DREXEL UNIVERSITY
College of
Arts and Sciences

Department of Mathematics

Annual Report 2013-2014

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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. Our graduate student Michael Minner was awarded both the university-wide Teaching Assistant Excellence Award and the departmental Al Herr Teaching Assistant Award. On top of that, he was also recognized by the Society for Industrial and Applied Mathematics (SIAM) for his outstanding efforts for Drexel's SIAM Student Chapter. Also, Amanda Parshall received the first prize in the oral presentations in Graduate Natural & Physical Sciences on the 2014 CoAS Research Day.

The accomplishments of our undergraduates also deserve special recognition. Jeremy Gaison is the proud recipient of a Barry M. Goldwater Scholarship and Junji Xiao of a DAAD Research Internship and Science Engineering award. At the annual honors day last spring, ZhuoXuan Ma, Julianna Quazi, Kelly Shiptoski, Juliana Speroni, Kaijie Zhang, and Wei Chen Zhou won The Dr. Robert J. Bickel Endowed Scholarship; and Alexander Karlovitz won the Frank H. M. Williams Annual Prize. Finally, Philip Fehlinger and Fan Fei received First and Second Senior Honors, respectively, and Yilin Yang was recognized as a freshmen achieving a 4.0 GPA. Kudos to all!

As always we welcomed several new department members. Jonah Blasiak and Gideon Simpson joined us this year as Assistant Professors, contributing to both our research and teaching missions. Dr. Blasiak is an expert in Algebraic Combinatorics, Representation Theory, and Complexity Theory, and Dr. Simpson an expert in Partial Differential Equations, Scientific Computing and Applied Mathematics. Dr. Carlo Fazioli joined us as an Assistant Teaching Professor, strengthening our teaching mission. Drs. Ryan Kaliszewski, Aijun Zhang, and Lei Cao joined our department as Visiting Assistant Professors to work with Jennifer Morse, Yixin Guo, and me, respectively.

This year our department went through Drexel's newly instituted Program Alignment and Review (PAR) process, which included a self-study and an external review. The departmental PAR committee did an excellent job in putting a 100+ page report together documenting and analyzing everything that is going on in the department, and subsequently handling the visit by external reviewers consisting of experts from the University of Maryland and Carnegie Mellon University. We believe this process will be very useful in setting out a course for the department for the next many years.

This year's invited distinguished lecturer Irene Fonseca, Mellon College of Science University Professor of Mathematics at Carnegie Mellon University and President of the Society of Industrial and Applied Mathematics (SIAM), had an agenda too full to make it to Drexel this year, but we hope to host her next fall. We are looking forward to it!

Finally, let me mention that this was my tenth and last year as Department Head. I am looking forward to being able refocus more fully on my research and teaching again. I have been very fortunate to work with many of my colleagues to try to push this department forward the best way we saw fit, and I thank all of them for their enthusiasm and dedication. I am absolutely confident that my successor, Professor Shari Moskow, will do the same and will do an excellent job at it. I look forward to her taking the lead and bring our department to the next level.

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

Thank you and Best Wishes,
Hugo J. Woerdeman, Professor & Department Head

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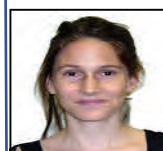
Jennifer Morse, Ph.D. **(University of California, San Diego). Professor.** Undergraduate Advisor. Algebraic and Tableaux Combinatorics, Discrete Math, Symmetric and Special Functions, Basic Hyper Geometric Series.

Tenured/Tenure-Track Faculty

Shari Moskow, Ph.D. **(Rutgers University) Professor.** Associate 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.

Hugo J. Woerdeman, Ph.D. **(Vrije University, Amsterdam). Professor.** Department Head. 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
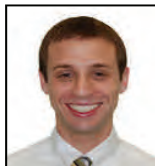
Jason Aran, MS **(Drexel University) Assistant Teaching Professor**.

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

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

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.

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.

Teaching Faculty

Andrey Melnikov, Ph.D. (Ben Gurion University). Assistant Teaching Professor. System / Operator Theory (especially theory of vessels) and its applications to linear and non-linear Differential Equations, Scattering Theory, Differential Rings Theory.

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.

Judy T. Smith, MS (West Chester University). Assistant Teaching Professor.

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

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.

Teaching Faculty

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

Visiting Faculty

Jean-Luc Bouchot, Ph.D. **(Kepler University of Linz, Austria). Visiting Assistant Professor.** Mathematical signal and image processing together with Clifford Algebra and analysis, Computer vision, Machine learning, Applied functional analysis, Compressive sensing and sparse representation.

Lei Cao, Ph.D. **(Drexel University). Visiting Assistant Professor.** Determinantal representations of stable polynomials and compressive sensing.

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.

Aijun Zhang, Ph.D. **(Auburn University). Visiting Assistant Professor.** Dynamical Systems, Differential Equations and their Applications, Biomathematics.

New Tenure-Track Faculty

Jonah Blasiak, **Ph**.**D**.
Assistant Professor

Jonah Blasiak received his PhD in 2009 from UC Berkeley under the direction of Mark Haiman. He then spent a year as an NSF postdoc at the University of Chicago working with Ketan Mulmuley. From 2010-2013 he was a Hildebrandt Assistant Professor at the University of Michigan, mentored by John Stem bridge. He is now on leave for a year at the University of Southern California and will return to Drexel University in Fall 2014.

New Tenure-Track Faculty

Gideon Simpson, **Ph.D**.

Assistant Professor.

Gideon Simpson earned a Ph.D. in Applied Mathematics in 2008 from Columbia University. His thesis, "The Mathematics of Magma Migration," examined the analytical, computational, and modeling challenges of partially molten rock. He has held postdoctoral positions at the University of Toronto and the University Minnesota. His research is in applied mathematics, numerical analysis, and scientific computing, with applications in materials science, optics, and geoscience.

New Teaching Faculty

Carlo Fazioli, **Ph.D**.

Assistant Teaching Professor

Carlo earned a Ph.D. in Mathematics at University of Illinois at Chicago in 2009. He was a Postdoctoral Research Associate at New Jersey Institute of Technology from 2011-2013, before joining the teaching faculty at Drexel in 2013. Carlo enjoys all aspects of applied mathematics and science, and loves helping students develop knowledge of these topics. He has been teaching undergraduates for almost a decade now! Carlo is an avid cyclist, having recently completed a 39-day 1,451-mile summer bicycle road trip.

New Visiting Faculty

Lei Cao, **Ph.D**.

Visiting Assistant Professor

Lei Cao completed his Ph.D. from Drexel University in 2012 under the supervision of Dr. Hugo Woerdeman. He subsequently held a visiting position at Bethel College in North Newton, Kansas. His research interests are determinantal representations of stable polynomials and compressive sensing.

Ryan Kaliszewski, **Ph.D**.

Visiting Assistant Professor

Ryan earned a Master's degree from Central Michigan University in 2008 and a Ph.D. from the University of North Carolina at Chapel Hill in 2013. His Master's work was in the algebra and combinatorics of different sets and his Ph.D. thesis is in the structure of quiver polynomials. His current research interests are in algebraic combinatorics, both by itself and how it relates to graph theory.

New Visiting Faculty

Aijun Zhang, **Ph.D**.

Visiting Assistant Professor

Aijun Zhang earned his M.S in Management of Science from Beihang University, China in 2003 and his Ph.D in Mathematics from Auburn University in 2011. Before joining Drexel as a visiting assistant professor in 2013, he was a Robert D. Adams visiting assistant professor at University of Kansas. His research interests are Dynamical Systems, Differential Equations and their Applications, and Biomathematics.

