Committees—2015-16

## Math Competition Coordinator

**Patrick Clarke**

## Mathematics Student Organization Faculty Advisor

**Pavel Grinfeld**

## Placement Exam Coordinator

**Raymond Favocci**

## Problem of the Month Coordinator

**Justin Smith**

## Pi Day Coordinators

Marna Mozeff, Jason Aran, Daryl Falco, Dimitri Papadopoulos, Adam Rickert

## Calculus Practicum Coordinator

**Jason Aran**

## Fall Coordination Assignments

**Math 100: Raymond Favocci**
**Math 101: Adam Rickert**
**Math 102: Robert Immordino**
**Math 121: Hwan Lee & Dimitrios Papadopoulos**
**Math T 185: Jeanne Steuber**
**Math T 186: Jason Aran**

## Winter Coordination Assignments

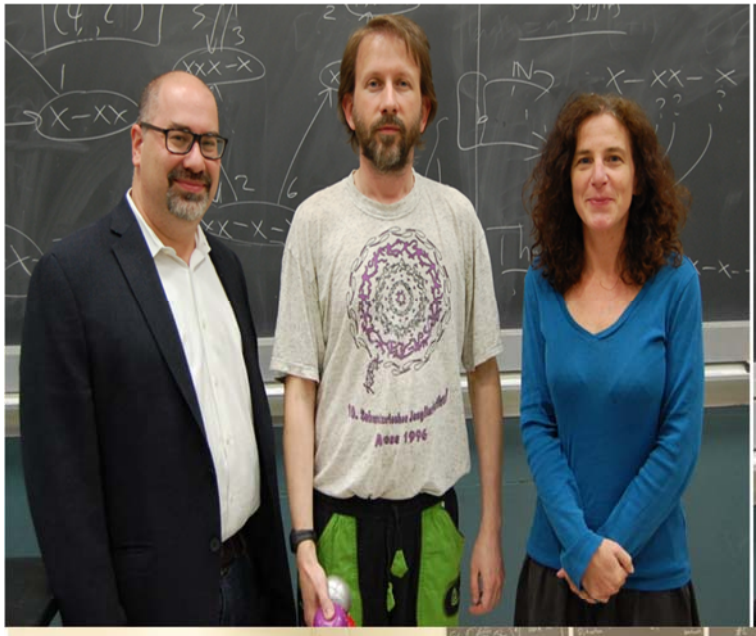
**Math 101: Raymond Favocci**
**Math 102: Adam Rickert & Jeanne Steuber**
**Math 122: Hwan Lee & Dimitrios Papadopoulos**
**Math T 187: Jason Aran**

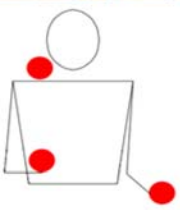
## Spring Coordination Assignments

**Math 101: Vaishalee Wadke**
**Math 102: Raymond Favocci**
**Math 119: Adam Rickert**
**Math 200: Hwan Lee & Dimitrios Papadopoulos**

# Distinguished Speaker Series

The 2015-16, Department of Mathematics , College of Arts and Science distinguished speaker was Allen Knutson, Ph.D., Cornell University, New York. He gave a public lecture on Mathematics and Juggling on May 17th, 2016. He gave many demonstrations and explained number of theorems about the Mathematics of Juggling with the results from the '80s , '90s , '00s .





# University Teaching Awards

The Math department faculties David Ambrose and Jason Aran received the **University Award for Pedagogy and Assessment** during the University Teaching & Service Awards for 2015-16.


Temple University Mathematics Department honored professor Raymond Favocci with Excellence in Teaching by Adjunct Faculty Award.

# SIAM Gene Golub Summer School

The Math department organized the SIAM Gene Golub Summer School on Drexel campus from July 25th—August 5th, 2016. Shari Moskow,, David Ambrose ,Douglas Wright , Gideon Simpso and Xiaoming Song was the organizers of this event. Fifty students from different parts of the world attended the two week summer school.

The participants enjoyed the classes along with the tour of the Barnes Foundation, Poster Session and dinner at Shari Moskow's house.

# Degrees Awarded

## Math Majors

Lorenzana, Adrian

DiDomenic, Gina (**Summa Cum Laude**)

Deng, Renke

Faria, Robert (**Cum Laude**)

Baksi, Tyler (**Cum Laude**)

Gheewala, Sonya (**Magna Cum Laude**)

Halko, James

Hou, Xiulin (**Magna Cum Laude**)

O'Brien, Heather

Scott, Lisa (**Cum Laude**)

Shi, Yi (**Summa Cum Laude**)

Wilson, William

Zhang, Jun

Zhong, Baohua

Cai, Zhiyi

Cao, Matthew

Chen, Ke Xin (**Cum Laude**)

Curtis, James

Einhorn, Lauren

Hancock, Richard

Hassler, Christian

Julian, Kristin

Li, Xiang (**Cum Laude**)

Perera, Nicholas (**Cum Laude**)

Proska, Kevin (**Summa Cum Laude**)

Springer, Erik

Zhang, Wangyue

Zhou, Weichen (**Summa Cum Laude**)

Furman, Bennett **(Cum Laude)**

# Degrees Awarded

## Math Minors

Duo, Xu

Uberti, Mathew

Cocco, Justin

Shen, Haopeng

Orban, Alexander

Aurely, Marc

Bafaloukos, Alexander

Bharita, Richa

Dintcheva, Dimana

Dong, Yufei

Douglas, Daniel

Fox, Kenneth

Gedin, Kahlil

Huang, Ying

John, Jeswin

Khedoo, Christopher

Lee, Brian

Liang, Xueqing

Liu, Congyi

Moran-Broc, Christopher

Most, Eric

Rosati, Carlo

Shadman, Nabil

Tsamoutalis, Panagiotis

Volkova, Airika

Wells, Andrew

Xu, Ting

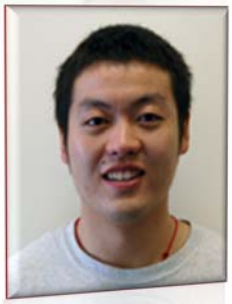
Zhou, Jiaqi

Zou, Yue

Shaindlin, Chloe N

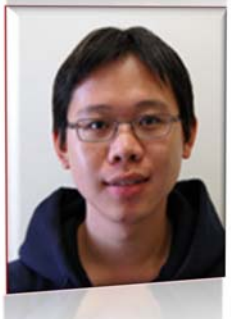
# Doctor of Philosophy Degree Awarded

**Michael F. Minner** presented and defended with success his Ph. D thesis entitled: "Compressive Sensing Applied to MIMO Radar and Sparse Disjoint Scenes". His Ph.D. advisor was Dr. Hugo Woerdeman and Dr. Simon Foucart. Conferred: March 2016.



**Xuezhi Tang** presented and defended with success his Ph. D thesis entitled: "Synchronization of Coupled Dynamical Systems on Cayley and Random Graphs". His Ph.D. advisor was Dr. Georgi Medvedev. Conferred: May 2016.

**Kelly Toppin** presented and defended with success his Ph. D thesis entitled: "Hodgkin Huxley Models". His Ph.D. advisor was Dr. Yixin Guo. Conferred: June 2016.



**Chung Wong** presented and defended with success his Ph. D thesis entitled: "Spectral Density Functions and Their Applications". His Ph.D. advisor was Dr. Hugo Woerdeman. Conferred: August 2016

**Timothy Hayes** presented and defended with success his Ph. D thesis entitled: "Quasi—Spline Sheaves and Their Contact Ideals". His Ph.D. advisor was Dr. Patrick Clarke Conferred: August 2016

# Graduate Student Awards

## Teaching Assistant Excellence

**Sarah Rody** received the teaching Assistant Excellence Award in the 2015-16 academic year.


## Albert Herr Teaching Assistant Award

**Charles Burnette** is the recipient of the 2016 **Albert Herr Teaching Assistant Award**. Charles received this prestigious award from Dr. Robert Boyer, the Associate Department Head in June, 2015.

The Albert Herr Teaching Assistant Award is presented to a Teaching Assistant of the Department of Mathematics who has excelled in teaching. This award is 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.

# Graduate Presentations

## Amanda Lohss

### Presentations:

Corners in Tree-Like Tableaux: SIAM Conference on Discrete Mathematics, Georgia State University—June 2016.

The Statistical Structure on Concave Compositions: SIAM Student Chapter, Drexel University—April 2016.

Corners in Tree-Like Tableaux: The 2nd Annual Finger Lakes Probability Seminar, Cornell University—April 2016.

Corners in Tree-Like Tableaux: Philadelphia Area Combinatorics and Algebraic Geometry Seminar , University of Pennsylvania—April 2016.

Corners in Tree-Like Tableaux: 12th Annual Graduate Student Combinatorics Conference, Clemson University—April 2016.

Corners in Tree-Like Tableaux: SIAM Student Chapter, Drexel University—October 2015.

The Asymptotic Distribution of Parameters in Random Weighted Staircase Tableaux: The 17th International Conference on Random Structures and Algorithms, Carnegie Mellon University—July 2015.

### Posters:

The Statistical Structure on Concave Compositions—The Third Annual Mid-Atlantic Algebraic Geometry and Combinatorics Conference , Drexel University—April, 2016.