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. George Watson, MS., Purdue University

9. Yun Yoo, Ph.D., Drexel University

10. Sergio Zefillipo, MA., Villanova University

11. Yihong Zhang, Ph.D., University of Alabama

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

Professional Staff

C. Gene Phan

Computer Specialist

Malinda Gilchrist

Graduate Program Coordinator

Kenneth Hemphill

Budget Coordinator

Sobha Philip

Math Resource Center Manager

Paige Chmielewski

Undergraduate Program Coordinator

Teaching Assistants and Research Assistants

Gulnara K. Abduvalieva

Myles Akin

Jeffrey J. Armstrong

Charles Burnette

Jingmin Chen

Avinash Dalal

Timothy Favor

Phillip Gaudreau

Teaching Assistants and Research Assistants

Benjamin Grossmann

Timothy Hayes

Shunlian Liu

Michael Minner
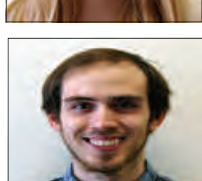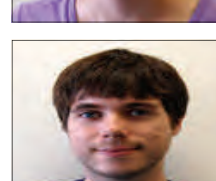
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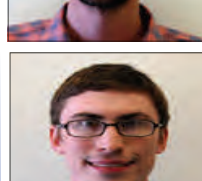Daniel T. Parry

Amanda Parshall

Sarah Rody

Scott Rome

Patrick Shields

Jonah Smith

Leonard Stevenson

David Sulon

Xuezhi Tang

Kelly Toppin

Daniel Watkins

Chung Wong

Trevor Zaleski

Faculty Grants

Ambrose, David

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

National Science Foundation—Dispersive PDE and Interfacial Fluid Dynamics, 2010-2013, DMS 1008387, $159,000

Blasiak, Jonah

National Science Foundation—Quantizing Schur Functors, 2012-2015, DMS 1407174, $73,923

Grinshpan, Anatolii

National Science Foundation—Decompositions for multivariable Schur-class functions, Christoffel—Darboux type formulas, and related problems, September 2009– August 2015, DMS 0901628, $475,578

Guo, Yixin

National Science Foundation—Closed-loop Deep Brain Stimulation, Synchrony breaking and Chimera State, 2012-2015, DMS 1226180, $164,996

Hicks, R. Andrew

National Science Foundation—Distributions for Optical Design, 2009-2013, DMS 0908299, $264,000

Hitczenko, Pawel

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

National Sciences Foundation—Probability and Analysis, 2011-2013, $25,500

Kaliuzhnyi-Verbovetskyi,Dmitry

National Science Foundation—Decompositions for multivariable Schur-class functions, Christoffel—Darboux type formulas, and related problems, September 2009– August 2015, DMS 0901628, $475,578

US-Israel Binational Science Foundation—Non-commutative function theory and its applications, 2011-2015, DMS 2010432, $88,000

Faculty Grants

Medvedev, Georgi

National Science Foundation—Mathematical analysis of synchronization in complex networks 2011-2014, DMS 1109367 ,$140,000

Morse, Jennifer

National Science Foundation—Combinatorics of affine Schubert calculus, K-theory and Macdonald polynomials, 2010-2013, DMS 1001898, $150,000

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

National Science Foundation—Combinatorics in algebra, geometry, and physics, 2013-2016, DMS 1301695, $290,000

Moskow, Shari

Department of Education— Recognition of and Activities for Women in Mathematical Sciences. 2010-2013 $251, 235

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

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

Woerdeman, Hugo

National Science Foundation—PI: Woerdeman, CoPIs: A. Grinshpan, Kalyuzhniy-Verbovetskyi, Decompositions for multivariable Schur-class functions, Christoffel-Darboux type formulas, and related problems, September 2009 - August 2015, DMS 0901628, $ 475,578

Wright, J. Douglas

National Science Foundation—Degenerate dispersive effects in partial and lattice differential equations, 2011-2014, DMS-1105635, $202,837

National Science Foundation—Distributions for Optical Design, 2009-2013, DMS 0908299, $264,000

Yu, Thomas

National Science Foundation—Topics in Geometric and Multiscale Numerical Methods, 2011-2014, DMS 1115915, $230,825

Faculty Appointments/Conferences Organized

Ambrose, David and Shari Moskow

Co-organizers of a special session, American Mathematical Society Eastern Sectional Meeting, October 2013

Medvedev, Georgi

Organized special session, "Stochastic Networks with Applications to Neuroscience," AIMS meeting on Differential Equations and Dynamical Systems, Orlando, FL, July 2013

Morse, Jennifer

Executive officer, Formal Power Series and Algebraic Combinatorics, Paris, France, 2013

Moskow, Shari

Co-organizer, "Applied Analysis for the Material Sciences," 60th birthday conference for Michael Vogelius, Luminy, France, May 2013

Co-organizer of mini-symposium, International Conference on Novel Directions in Inverse Scattering, Honoring David Colton, Newark, DE, August 2013

Simpson, Gideon

Co-organizer of mini-symposiums, Recent Advances in Nonlinear Dispersive Partial Differential Equations - Part I & II, SIAM Conference on Partial Differential Equations, Lake Buena Vista, FL, December 2013

Woerdeman, Hugo

Chair of the International Linear Algebra Society (ILAS) Institutional Membership Committee

Member of the Scientific Organizing Committee for the 2013 International Linear Algebra Society (ILAS) meeting, June 2013, Providence, RI, USA.

Member of the International Program Committee, The 21st International Symposium on Mathematical Theory of Networks and Systems (MTNS 2014) to be held in July 2014, Groningen, The Netherlands.

Mini-symposium co-organizer for the International Linear Algebra Society Meeting, June 2013, Providence, RI

Wright, J. Douglas

Co-organizer of special sessions, Nonlinear Elliptic and Wave Equations and Applications I and II, American Mathematical Society Sectional Meeting, Temple University, Philadelphia, PA, October 2013

Faculty Appointments/Conferences Organized

Yu, Thomas

Co-organizer of mini-symposium, Geometric Approximation, 14th International Conference on Approximation Theory, San Antonio, TX, April 2013

Zhang, Aijun

Co-organizer of a mini-symposium, Dynamics in Non-Local Problems, SIAM conference on applications of dynamical systems, Snowbird, UT, May 2013

Faculty Publications

Abduvalieva, Gulnara and **Dmitry S. Kaliuzhnyi-Verbovetskyi**, "Fixed point theorems for noncommutative functions," Journal of Mathematical Analysis and Applications, 401(1), p. 436-446, 2013

Akers, B.**, David Ambrose**, and **J. Douglas Wright,** "Traveling waves from the arclength parameterization: Vortex sheets with surface tension," Interfaces and Free Boundaries, 15, p. 359-380, 2013

Akers, B., **David Ambrose** and **J. Douglas Wright**, "Gravity Pertubed Crapper Waves," Proceedings of the Royal Society A, 470(2161), p. 1471-2946, 2013

Ambrose, David and **Shari Moskow**, "Scattering of electromagnetic waves by thin high contrast dielectrics: Effects of the object boundary," Communications in Mathematical Sciences, 11, p. 293-314, 2013

Ambrose, David and **J. Douglas Wright**, "Dispersion vs. anti-diffusion: Well-posedness in variable coefficient and quasilinear equations of KdV-type," Indiana University Mathematics Journal, 62, p. 1237-1281, 2013

Ambrose, David and **J. Douglas Wright,** "Traveling waves and weak solutions for an equation with degenerate dispersion, Proceedings of the American Mathematical Society," 141, p. 3825-3838, 2013

Ambrose, David, M. Siegel, and S. Tlupova, "A small-scale decomposition for 3D boundary integral computations with surface tension," Journal of Computational Physics, 247, p.168-191, 2013

Ambrose, David and T. Milgrom, "Temporal boundary value problems in interfacial fluid dynamics, Applied Analysis," 92, p. 922-948, 2013

Faculty Publications

Bobecka, K., F. Lopez Blazquez, **Pawel Hitczenko**, G. Rempala, and J. Wesolowski, "Asymptotic normality through factorial moments and partition identities," Combinatorics, Probability, and Computing 22, p. 213-240, 2013

Boyer, Robert and William Keith, "Stabilization of coefficients for partition polynomials," Integers, 13, 15p, 2013

Cakoni, F. and **Shari Moskow**, "Asymptotic expansions for transmission eigenvalues for media with small inhomogeneities," Inverse Problems, 29,104014,2013

Chen, R., J. Marzuola, D. Spirn, and **J. Douglas Wright,** "On the regularity of the flow map for the gravity-capillary equations," Journal of Functional Analysis, 264, p. 752-782, 2013

Dalal, Avinash and **Jennifer Morse**, "A t-generalization for Schubert representatives of the affine Grass-mannian," Discrete math and theoretical computer science, proceedings, 12pp, 2013

Duchamp, T., G. Xie, and **Thomas Yu**, "Single Basepoint Subdivision Scheme for Manifold-Valued Data: Time-Symmetry without Space-Symmetry," Foundations of Computational Mathematics, 13, p. 693-728, 2013

Grinfeld, Pavel, Tensor Analysis and the Calculus of Moving Surfaces, Springer, 2013

Gruebel, R. and **Pawel Hitczenko**, "Pruned discrete random samples," Journal of Applied Probability, 50, p. 542-556, 2013

Gruebel, R. and **Pawel Hitczenko**, "Pruned discrete random samples: extended abstract" Electronic Notes in Discrete Mathematics, 44, p. 321-326, 2013

Guo, Yixin, Choongseok Park, Min Rong, Robert M. Worth, and Leonid L. Rubchinsky, "Basal ganglia modulation of thalamocortical relay in Parkinson's disease and dystonia," Frontiers in Computational Neuroscience, 7(124), 2013

Guo, Yixin and **Guang Yang**, "Smale horseshoe structure in the firing rate model," BMC Neuroscience, 14(Suppl 1), p. 152, 2013

Coletta, Meredith and **R. Andrew Hicks,** "Computational Photography with Panoramic Sensors that Have Uniform Resolution with Respect to Unwarping Transformations," Journal of Mathematical Imaging and Vision, 46(1), p. 121-127, 2013

Faculty Publications

Coletta, M, **R. Andrew Hicks**, and **Shari Moskow**, "The Frobenius Integrability Theorem and the Blind-Spot Problem for Motor Vehicles," SIAM Journal of Imaging Science, 6(3), p. 1367-1384, 2013

Duchamp, T, G. Xie, and **Thomas Yu,** "Single Basepoint Subdivision Schemes for Manifold-Valued Data: Time-Symmetry without Space-Symmetry," Foundations of Computational Mathematics, 13(5), p. 693-728, 2013

Grinshpan, A., D.S. Kaliuzhnyi-Verbovetskyi, and **H.J. Woerdeman,** Norm-constrained determinantal representations of multivariable polynomials. Complex Anal. Oper. Theory 7, no.3, pp. 635--654, 2013

Haglund, J., **Jennifer Morse**, and M. Zabrocki. "A compositional shuffle conjecture specifying touch points of the Dyck path." Canadian Journal of Math, 64, p. 822-844, 2013

Hicks, R. Andrew, Sarah Rody, and **J. Douglas Wright**, "Bundle separation, obstructions to perfect imaging and other qualitative aspects of simultaneous multiple surface design," Optical Engineering, 53(3), 031309, 2013

Hitczenko, Pawel and S. Dasse-Hartaut, "Greek symbols in random staircase tableaux," Random Structures and Algorithms, 42, p. 73-96, 2013

Hitczenko, Pawel, and **Georgi Medvedev**, "The Poincare map of randomly perturbed periodic motion," Journal of Nonlinear Science, 23, p. 835-861, 2013

Lam, T., L. Lapointe, **Jennifer Morse**, and M. Shimozono. "The poset of k-shapes and a k-branching rule for k-Schur functions." Memoirs of the AMS, 223, no. 1050, 2013

Liu, X., **Gideon Simpson,** and C. Sulem, "Focusing Singularity in a Derivative Nonlinear Schrodinger Equation," Physica D, 262, p. 45-58, 2013

Liu, Z, D. Chen, **Li Sheng**, A.Y. Liu, "Class prediction and feature selection with linear optimization for metagenomic count data," PLoS ONE in Computational Biology, 8(3), doi: 10.1371/journal.pone.0053253, 2013

Schmutz, Eric and Caroline Shapcott, "Part-products of S-restricted integer compositions," Applicable Analysis and Discrete Mathematics, 7(1), p. 51-71, 2013

Qi, R., D. Wu, **Li Sheng**, D. Henson, A. M. Schwartz, E. Xu, K. Xing, D. Chen, "On an ensemble algorithm for clustering cancer patient data." BMC Systems Biology 7(Suppl. 4): S9, 2013

Faculty Publications

Ryan Wasson and **Hugo J. Woerdeman**, The normal defect of some classes of matrices, Linear Algebra and its Applications, Linear Algebra Appl. 438, no. 8, 3530–3546, 2013

Sergey Voronin and **Hugo J. Woerdeman,** A new iterative firm-thresholding algorithm for inverse problems with sparsity constraints. Appl. Comput. Harmon. Anal. 35, no. 1, 151–164, 2013

David P. Kimsey and **Hugo J. Woerdeman**, The truncated matrix-valued K-moment problem on R^d, C^d and T^d, Trans. Amer. Math. Soc. 365, no. 10, 5393–5430, 2013

Hugo J. Woerdeman, Determinantal representations of stable polynomials, Operator Theory: Advances and Applications 237, 241-246, 2013

M. A. Kaashoek, L. Rodman, **H. J. Woerdeman** (Editors), Advances in Structured Operator Theory and Related Areas, Birkhaŭser, 246pp, 2013.

Wright, J. Douglas, "On the spectrum of the superposition of separated potentials." Discrete & Continuous Dynamical Systems - Series B, 18(1), p. 273-281, 2013

Zhang, Aijun, "Traveling Wave Solutions with Mixed Dispersal for Spatially Periodic Fisher-KPP Equations," Discrete and Continuous Dynamical Systems Supplement, p.815-824, 2013
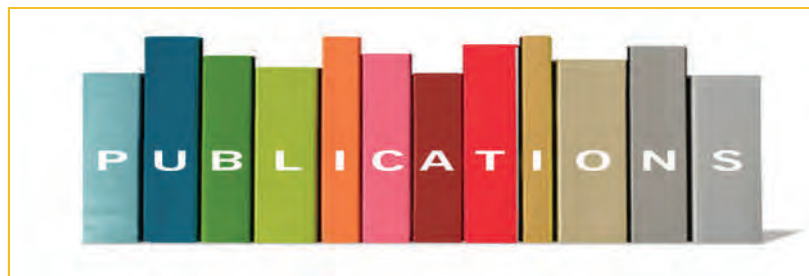
Faculty Presentations

Ambrose, David

Traveling and Time-Periodic Vortex Sheets with Surface Tension, Applied Math Seminar, Temple University, Philadelphia, PA, January 2013

Time-Periodic and Traveling Waves in Interfacial Fluid Dynamics, Joint Mathematics Meetings Special Session on Water Waves, Tsunamis, and Extreme Waves, San Diego, CA, January 2013

Existence Results for Free-Surface Problems in Fluid Dynamics, Analysis Seminar, University of Delaware, Newark, DE, February 2013

Traveling waves with multi-valued height, Applied Mathematics Seminar, University of Illinois at Chicago, Chicago, IL, April 2013

Scattering of electromagnetic waves by thin, high-contrast dielectrics, Minisymposium on Computational Methods in Inverse Scattering, International Conference on Novel Directions in Inverse Scattering, Newark, DE, July 2013

Ill-posedness issues for truncated series models of water waves, Workshop on Water Waves: Computational Approaches for Complex Problems, Banff International Research Station, Banff, AB, July 2013

Existence results for free-surface problems in fluid dynamics, Colloquium, University of Calgary, Calgary, AB, June 2013

Traveling and time-periodic waves in interfacial fluid dynamics, Workshop on Wave Interactions and Turbulence, Fields Institute, Toronto, ON, May 2013

Existence results for free-surface problems in fluid dynamics, Applied Mathematics Colloquium, University of California, Los Angeles, CA, May 2013

Well-posedness and ill-posedness in equations with degenerate dispersion Applied Mathematics and Computation Seminar, Oregon State University, Corvallis, OR, May 2013

Existence results for free-surface problems in fluid dynamics, Colloquium, Oregon State University, Corvallis, OR, May 2013

Blasiak, Jonah

Generalized Knuth equivalence for Macdonald polynomials, Combinatorics Seminar, University of California, Los Angeles, CA, November 2013

Positivity, complexity, and the Kronecker problem, Colloquium, University of Southern California, Los Angeles, CA, November 2013

Faculty Presentations

Bouchot, Jean-Luc

Hard Thresholding Pursuit Algorithms, Computational Analysis Seminar, Center for Constructive Approximation, Vanderbilt University, Nashville, TN, September 2013

Generalized thresholding algorithms for spare signal recovery, Applied analysis seminar, University of Georgia, Athens, GA, September 2013

Progress on Hard Thresholding Pursuit, 14th International Conference Approximation Theory, San Antonio, TX, April 2013

Hard Thresholding Pursuit Algorithms for Sparse Signal Recovery, CAIMS annual meeting, Québec, QC, June 2013

Hard Thresholding Pursuit Algorithms for Sparse Signal Recovery, SIAM Annual meeting, San Diego, CA, July 2013

Boyer, Robert

Curves from Combinatorial Polynomials, Rowan University, Glassboro, NJ, April 2013