## Shunlian Liu

### Posters:

Well-posedness of two dimensional nonlinear hydro elastic waves with the gravity of elastic sheet—SIAM Seminar , Drexel University—March 9, 2016

Sufficiently strong dispersion removes ill-posedness in truncated series models of gravity water waves—SIAM Seminar, Drexel University—June 1, 2016

# Graduate Presentations

## Charles Burnette

### Presentations:

Representing Random Permutations as the Product of Two Involutions: 17th International Conference on Random Structures and Algorithms, Carnegie Mellon University—July 30, 2015.

Periods of Iterated Rational Functions Over a Finite Field: Analysis Seminar, Drexel University—October 23, 2015.

Laplace's Method for Sums Over Lattices: SIAM Graduate Student Seminar, Drexel University—mJanuary 13, 2016.

Abelian Squares and Their Progenies: SIAM Graduate Student Seminar, Drexel University—January 20, 27, February 17 & May 24, 2016.

Abelian Squares and Their Progenies: Analysis Seminar, Drexel University—January 29, February 5, 2016.

Periods of Iterated Rational Functions: Graduate Student Combinatorics Conference, Clemson University—April 2, 2016.

Periods of Iterated Rational Functions: Philadelphia Area Number Theory Seminar, Bryn Mawr College—April 7, 2016.

Involution Factorizations of Random Permutations Chosen from the Ewens Distribution: 2016 Finger Lakes Probability Seminar, Cornell University—April 23, 2016.

Involution Factorizations of Random Permutations Chosen from the Ewens Distribution: 2016 SIAM Conference on Discrete Mathematics, Georgia State University—June 8, 2016.

### Posters:

Abelian Squares and Their Progenies, 3rd Mid-Atlantic Algebraic Geometry and Combinatorics Workshop (MAAGC), Drexel University, Philadelphia, PA, May 7, 2016.

### Papers:

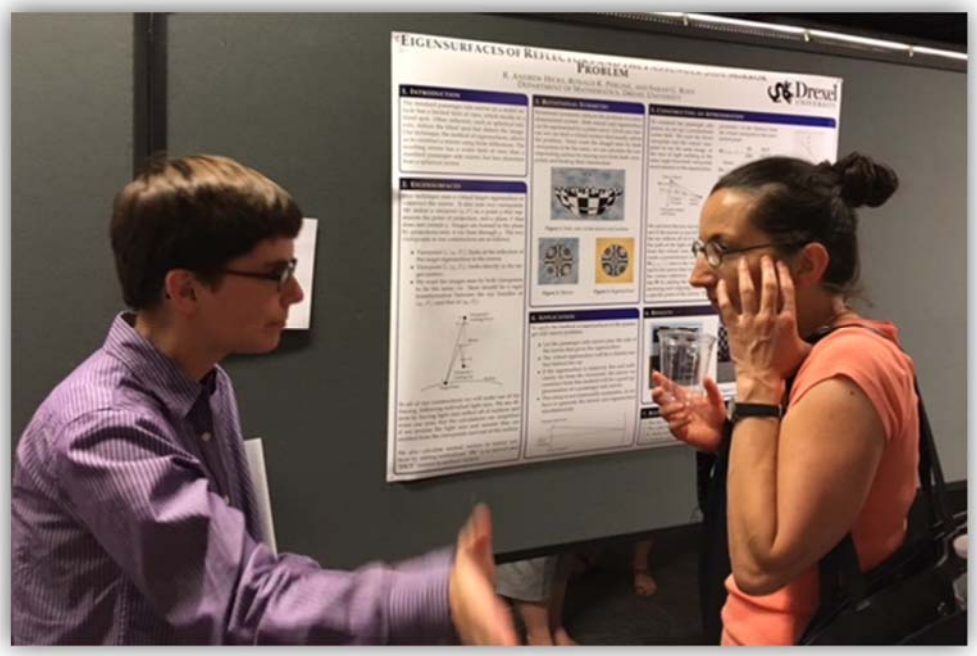
Abelian Squares and Their Progenies, extended abstract accepted by Permutation Patterns 2016.

Periods of Iterated Rational Functions, accepted, to appear in *International Journal of Number Theory.*

# Graduate Presentations

## Sarah Rody

Sarah Rody attended the SIAM Annual Meeting in Boston, July 11-12, as the Drexel Student Chapter representative. She presented her poster "Eigen surfaces of reflectors and the passenger side mirror problem" at the Poster and Dessert Reception.