Clarke, Patrick

Curved A-infinity Categories and their Modules, Workshop on Matrix Factorizations, Erwin Schrödinger International Institute for Mathematical Physics, University of Vienna, Wien, Austria, 2013

Splines and their Moduli, Colloquium, Towson State University, Towson, MD, 2013

Homotopy Theory of Modules over Curved A1 Categories, University of Pennsylvania, Philadelphia, PA, 2013

Guo, Yixin

A Model of Thalamocortical Relay Neuron and the Parkinsonian Network, Colloquium, New Jersey Institute of Technology, Newark, NJ, February 2013

MBI Workshop 3: Disease, Mathematical Biosciences Institute, Columbus, OH, February 2013

Modeling thalamocortical relay neuron, parkinsonian network, and deep brain stimulation colloquium, Georgetown University, Washington, DC, April 2013

The Smale Horseshoe Structure in the Firing Rate Model, Twenty-first Annual Computational Neuroscience Meeting, Paris, France, July 2013

Standing patterns in a neural field model with non-saturating gains by Yixin Guo and Dennis, AMS sectional meeting in Mathematical Biology, Temple University, Philadelphia, PA, October 2013

Faculty Presentations

Hicks, R. Andrew

From Robot Soccer to Automotive Safety: An Optical Tour, Science on Saturday Lecture at the Princeton Plasma Physics Laboratory, Princeton, NJ, February 2013

 Controlling Ray Bundles with Reflectors, Tetrahedral Geometry Seminar, Lancaster, PA, 2013

Hitczenko, Pawel

Weighted random staircase tableaux, Combinatorics Seminar, University of California, Berkeley, CA, March 2013

Kaliuzhnyi-Verbovetskyi, Dmitry

Norm-constrained determinantal representations of multivariable polynomials, Analysis seminar, Virginia Tech, Blacksburg, VA, March 2013

Noncommutative Functions: A Bird's-eye View, Plenary talk, South Eastern Analysis Meeting, Blacksburg, VA, March 2013

Norm-Constrained Determinantal Representations of Multivariable Polynomials, minisympoium, SIAM Conference on Applied Algebraic Geometry, Fort Collins, CO, August 2013

Medvedev, Georgi

Synchronization and spontaneous dynamics in electrically coupled networks, Institute of Theoretical Physics Seminar, Technische Universität, Berlin, Germany, December 2013

Laboratory of Computational Neuroscience Seminar, French National Centre for Scientific Research, Gif-sur-Yvette, France, December 2013

The geometry of spontaneous spiking in neuronal networks, Applied Mathematics Seminar, University of Delaware, Newark, DE, November 2013

The Poincare map of randomly perturbed periodic motion, SIAM Conference on Applications of Dynamical Systems, Snowbird, UT, May 2013

The geometry of spontaneous spiking in neuronal networks, Mathematics Colloquium, Rensselaer Polytechnic Institute, Troy, NY, April 2013

Morse, Jennifer

Quantum cohomology for flags and symmetric functions. ICERM, Brown University, Providence, RI, March 2013

Faculty Presentations

Moskow, Shari

Local Inversions in Ultrasound Modulated Optical Tomography, minisymposium, Joint Mathematics Meetings, San Diego, CA January 2013

Inverse Problems: Determining the Equation from the Solution, colloquium, Villanova University, Villanova, PA, April 2013

Asymptotic Expansions for Transmission Eigenvalues in the Presence of Inhomogeneities, minisymposium, WAVES 2013, Gammarth, Tunisia, June 2013

Scattering and Resonances of thin high contrast dielectric structures, minisymposium, SIAM Conference on Mathematical Aspects of Materials Science, Philadelphia, June 2013

Local Inversions in Ultrasound Modulated Optical Tomography, minisymposium, Applied Inverse Problems, Daejeon, South Korea, July 2013

Scattering and resonances of thin high contrast electromagnetic structures, minisymposium, Applied Inverse Problems, Daejeon, South Korea, July 2013

Asymptotic Expansions for Transmission Eigenvalues in the Presence of Inhomogeneities, minisymposium, International Conference on Novel Directions in Inverse Scattering Honoring David Colton, University of Delaware, Newark, DE, August 2013

Asymptotic Expansions for Transmission Eigenvalues in the Presence of Inhomogeneities, seminar, University of Delaware, Newark, DE, October 2013.

Asymptotic Expansions for Transmission Eigenvalues in the Presence of Inhomogeneities, seminar, Temple University, Philadelphia, PA, October 2013

Asymptotic Expansions for Transmission Eigenvalues in the Presence of Inhomogeneities, special session, AMS Fall Eastern Sectional Meeting, Temple University, Philadelphia, PA, October 2013

Simpson, Gideon

Numerical Analysis and Convergence Diagnostics for Parallel Replica Dynamics, Applied Math Seminar, University of Delaware, Newark, DE, December 2013

Numerical Analysis of Parallel Replica Dynamics and Metastability, The Analysis Seminar, Binghamton University, Binghamton, NY, October 2013

Diagnostics and extensions for parallel replica dynamics, Warwick EPSRC Symposium on Statistical Mechanics, Warwick University, Coventry, UK, December 2013

Low Regularity Well-posedness for the 2D Maxwell-Klein-Gordon Equation, SIAM Conference on Partial Differential Equations, Lake Buena Vista, FL, December 2013

Faculty Presentations

Woerdeman, Hugo

Norm constrained determinantal representations for multivariable polynomials, 2013 Joint Mathematics Meetings, San Diego, January 2013

Norm constrained determinantal representations for multivariable polynomials, 2013 International Linear Algebra Society (ILAS) meeting, Providence, RI, USA, June 2013

Determinantal representations of stable polynomials, 2013 International Linear Algebra Society (ILAS) meeting, Providence, RI, USA, June 2013

Determinantal representations of stable polynomials, 4th International Conference on Matrix Analysis and Applications, Konya, Turkey, July 2013

Wright, J. Douglas

Disastrous equations, Science on Saturday Lecture at the Princeton Plasma Physics Laboratory, Princeton, NJ, January 2013

Disastrous equations, Concordia Astronomy and Science Club, Monroe Township, NJ, August 2013

Approximation of Polyatomic FPU Lattices by KdV Equation, SIAM Conference on Analysis of Partial Differential Equations mini-symposium, "Advances in Nonlinear Dispersive Partial Differential Equations," Lake Buena Vista, FL, December 2013

Yu, Thomas

Differential Proximity Condition, 14th International Conference Approximation Theory, San Antonio, Texas, April 2013

Multiscale Method for the Canham-Helfrich Model, The Mathematics of Finite Elements and Applications 2013, London, England, June 2013

Faculty Presentations

Zhang, Aijun

Traveling Wave Solutions with Mixed Dispersal for Spatially Periodic Fisher-KPP Equations, SIAM conference on applications of dynamical systems, Snowbird, UT, May 2013

Traveling Wave Solutions with Mixed Dispersal for Spatially Periodic Fisher-KPP Equations, The Central Region Conference on Numerical Analysis and Dynamical Systems, University of Kansas at Lawrence, KA, May 2013

Competing Interactions and Traveling Wave Solutions in Lattice Differential Equations Computational and Applied Mathematics (CAM) Seminar at University of Kansas, Lawrence, KA, March 2013

Competing Interactions and Traveling Wave Solutions in Lattice Differential Equations, International Conference on Dynamics of Differential Equations (In memory of Jack Hale) at Georgia Institute of Technology, Atlanta, GA March 2013

Competing Interactions and Traveling Wave Solutions in Lattice Differential Equations, Joint Mathematics Meetings, San Diego, CA, January 2013

Editorial Positions

Medvedev, Georgi

Editor, *Discrete and Continuous Dynamical Systems B*

Morse, Jennifer

Managing editor, *Journal of Combinatorics*

Associate guest editor, *Journal of Combinatorics,* 2011—2013

Woerdeman, Hugo

Editor, *International Journal of Information and System Sciences*

Guest Editor, *Linear Algebra and its Applications*

The Mathematics Department hosted the 2013 Careers in Mathematics Conference organized by the Eastern Pennsylvania/Delaware (EPADEL) Mathematical Association of America. The conference was held at the Papadakis Integrated Science building Atrium on November 23, 2013, from 9:00 am to 3:30 pm. Mathematics alumni came to Drexel to talk about their current profession to undergraduate students. The alumni talked about opportunities in different fields such as Actuarial Science, Education, Finance, Government and Graduate schools.

After the registration and breakfast, Donna Murasko, Dean of the College of Arts & Sciences, Drexel University and Annalisa Crannell, EPaDel section Governor welcomed the participants and introduced the panelist.

The panel consisted of the following experts.

Actuarial Science & Statistics :   **Sese Abhulimen, StrategiK Insight Global LLC**

Kevin Robinson, Millersville University

John Parkinson, Employee Benefits Consultant

Finance: **Gabriel Beitler, VMware**

Donald McElheny, Information Technology Consultant

Robert Buchanan, Millersville University

Government: **Brian Habecker, U. S. Department of Defense**

Matt Hutchinson, Cybix Systems

Greg Coxson, U. S. Naval Research Lab in Washington

Education: **Cynthia Taylor, Millersville University**

Susan Cooper –Nguyen, Harrisburg Area Community College

Christopher Rachor, Solanco High School

Graduate School: **Christina Weaver, Franklin & Marshall College**

Michael Minner, Drexel University

Angela Minster, Temple University

This conference was a wonderful opportunity for students who explore the wide range of careers and opportunities available to them as mathematical majors.

Employee Service Award Recipients

The Drexel University Employee Service Awards Ceremony was held on December 13, 2013 at the Sheraton Philadelphia Center City Hotel. The following members of the Drexel Mathematics department were recognized for their service at Drexel University.

Five Year Award Recipients

David Ambrose   Jason Aran

Malinda Gilchrist   Kenneth Swartz

Fifteen Year Award Recipients

Robert Immordino

Li Sheng

Twenty five Year Award Recipients

Patricia Henry Russell

Eric Schmutz

Thirty Year Award Recipient

Justin Smith

Thirty Five Year Award Recipient

Robert Boyer

Departmental Committees 2013-2014

Tenure and Promotion

Chair— Thomas P. Y. Yu and All Tenured Faculty Members

Undergraduate Program (Including Assessment)

Chair—Eric J. Schmutz

Patrick Clarke, Alexander Dolgopolski, Daryl Falco, Marci A. Perlstadt, Li Sheng

Undergraduate Advisor— Jennifer Morse

Teaching Faculty Promotion

Chair—Marci A. Perlstadt

Alexander Dolgopolski, Marna Mozeff, Oksana P. Odintsova, Adam Rickert, Patricia Henry Russell, Eric J. Schmutz, Justin Smith

Tenure– Track Faculty Search

Chair—Dmitry Kaliuzhnyi- Verbovetskyi

Yixin Guo, Georgi Medvedev, J. Douglas Wright, Thomas P. Y. Yu

Program Alignment and Review Committee

Chair—Robert P. Boyer

David Ambrose, Dmitry Kaliuzhnyi- Verbovetskyi, Jennifer Morse , Eric Schmutz

Fall Coordination Assignments

Math 100—Raymond Favocci

Math 101—Jeanne Steuber

Math 110—Robert Immordino

Math 121—Jason S. Aran & Dimitrios Papadopoulos

Graduate Program (Including Assessment)

Chair—Georgi Medvedev

David Ambrose, Robert P. Boyer, Pawel Hitczenko (fall), Shari Moskow (spring), Li Sheng, Gideon Simpson

Departmental Committees 2013-2014

Graduate Advisor—J. Douglas Wright

Qualifying Exam Subcommittee

Robert P. Boyer, Hugo Woerdeman

College and University Events Coordinator— Ronald K. Perline

Colloquium Coordinator— Pavel Grinfeld

Distinguished Speaker Coordinator—Ronald K. Perline

Library Liaison— Gideon Simpson

CoAS Undergraduate Program Representative—Eric J. Schmutz

CoAS Graduate Program Representative— Georgi Medvedev

CoAs Tenure and Promotion Representative— Thomas P. Y. Yu

CoAs Research Day Representative—Li Sheng

University 101 Representative— Ronald K. Perline and Yixin Guo

Math Competition Coordinator—Patrick Clarke

Math Student Organization Faculty Advisor— Dimitrios Papadopoulos

Placement Exam Coordinator—Raymond Favocci

Math Problem of the Month Coordinator—Justin Smith

Pi Day Coordinator— Jason Aran, Daryl Falco, Marna Mozeff, Adam Rickert

Assistant Scheduler— R. Andrew Hicks (spring)

Math 101— Adam Rickert (Winter)

Math 102—Jeanne Steuber (Winter)

Math 122—Jason Aran & Dimitrios Papadopoulos (Winter)

Math 102—Adam Rickert (Spring)

Math 119— Michael Daniel (Spring)

Math 200—Jason Aran & Dimitrios Papadopoulos (Spring)

COLLOQUIUM

November 6, 2013

Jack W. Silverstein

Department Of Mathematics, North Carolina State University

Estimating Population Eigenvalues From Large Dimensional Sample Covariance Matrices

November 13, 2013

Igor Rivin

Department Of Mathematics, Temple University

Generic And Random Matrices, Maps And Manifolds

January 14, 2014

Scott McCullough

Department Of Mathematics, University of Florida

* Free Convex Analysis And Semi Algebraic Geometry*

January 24, 2014

Nestor Guillen

Department Of Mathematics, University Of California At Los Angeles

Free Boundaries In Random Domains

January 31, 2014

Ting Zhou

Department Of Mathematics, MIT

* On Transformation—Optics Based Invisibility*

COLLOQUIUM

February 14, 2014

Zhongyang Li

Department of Mathematics, University of Cambridge

* Critical Parameters of lattice models*

February 19, 2014

Ju-Yi Yen

Assistant Professor, University of Cincinnati

* Some examples of Skorokhod Embeddings and Their Applications*

March 10, 2014

Jeremy Clark

Michigan State University

* Suppressed Dispersion for a Randomly /Kicked Quantum Particle in a Dirac Comb*

March 12, 2014

Xiaoming Song

Ritsumeikan University

* Backward Stochastic Differential Equations and Malliavin Calculus*

April 2, , 2014

Yvonne Ou

Department of Mathematics, University Of Delaware

Mathematical Links Between Microstructure And Effective Properties Of Composite Material

COLLOQUIUM

April 9, 2014

Isaac Klaper

Temple University

Microbial-Induced Mineralization in Biofilms

April 21 , 2014

Alebereto De Sole

Sapienty University of Rome

*W-Algebras and Hamiltonian Equations"

April 23, 2014

Alona Ben-Tal

Massey University

Why breathing deep and slow is good for you—Insights from Respiratory Sinus Arrhythmia