# COLLOQUIUM

## October 5, 2015

**Jiro Akahori, Ritsumeikan University, Japan**

Title: Hyperbolic Brownian Motion in Finance

## October 19, 2015

**Carlo Lancellottii, City University of New York**

Title: On the Time - Asymptotic Evolution of Gaussian Vlasov Fluctuation Fields

## November 9, 2015

**Benedetto Piccoli, Rutgers University, Camden**

Title: Conservation Law Models for Traffic Flow on Networks

## November 23, 2015

**Alexei Novikov, Penn State University**

Title: Diffusion in Fluid Flows

## January 4, 2016

**David Kimsey, New Castle University, UK**

Title: Quaternionic Analysis: Function Theory, Moment Problems and Spectral Theory

## January 25, 2016

**Ryan Hynd, University of Pennsylvania**

Title: Approximation Schemes for the Optical Poincare Inequality

# COLLOQUIUM

## February 8, 2016

**Russell Shinohara, University of Pennsylvania**

Title: Statistical Quantitative Imaging

## February 22, 2016

**Hosam Mahmoud, Georgia Washington University**

Title: Issues in Random Network—The Apollonian Network as a Case Study

## March 7, 2016

**Xiaoming Song, Drexel University**

Title: Admission Control for Multidimensional Workload Input with Heavy Tails and Fractional Ornstein –Uhlenbeck Process

## March 28, 2016

**Nayantara Bhatnagar, University of Delaware**

Title: Reconstruction in Trees and Random Graphs

## April 11, 2016

**Werner Linde , Jena Germany & University of Delaware**

Title: The size of Convex Hulls in Hilbert Space.

## April 25, 2016

**Radu Balan, University of Meryland**

Title: Approximation Schemes for the Optical Poincare Inequality

# COLLOQUIUM

## May 2, 2016

**Fengqing (Zoe) Zhang , Drexel University**

Title: Statistical Modeling for High Dimensional Structured Biomedical Imaging Data

## May 9, 2016

**Arkady Pikovsky, University of Potsdam, Germany**

Title: Dynamics of coupled oscillators - direct and inverse problems

## May 23, 2016

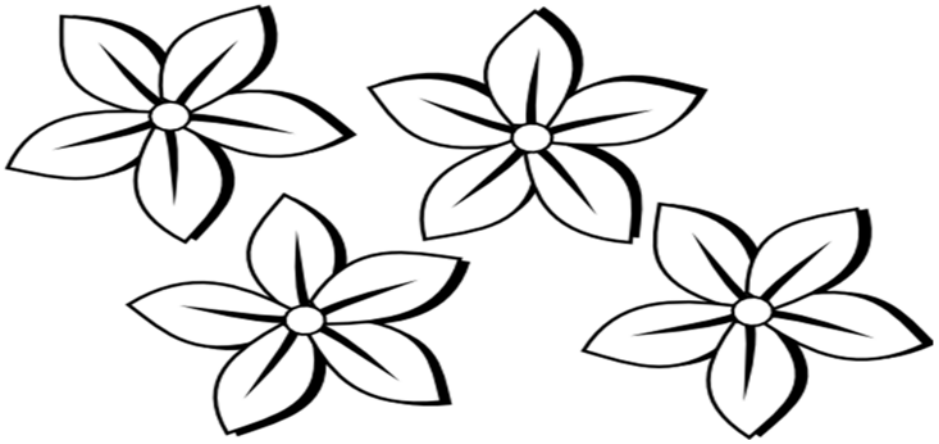
**Huseyin Acan, Rutgers University**

Title: Phase transitions in random chord diagrams and permutations

## June 6, 2016

**Justin Smith, Drexel University**

Title: Perspectives on a career in mathematics



# Analysis Seminar

## October 9, 2015

Pawel Hitczenko — Drexel University
Recurrences for Generating Polynomials and their Probabilistic Consequences.

## October 16, 2015

Hugo Woerdeman — Drexel University
Real—zero Polynomials

## October 23, 2015

Charles Burnette — Drexel University
Periods of Iterated Rational Functions Over a Finite Field

## October 30, 2015

Hugo Woerdeman —Drexel University
Proof of Anderson's Paving Conjecture (after Marcus, Spielman, Srivastava)

## November 6, 2015

Hugo Woerdeman —Drexel University
Proof of Anderson's Paving Conjecture (continued)

## November 13, 2015

Hugo Woerdeman —Drexel University
Proof of Anderson's Paving Conjecture (continued)

## November 20, 2015

Benjamin Grossman—Drexel University
On the Quantum Chromatic Number of a Graph (after Cameron et al)

# Analysis Seminar

## December 4, 2015

Hugo Woerdeman — Drexel University
Proof of Anderson's Paving Conjecture (continued)

## January 8, 2016

David Kimsey — University of Newcastle
Moment Problems on R ^N

## January 15, 2016

Anatolii Grinshpan — Drexel University
Khinchin's Inequality

## January 22, 2016

Chung Wong —Drexel University
Abelian Squares and Their Progenies

## January 29, 2016

Charles Burnette —Drexel University
Abelian Squares and Their Progenies (continued)

## February 5, 2016

Charles Burnette —Drexel University
Abelian Squares and Their Progenies (continued)