April 30, 2014

Miao-Jung Yvonne Ou

University Of Delaware

**Mathematical Links Between Microstructure and Effective Properties of Composite Material*

May 7, 2014

Jiaxu Li

University of Louisville

Modelling Impulsive Insulin Delivery Towards Artificial Pancreas

COLLOQUIUM

May 28, 2014

Justin Smith

Drexel University

*Steenrod Coalgebras *

June 2, 2014

Arno Kuijlaars

KU Leuven Belgium

*Singular Values of Products of Random Matrices *

☆   ☆   ☆

Special Topic Courses

Fall Quarter, 2013-14

MATH 279 001 Secondary Education Math Enrichment - Dimitrios Papadopoulos

MATH 279 601 Elementary Discrete Mathematics – Elena Koublanova

MATH 680 001 Differential Topology - Justin Smith

Winter Quarter, 2013-14

MATH 498 001 Actuarial Math II - Marci Perlstadt

MATH 680 001 Methods of Optimization I - Pavel Grinfeld

Spring Quarter, 2013-14

MATH 680 001 Computational Algebraic Combinatorics - Jennifer Morse

SIAM SEMINAR

October 10, 2013

Daniel Parry — Drexel University

Elementary Properties of Concave Compositions

October 17, 2013

Daniel Watkins — Drexel University

Assessing Performance & Tradeoffs of Bioforensic Signature Systems

October 24, 2013

Charles Burnette — Drexel University

Geodetic Spectra of Graphs

November 7, 2013

Sam Clearman — Lehigh University

Combinatoris of Hecke Algebra Traces

November 14, 2013

Leonard Stevenson — Drexel University

Numerical Solution of the Schrodinger Equation

January 23, 2014

Isaac Harris — University of Delaware

Transmission Eigenvalues and Non– destructive testing of Anisotropic Materials

SIAM SEMINAR

February 6, 2014

Michael Minner— Drexel University

On-Grid MIMO Radar via Compressive Sensing

February 20, 2014

Timothy Hayes — Drexel University

The Moduli Space of Curves of Genus 0

February 27, 2014

Gideon Simpson — Drexel University

Brownian Motion, Metastability and Parallel Replica Dynamics

March 6, 2014

Chung Wong — Drexel University

Stable polynomials, Fourier Coefficients and permanents

March 13, 2014

Matthew Lagro— Temple University

Introduction to Quantum Computing

April 10, 2014

Eric Stachura— Temple University

Introduction to Several Complex Variables

SIAM SEMINAR

April 24, 2014

Eric Stachura— Temple University

Introduction to Several Complex Variables

May 8, 2014

Jonah Smith — Drexel University

Backlund Transformations and Spherical Curves

May 22, 2014

Amanda Parshall — Drexel University

On the Distribution of Random Staircase Tableaux

Analysis Seminar

October 4, 2013

Patrick Clarke

Splines and their Moduli

October 11, 2013

Hugo Woerdeman

The Schwarz lemma and the Schur-Agler class

October 18, 2013

Andrey Melnikov

A generalization of the inverse scattering for linear Differential Equations

October 25, 2013

Hugo Woerdeman

The Schwarz lemma and the Schur-Agler class

November1, 2013

Dmitry Kaliuzhnyi-Verbovetskyi

Long-resolvent representations of rational Cayley inner Herglotz –Agler functions

November 8, 2013

Dmitry Kaliuzhnyi-Verbovetskyi

Long-resolvent representations of rational Cayley inner Herglotz –Agler functions

November 15, 2013

Anatolii Grinshpan

Determinantal representation of stable polynomials with real coefficients

Analysis Seminar

November 22, 2013

Seva Joukhovitski

Option pricing and volatility at extreme strikes

February 7, 2014

Ahmad Sabra

Reflector problem and the inverse –square law

February 21, 2014

Daniel Parry

A one-page proof of Dyson's Crank Distribution Conjecture

February 28, 2014

Hugo Woerdeman

A stabilization theorem for Hermitian forms and applications to holomorphic mappings (after Catlin & D'Angelo)

April 4 , 2014

Hugo Woerdeman

Moment Problems—One variable vs Two variables

April 18 , 2014

Lei Cao

A normal variation of the problem of A. Horn: The rank one case, and the Inverse spectral problems for Jacobi and Quasi-Jacobi Matrices

Structured Signal Analysis Seminar

October 01, 2013

Jean-Luc Bouchot, Drexel University

Microbial Unknown Estimation

October 08, 2013

Michael Minner, Drexel University

Message Passing

October 15, 2013

Michael Minner, Drexel University

Compressed Sensing Radar

October 29, 2013

Phillip Gaudreau, Drexel University

Graph Sparsification

November 05, 2013

Hugo Woerdeman, Drexel University

Matrix Completion

November 12, 2013

Jean-Luc Bouchot, Drexel University

Sparsity in Genrtic Studies

November 19, 2013

Michael Minner, Drexel University

MIMO Radar

Structured Signal Analysis Seminar

December 3, 2013

Jean-Luc Bouchot, Drexel University

Sparse Interferometric Imaging

January 21, 2014

Jean-Luc Bouchot, Drexel University

High Dimensional Regression

January 28, 2014

Michael Minner, Drexel University

Model-Based CS

February 4, 2014

Lei Cao, Drexel University

Circulant Matrices in CS

February 11, 2014

Hugo Woerdeman, Drexel University

Random Matrices

February 25, 2014

Jean-Luc Bouchot, Drexel University

Random Matrices

March 5, 2014

Roza Aceska, Vanderbilt University

Dynamical Sampling

Structured Signal Analysis Seminar

April 15, 2014
Jean-Luc Bouchot, Drexel University
Sparse Methods in Gene Networks

April 22, 2014
Edinah Gnang, IAS
Hypermatrix Algebra

April 29,2014
Hugo Woerdeman, Drexel University
CUR Decompositions

May 6 , 2014
Michael Minner, Drexel University
*Sparsest Solutions in Subspaces *

May 13 ,2014
Lei Cao , Drexel University
Toeplitz and Circulant Matrices in Compressed Sensing

Combinatorics & Algebraic Geometry Seminars

September 10, 2013

Gabe Feinberg, Haverford College

Homogeneous Representations of Khovanov-Lauda-Rouquier Algebra

September 19 , 2013

Ryan Kaliszewski, Drexel University

Structure of Quiver Polynomials

September 24, 2013

Tina Garrett, St.Olaf College

The Combinatorics of Generalized Legendre—Stirling Numbers

October 3, 2013

Eric Carlsson, Stonybrook

Representation Theory and the ind—Grassmannian

October 8, 2013

Will Traves, US Naval Academy

Enumerative Geometry of Hyper plane Arrangements

October 15, 2013

Adriano Garsia, UC San Diego

The two sides of the extended Shuffle Conjecture I

October 17, 2013

Adriano Garsia, UC San Diego

The two sides of the extended Shuffle Conjecture II

Combinatorics & Algebraic Geometry Seminars

October 22, 2013

Pawel Hitczenko, Drexel University

Weighted Random Staircase Tableaux

November 5, 2013

Avi Dalal, Drexel University

Macdonald Polynomials, Affine and Quantum Schubert Calculus

November 14, 2013

Frank Sottile, Texas A&M

Combinatorial Positivity in the Schubert Calculus via Dual Equivalence Graphs

November 21, 2013

Jae-Ho Lee, University of Wisconsin

Q-Polynomial distance-regular graphs and a double affine Hecke Algebra of rank1

November 26, 2013

Zach Hamaker, Dartmouth

Little Maps and Insertion Algorithms

December 3, 2013

Anna Bertiger, University of Waterloo

An Equivariant Rim Hooke Rule

January 15, 2014

Susanna Fishel, Arizona State

Enumeration of Strong, Standard ,Starred Tableaux

Combinatorics & Algebraic Geometry Seminars

February 4, 2014

Sam Clearman, Lehigh University

The combinatorics Hecke Algebra Characters

February 11, 2014

Yusra Naqvi, Rutgers

A product formula for certain coefficients of Jack Polynomials

February 25, 2014

Austin Roberts, University of Washington

Dual equivalence graphs and the Schur Expansion of Hall-Littlewood Polynomials via Yamanouchi Words

March 20, 2014

Matt Hyatt, Lehigh University

Eulerian Polynomials and bubble sorting

March 25, 2014

Daniel Orr, Virginia Tech

Specializations of non-symmetric Macdonald Polynomials at Infinity

April 3, 2014

Brendon Rhoades, UC San Diego

Parking Spaces

April 10, 2014

Drew Armstrong, University of Miami

Diagonal Harmonics and the Shi Arrangement

Combinatorics & Algebraic Geometry Seminars

April 17, 2014

Mahir Can, Tulane

Combinatorics of the Borel Orbit Posets in Matrices

April 24 , 2014

Kaisa Taipale, University of Minnesota

Quantum K –Theory of Grassmannians

May 2 ,2014

Mike Zabrocki, York University

Schur Analogues in Non-Communicative Symmetric Functions

May 8, 2014

Linda Chen, Swarthmore College

Equivariant quantum cohomology, Schubert Calculus and Positivity

PDE/ Applied Mathematics Seminar

October 8, 2013

Dan Spirn, University of Minnesota

Connections Between Phase Transition Equations and Fluid Dynamics Equations

October 17, 2013

Ian Tice, Carnegie-Mellon University

Instability Theory of Gaseous Stars

PDE/ Applied Mathematics Seminar

October 21, 2013
Emanuel A. Lazar, University of Pennsylvania

Dynamical Cell Structures: Evolution and Statistics

October 31, 2013
Amanda French, McMaster University

Global Solutions for Semi-linear Waves on Hyperbolic Space

November 4, 2013
Toan Nguyen, Penn State

Non-linear Stability of Source Defects in Oscillatory media

November 18, 2013
Marc Spiegelman, Columbia University

Physics and Computation for Magma Dynamics

March 13, 2014
David Aristoff, University of Minnesota

Mathematical Analysis of Accelerated Dynamics

March 20, 2014
Richard O. Moore, NJIT

Sampling and Assimilating with Optimal Control

April 10, 2014
Sarah G. Raynor, Wake Forest University

Asymptotic Stability of Solitons for the Korteweg-de Vries Equation

PDE/ Applied Mathematics Seminar

April 17, 2014

Robert Buckingham, University of Cincinnati

Transition Behavior in Semi-classical Non-Linear Wave Equations

April 24, 2014

Stephen Morris, University of Toronto

Consider the Icicle

May 1, 2014

Michael I. Weinstein, Columbia University

Waves in Honeycomb Structures

May 15, 2014

David Ambrose, Drexel University

Non-existence of Small, Time-periodic Spatially periodic Solutions for Equations with Strong Dispersion

May 22, 2014

Magdalena Czubak, Binghamton University

Uniqueness Questions for the Navier-Stokes Equations in the Hyperbolic Setting

May 29, 2014

Dennis G. Yang, Drexel University

Localized Solutions in 1D Neural Network Models

Graduate Presentations

Michael Minner

On-Grid and Off-Grid Compressive MIMO Radar, 2nd International Workshop on Compressed Sensing Applied to Radar, Bonn, GER, September 19, 2013

Life as a Graduate Student in Mathematics, Careers in Mathematics Conference hosted by the EPADel section of the MAA, Drexel University, Philadelphia, PA, November 23, 2013

Poster

On-Grid MIMO Radar via Compressive Sensing, College of Arts and Sciences Research Day, Drexel University, February 18, 2014

On-Grid MIMO Radar via Compressive Sensing, February Fourier Talks, University of Maryland, February 20, 2014

On-Grid MIMO Radar via Compressive Sensing, Drexel University Research Day, April 10, 2014

Scott Rome

Asymptotic Expansions for the Transmission Eigenvalues of a Scatterer with Small Inhomogeneities, Delaware University, Newark, DE, May 15, 2014

Scattering of Electromagnetic Waves by Thin High Contrast Dielectrics: Analysis of the Transversal Component, Temple University, Philadelphia, PA, November 14, 2013

Charles Burnette

Representing Random Permutations as a Product of Two Involutions,2014 MAAGC (Mid-Atlantic Algebraic Geometry and Combinatorics) Workshop, Drexel University, Philadelphia, PA, May 3, 2014

Amanda Parshall

On the distribution of parameters in random weighted staircase tableaux, AofA, 2014, 25th International Conference on Probabilistic, Combinatorial and Asymptotic Methods for the Analysis of Algorithms, Paris, France, June 16–20, 2014

Poster

On the distribution of parameters in random weighted staircase tableaux, Mid-Atlantic Algebraic Geometry and Combinatorics Conference, Philadelphia, PA, May 3, 2014.

2014 CoAS Research day award

Graduate Natural & Physical Sciences—Oral Category

1st Place: Amanda Parshall, Mathematics.

"On the Distribution of Parameters in Random Staircase

Tableaux."

Advisor: Dr. Pawel Hitczenko. (Co-Author: Dr. Pawel Hitczenko)

GRADUATE STUDENT AWARD

Congratulations Michael Minner !

Michael Minner received a **Highly Commented Teaching Excellence Award** on May 29, 2014 for his excellence in teaching at Drexel University. This award was presented by Alexis Finger, chair of TA Excellence Sub Committee.

Michael with Alexis Finger

Michael with Dr. Robert Boyer

Michael Minner is the recipient of the 2014 **Albert Herr Teaching** Assistant Award. Michael received this prestigious award from Dr. Robert Boyer on June 9, 2014.

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.

Also Michael received **SIAM Student Chapter Certification of Recognition Award** for the year 2014.

The certificate recognizes the student's hard work, instills loyalty to SIAM, encourages students to join and work with SIAM, gives direct exposure of SIAM leadership to the students, and adds something noteworthy to the student's record for career building.
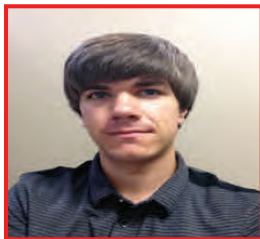
Congratulations!

Honors Day Awards

The Drexel University College of Arts and Sciences Honors Day was held on May 22, 2014 in Behrakis Hall.

Frank H. M. Williams Prize in Mathematics—Winner

Alex Karlovitz's father is a mathematician, and his brother is currently a Ph. D. student in Statistics at Penn State. Alex plans to continue the family tradition and hopes to get his own Ph. D. in Mathematics. Entering Drexel as a Math major and a member of the Pennoni Honors College in 2012, Alex quickly developed an interest in scientific computing and added a Computer Science minor his freshman year. He is currently working at his first co-op doing data analysis for an engineering firm called PetroMar Technologies. Alex looks forward to returning to school in the fall to take more math courses.

Robert J. Bickel Endowed Scholarship Fund—Winners

Julianna Quazi is a rising pre-junior pursuing a major in Mathematics and a minor in Music. This year, she served as Vice President of the Math Student Organization, and she will be co-president for the 2014-2015 academic year. She is also a tutor in the Math Resource Center, and she sings in the Drexel University Chorus and Drexel's vocal jazz ensemble, Naturally Sharp. When she is not doing math or singing, she loves to play piano and guitar, spend time with her family, and try new foods.

Kaijie Zhang is a junior in Drexel, double major in mathematics and economics. He is interested in applying mathematics methods into economics and finance models, and he believes that mathematics is the core of all business areas. Kaijie enjoys his study at Drexel and he has already passed the first two actuarial exams. After Drexel, Kaijie wants to enter a Ph.D. program in actuarial science.

Kelly Shiptoski is a sophomore mathematics major at Drexel. She was originally an engineering student but found her true love of math in her Calculus II class. She is a tutor at the Drexel Math Resource Center, where her favorite class to tutor for is Multivariate Calculus. She is currently doing her first co-op with the Informatics department of Independence Blue Cross as a software developer.

Honors Day Awards

Robert J. Bickel Endowed Scholarship Fund—Winners

Weichen Zhou is an international student from China. Having the goal of pursuing a career in statistical analysis and actuarial sciences, in 2012, she started off as a Math Major and a member in the Pennoni Honors Colleges in Drexel. As she went further into Math, she found herself falling in love with Math and everything that's related to it. Weichen started working as a student tutor in the MRC in Winter2014 and she loved her job. Being in Drexel's 5-year-Co-op program, she is on her first Co-op working as a programmer, analyzing data. The job is challenging and she is enjoying it. She declared her minor in Computer Science during her sophomore year and is planning on branching out into the field of Finance after getting back to school from Co-op.

Juliana Speroni has always had an interest in numbers and mathematics. Attending Drexel and being a member of the Mathematics Department seemed like an obvious choice for her after graduating high school in 2009. With the support and knowledge from the Mathematics Department, Juliana was given the opportunity to spread her love of the subject through being an academic tutor at the Math Resource Center. This experience helped Juliana expanded her interests to other areas including education. In 2010, she enrolled in the BS/MS program where she will receive her Bachelor of Science in Mathematics, and her Master of Science in Teaching, Learning, and Curriculum. In addition, Drexel's co-op program has opened Juliana's eyes to business areas, and she is receiving minors in accounting and legal studies. Along with her studies, Juliana has also spent a lot of her time at Drexel as a member of Drexel University Division 1 Women's Soccer team. As a committed Dragon, Juliana is very appreciative of all the athletic and academic experiences given to her over the last 5 years. Upon her graduation in June, Juliana will be working in an accounting firm in Blue Bell, Pennsylvania.

Zhuoxuan Ma became fascinated by mathematics from a very young age. She has always challenged herself with interesting and complex mathematics problems through mathematics competitions since elementary school. She joined Drexel as a freshman with double majors in mathematics and business administration in 2009. At Drexel, Zhuoxuan has thoroughly enjoyed the material in all her math courses, especially topics in probability and statistics, math reasoning, and abstract algebra. After five years of study, she figured out mathematics could be a really helpful tool for financial modeling and business quantitative analysis. She plans to pursue for her master degree in financial mathematics in 2-3 years, and get a job related to financial modeling or quantitative analysis that greatly utilizes her mathematics knowledge in the future.

Philip Fehlinger - Senior First Honors

Fan Fei—Senior Second Honors

Yilin Yang—First Year Math Major Student Achieving 4.0 GPA

Honors Day Awards

Honors Day Award Winners with the College of Arts & Science Dean, Donna Murasko, Ph.D. and Math Department Head, Hugo Woerdeman, Ph.D.
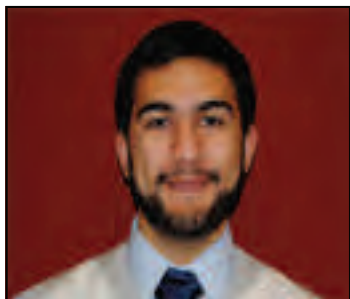
Zhuoxuan Ma, Julianna Quazi, Kelly Shiptoski, Juliana Speroni, Kaijie Zhang with Donna Murasko, Dean of CoAS and Dr. Hugo Woerdeman, Math Department Head.