## February 12, 2016

Robert Boyer—Drexel University
Root Dilogarithms

# Analysis Seminar

## February 19, 2016

Anatolii Grinshpan — Drexel University
Hilbert's Third Problem

## March 4, 2016

Thomas Yu — Drexel University
Optimal Transport Theory and Isoperimetric Problems

## April 8 , 2016

Hugo Woerdeman — Drexel University
On Mapping Theorems for Numerical Range

## April 15, 2016

Anatolii Grinshpan — Drexel University
On Sphere Packing in R^n

## May 13, 2016

Jonah Blasiak — Drexel University
The Rule of Three for Commutation Relations

## May 20, 2016

Timothy Faver — Drexel University
Periodic Travelling Waves in Diatomic FPUT Lattices

# PDE/Applied Math Seminars

## Fall, 2015

### October, 1

J. Douglas Wright — Drexel University
Traveling Waves for diatomic FPUT Lattices in the Long Wave Limit

### October, 29

Brittan Farmer — Drexel University/University of Minnesota
Analysis of a Simple One-Dimensional Analogue of Carbon Nanotube Growth

### November, 5

J. Thomas Beale — Duke University
Uniform Error Estimates for Finite Difference Methods Applied to Problems with Interfaces

### November, 12

Charles L. Epstein — University of Pennsylvania
Boundary Integral Equation Methods for the Wave Equation

### November, 19

Jingmei Qiu — University of Houston
High Ordrer Semi-Lagrangian Methods with Applications to Plasma Physics and Global Transport Simulations

# PDE/Applied Math Seminars

## Winter & Spring 2016

### January, 27

Jay Hineman — Fordham University
Very Week Solutions for Poisson –Nernst –Plank System

### February, 3

Vincent Caudrelier— University of Leeds
On the Inverse Scattering Method for Integrable PDEs on Graphs

### February, 10

Robert Gilmore — Drexel University
A Stochastic Walk by a Physicist Near Mathematics

### February, 24

Vlad Vicol — Princeton University
On the Inviscid Limit of the Navier-Stokes Equations with Dirichlet Boundary Conditions

### March, 9

David Ambrose—Drexel University
On Vortex Sheets and Mean Field Games

### April, 27

Antoine Mellet —University of Maryland
A Higher Order Free Boundary Problem for Hydraulic Fractures

# Combinatorics & Algebraic Geometric Seminars

## September, 22

### Adriano Garsia—University of California, San Diego

On the Sweep Map for Rational Dyck Paths

## October , 1

### Christian Ikenmeyer—Texas A&M

Plethysms and Kronecker Coefficients

## October , 7

### Erik Carlsson —Harvard

A proof of the Shuffle Conjecture

## October , 15

### Dave Anderson —Ohio State

Determinantal and Pfaffian Formulas for Classical Type Degeneracy Loci

## October , 22

### Joel Lewis —University of Minnesota

Q-Analogues of Factorization Problems in the Symmetric Group

## October , 29

### Per Alexandersson —University of Pennsylvania

Key Polynomials and Atoms

# Combinatorics & Algebraic Geometric Seminars

## November, 5

### Patrick Shields —Drexel University

A Dual Approach to K-Theoretic Littlewood-Richardson Coefficients

## November, 10

### Anna Pun—University of Pennsylvania

On Decomposition of the Product of a Monomial and a Demazure Atom into Atoms

## November, 19

### Andy Wilson —University of Pennsylvania

The Delta Conjecture

## November, 23

### Apoorva Khare—Stanford

Matrix Positivity Preservers in Fixed Dimension

## February, 18

### Zach Hamaker —IMA

Involution Words– A Survey

## February, 25

### Emily Sergel– Leven —University of California, San Diego

A Proof of the Square Paths Conjecture

# Combinatorics & Algebraic Geometric Seminars

## March, 3

### Anton Mellit —SISSA, Italy

Plethystic Identities for Mixed Hodge Structures of Character Varieties

## April, 21

### Amanda Lohss —Drexel University

Corners in tree-like tableaux

## April, 28

### Mark Skandera —Lehigh University

Evaluations of the Power Sum Traces at Kazhdan-Lusztig Basis Elements of the Hecke Algebra

## May, 3

### Arun Ram—University of Melbourne

Parking Functions , the Shi Arrangement and Macdonald Polynomials

## May, 10

### Ben Salisbury—Central Michigan University

Crystal Structure of Certain PBW bases

## May, 16

### Allen Knutson—Cornell

The Geometry of Juggling Patterns

# Combinatorics & Algebraic Geometric Seminars

## May, 23

### Jed Yang —University of Minnesota

Complexity of Tiling Using Triangles

## June 2

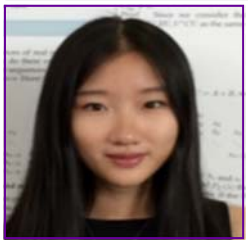
### Greta Panova —University of Pennsylvania

Hook Formulas for Skew Shapes

# Honors Day Awards

The Drexel University College of Arts and Sciences Honors Day was held on May 21, 2015 in Behrakis Grand Hall.

## Frank H. M. Williams Prize in Mathematics—Winner



**Yilin Yang i**s a third-year math major student in Honors College with a 4.0 GPA. She is a tutor at Math Resource Center and the president of Math Student Organization for 2016 -2017. Yilin started her research in theoretical math from freshman year. In 2016, Yilin presented her research work on Horn's Conjecture and inverse problem of band matrices at Harvard University and Stanford University. She is currently doing a research co-op with Dr. Thomas Yu on applied math, and she will be applying for graduate school this fall. She wants to thank Dr. Yu and all her professors for their guidance and patience; and she wants to thank math department for all the support on her research.

## Robert J. Bickel Endowed Scholarship Fund—Winners

**Debdut Karmakar** is a sophomore and working as a math tutor at the Math Resource Center. He is currently doing a research work with Dr. Woerdeman and Dr. Ryan Kaliszewski along with his studies.

**Alex Karlovitz** is a math senior with a 4.0 GPA. He is a BS/MS student and working at the Math Resource Center as a student tutor. During his Coop, he worked at Lockheed Martin and on a research project with Dr. Shari Moskow. He is continuing his research work with Dr. Moskow along with his studies.

**Kevin Proska** -My experience with Drexel's Math Department has been very enriching. In addition to majoring in mathematics, I am also physics major, so my courses have helped strengthen my understanding of the specific mathematics that governs the laws of nature. In addition, my math courses have helped me greatly on my last two co-ops, which I spent at Lockheed Martin's Advanced Technology Laboratory (ATL). At ATL, I have been able to use my strong mathematical background to develop cost-effective solutions to a wide variety of complex military problems. Indeed, my experience with the math department has been both intellectually stimulating and professionally rewarding.

**Zuolin Shen** is a math major minoring in Finance and Computer Science. He is currently on Coop at Automotive Resources International (ARI) as an ISD developer.

# Honors Day Awards

## Robert J. Bickel Endowed Scholarship Fund—Winners

**Stephan James Costa** is a senior double majoring in Math and Finance. He is a 4.0 GPA student. He is currently on Coop at Independence Blue Cross with Medicare pricing team of the actuarial department.

**Yuwei Zhou** is a math Junior with a 4.0 GPA. She is a Dean's merit list student and currently working as a tutor at the Math Resource Center. During her Coop, she worked at SAP QA team as a software developer.

**Jiahong Wen** is a senior majoring in Math and Computer Science. He is in the Dean's merit list since his freshman year. He is currently on Coop with a start-up called Moven as a data scientist intern. He worked at Unisys and SAP before as a Coop student.

**Fawn Jakielaszek** is a senior majoring in Math and minoring in Finance. She is currently on Coop , working as an actuary in Voya Financial on a model convergence project for projections. She is the Governor for Pennsylvania Circle K, a branch of Circle K International, the world's largest student run service organization. She is responsible for all Circle K clubs in Pennsylvania.

**Marcus Seaman** is a senior majoring in Math and Physics and minoring in Computer Science. He is a Drexel Physics fellow. He received the Walter R. Coley award in 2015 for academic excellence in Physics.

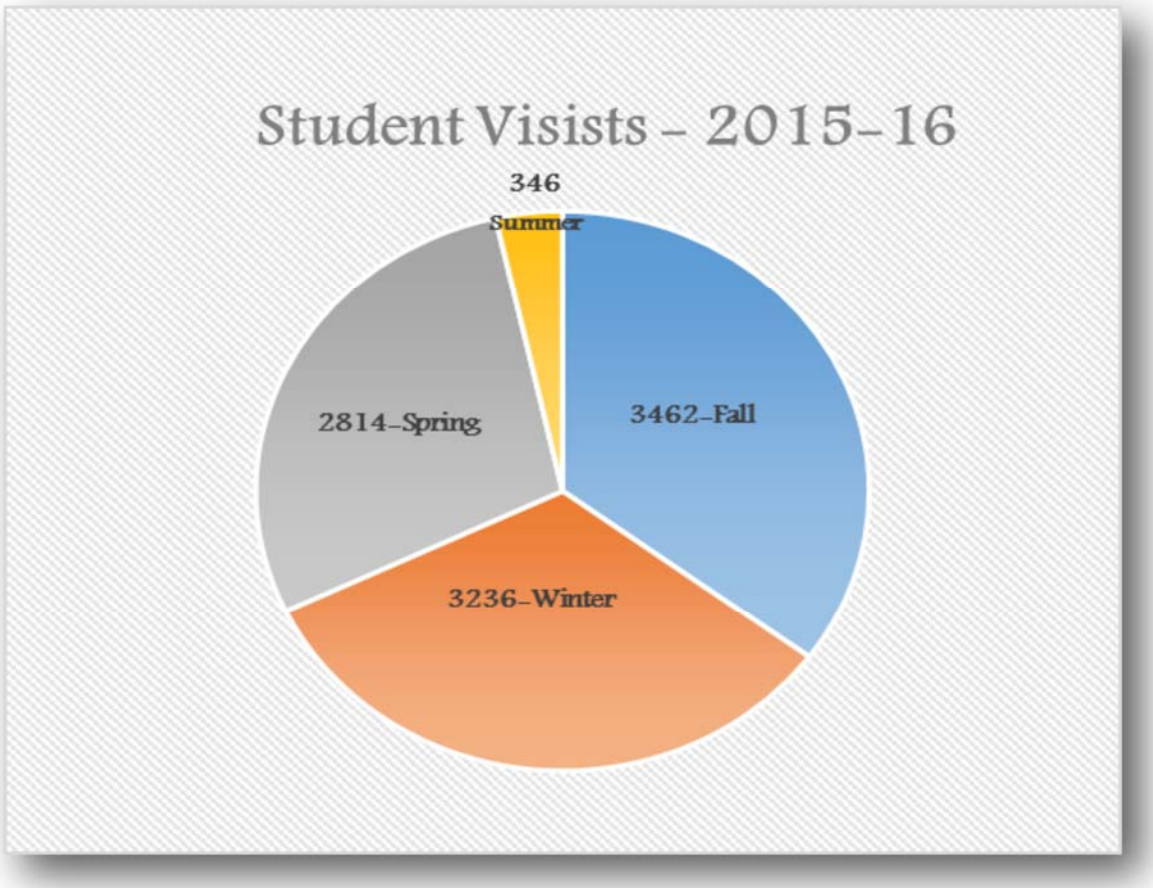
**Jia Zhang** is a senior and working at the Math Resource Center as an undergraduate student tutor. Along with his Math major, he is minoring in Physics and Computer Science. During his Coop, he worked at Weblink as a data analyst.


# Math Resource Center

The Math Resource Center is the walk in help center on campus for students enrolled in courses offered by the Mathematics Department. The MRC strives to create an environment conducive to a positive learning experience. The MRC is staffed by teaching faculty, graduate students, and selected undergraduate students. Therefore, the students visiting the MRC are exposed to different tutoring styles, levels of expertise, and background experiences.

During the fall, winter and spring quarters, the MRC is open from 10:00 am – 7:00 pm, Monday through Thursday and 10:00 am – 4:00 pm on Friday, which makes a total of 42 hours per week. During summer quarter, the MRC hours are reduced as the amount of math classes offered differed greatly from the other terms. This academic year, the department hired a program assistant to work with the coordinator in enhancing a smooth professional environment to the Drexel students.

In the 2015-2016 academic year, the MRC recorded 9858 student visits. The graphs below illustrate the breakdown of visits per quarter. Fall proved to be the busiest term with 3462 student visits while summer was the slowest term with 346 student visits.

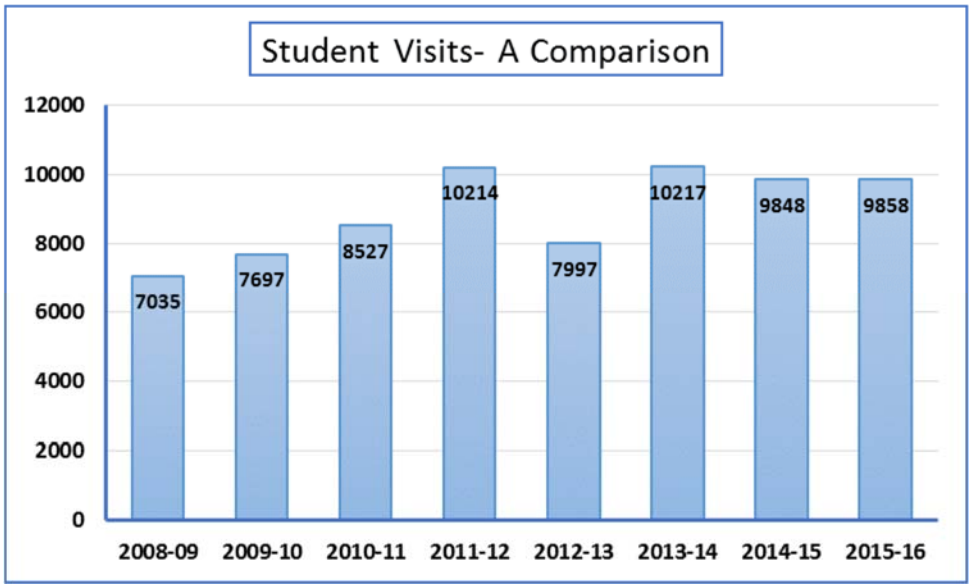


# Math Resource Center

The MRC conducted an annual survey to get the feedback from the students and many students were very appreciative and happy about the free math help on campus. According to the students, the tutors help them to understand the concepts which they were not able to grasp before and they learnt the logic behind the math principles which they simply took as “truth”.

Another student said that everyone at the center was very capable and well equipped to cater the needs of the students and great at explaining abstract ideas and admired the patience of tutors in handling the students and in motivating them. The picture below shows the MRC in action.

The graph below shows a comparison of student visits from 2008-2015




The MRC is one of the best student resource center on campus and the center receive an unconditional support from the Head of the department Dr. Shari Moskow and Associate Heads Dr. David Ambrose, Dr. Robert Boyer and Dr. Douglas Wright.

# Mathematics Student Organization

The Math Student Organization (MSO) is a university general organization that aims at bringing together students of all majors with the common interest in Mathematics. This year, with limited funding, the MSO officer group set the goal to do more activities on and off campus to recruit more members to the organization and make the MSO better known on Drexel campus.

Throughout the whole academic year, we organized various general body meetings and board game nights on campus. Among all the events, there are three that are definitely the highlights of the year:

## 1. MSO's Trip to MoMATH

On Jan 16th, 2016, the MSO organized a trip to the National Museum of Mathematics (MoMATH) in Manhattan. We spent more than three hours in the museum getting our hands on trying out all the "Math gears" and exploring the cool Math ideas with our fellow MSO members.

## 2.MSO Attending Moravian Conference

On Feb 27th, 2016, the MSO organized a group to attend the 30th Annual Student Mathematics Conference at Moravian College. We spent the day listening to mathematical talks on researches in various fields and networking with students from other colleges and university around Philadelphia.

Special thank you to Jason Aran who drove us to the conference!

# SIAM Student Chapter

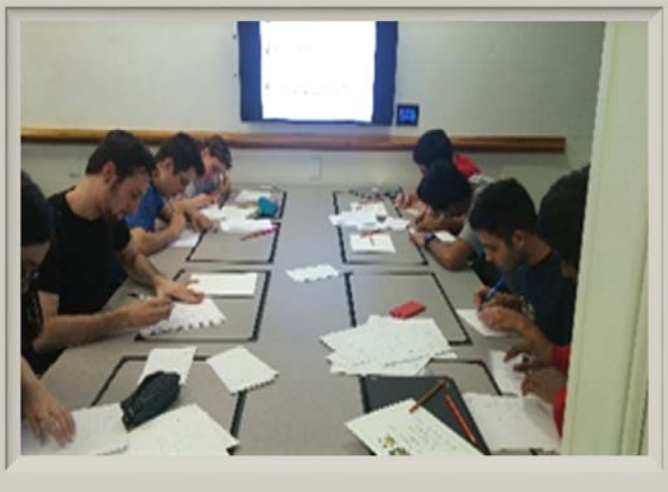
The SIAM student chapter at Drexel holds weekly seminars where graduate students can present their research and other mathematical topics. The student chapter officers this year were Amanda Lohss, Leonard Stevenson, Patrick Shields, and Timothy Favor. This year over 40% of the math graduate students presented a talk at the seminar with many of those students presenting more than one talk. One of the highlights of the year are the Epsilon talks where first year graduate students are invited to give short presentations. This year both Daniel Summers and Aleksandr Yaroslavskiy gave an Epsilon talk on Quiver Algebras and Hecke Algebras respectively. In addition to the weekly seminars, each SIAM student chapter sends one representative to the SIAM Annual Meeting. This year Sarah Rody was selected to attend as a representative for Drexel

Society for Industrial and Applied Mathematics

# PI DAY

On Friday, March 11, 2016, the Math Department was proud to celebrate our 11th 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. This year's events included favorite games from years past such as Jeopardy and Bingo, all Pi-themed of course! We also featured an exciting Pi-Eating contest!

Our Integration Bee is still going strong. This mathematical take on a spelling bee has teams of students solve increasingly difficult integrals until one team is crowned Integration Champions. Congratulations to Weichen Zhou and Brian Goddard for their excellent first place showing in our seventh-annual competition!



A great time was had by all at our 2016 Pi Day celebration. We are already looking forward to Pi Day 2017!

# Let's Party!

## Christmas at Salento

## Professor Justin Smith—Retirement Party

## Weekly Tea

*Each Monday during the term at 2:30 pm faculty, students and staff gather in room 241 to chat , eat and relax.*