Kelly Shiptoski with mother, grandfather and Dr. Hugo Woerdeman

Undergraduate Awards

Goldwater Scholar Award for Math & Physics Major

Jeremy Gaison, Physics and Mathematics Junior, has achieved national distinction as a recipient of the prestigious Barry M. Goldwater Scholarship. The scholars were selected on the basis of academic merit from a field of 1,166 mathematics, science and engineering students who were nominated by the faculties of colleges and universities nationwide.

Jeremy Gaison did a research co-op in the period April-August 2013 with the project title: "Nonlinear effects on wave propagation in heterogeneous media". The research co-op was under supervision of Professors J. Douglas Wright and Shari Moskow, both from Mathematics, and sponsored by their NSF grants DMS 1105635 and DMS 1108858, as well as the provost office. The project resulted in the publication: J. Gaison, S. Moskow, J. Douglas Wright and Q. Zhang, "Approximation of polyatomic FPU lattices by KDV equations", accepted by SIAM's interdisciplinary peer-reviewed journal Multiscale Modeling and Simulation.

DAAD Research Internships & Science Engineering (RISE) award

Junyi Xiao has received a DAAD Research Internships & Science Engineering (RISE) award. DAAD stands for Deutscher Akademischer Austausch Dienst (German Academic Exchange Service).

Junyi's DAAD RISE internship is taking her to the Institute of Diagnostic and Interventional Radiology at the University Hospital of Jena, Germany. She will be working on a project to quantify magnetic susceptibility using MRI. Her Drexel mentors are Yuanfang Cai (Computer Science) and Georgi Medvedev (Mathematics). All RISE programs are based on the idea of offering highly motivated students internships and funding during the summer sessions.

CONGRATULATIONS

Bachelor Degrees Awarded

Mathematics Majors

Collins, Erik Michael (Magna Cum Laude)

Conrad, Chad J (Cum Laude)

Fehlinger, Philip Jacob (Summa Cum Laude)

Fei, Fan   (Magna Cum Laude)

Groch, Erik John (Magna Cum Laude)

Kimani, Elijah Gatuanjau (Cum Laude)

Kind, Jensen Leigh-Ann (Magna Cum Laude)

Long, Penelope (Cum Laude)

Ma, Zhuoxuan (Magna Cum Laude)

Miller, Mathew M (Cum Laude)

Patel ,Krina S

Sanchirico, Colleena M (Summa Cum Laude)

Wagner, Jason P

Wang, Hanjia (Cum Laude)

Wang, Ke (Magna Cum Laude)

Zapisek, Stephen Joseph (Cum Laude)

Zhao, Yu (Cum Laude)

Zielinski, Steven C

Mathematics Minors

Bluestein, Sean

Brooks, Luke B

Calhoun, Kristian D

Carchidi, Eric Michael

Davis, Edward Christopher

Gogarty, Kayla

Guilfoyle, Erin V

Haberman, Andrea J

Harvey, Christopher C

Horrocks, Keith J

Kapllani, Alda

Kapoor, Akhil

Kennedy, Ian Andrew

Lacombe-Bar, Cloe M

Liao, Jennie

Lloyd, Anthony J

Marini, Robert J

McLaughlin, Michael P

Meters, Michael C

Meyle, Ann M

Mui, Kenneth K

Nabial, John Walter

Nguyen, Phat Tan

Nguyen, Thao Thi Huong

Park, Michael A

Pinkos, Hannah L

Sahay, Anupma

Thai, Duc A

Tran, Thanh Huy

Wang, Jinning

Wheeler, Kurt G

Wilf, Rona

Zettlemoyer, Jacob C

Master of Science Degrees Awarded

Rome, Scott Albert

Toppin, Kelly Paul

Wong, Chung

Doctor of Philosophy Degree Awarded

Avinash Dalal presented and defended with success his Ph.D. thesis entitled "Quantum and Affine Schubert Calculus and Macdonald Polynomials." His Ph.D. advisor was Professor Jennifer Morse. Conferred: May 2014

Daniel T. Parry presented and defended his Ph.D. thesis entitled " A Polynomial Version of Meinardus' Theorem." His Ph.D. advisor was Professor Robert P. Boyer. Conferred: May 2014
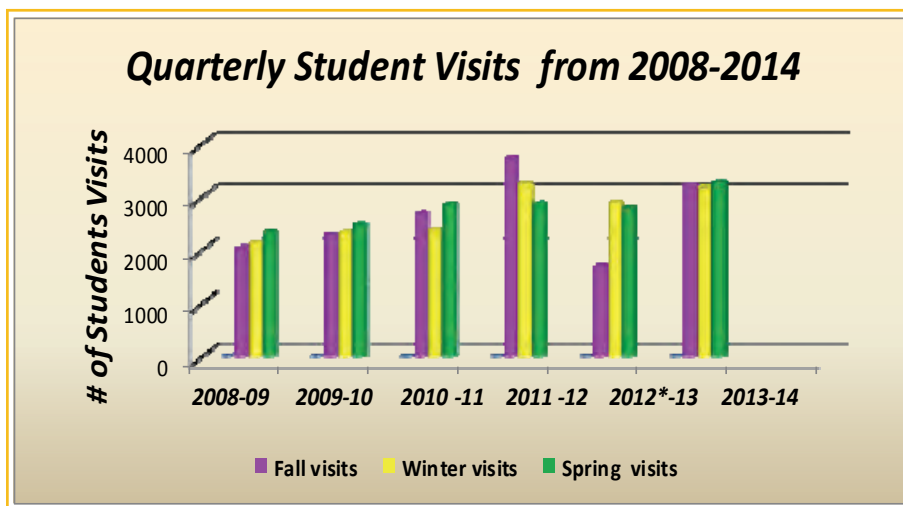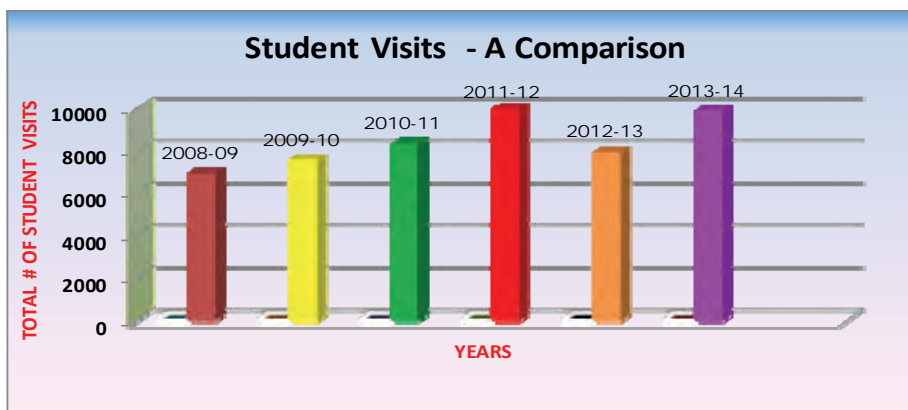
Mathematics Resource Center

The mathematics resource center of Drexel University, Department of Mathematics offers an informal and comfortable learning environment for Drexel students who are enrolled in an Undergraduate Math course offered by the math department. The math resource center is open during fall, winter, spring and summer quarters. The center is open 42 hours per week, having six tutors per hour. The students may walk in without any prior appointment. The hours at the MRC are from 10:00 am to 7:00 pm, Monday to Thursday and 10:00 am to 4:00 pm on Friday. During summer, the center is open Monday to Thursday from 11:00 am—4:00 pm. The faculty, TA's, undergraduate student tutors help students to understand the course material they have difficulty with. The students who visit the center on a regular basis drastically improved their math skill and scores. Most of the students are grateful to the Math department for providing a wonderful free resource center for Math. The students can check the schedule online to see the availability of tutors.

The graph below represents quarterly student visits from 2008 to 2014. The number of student visits during the academic year 2012-13 is not accurate due to non-availability of complete data.

A total of 9895 student visits reported in the fall, winter and spring quarter. On an average per week, the center has 266 students for the fall quarter, 237 for the winter quarter and 298 students for the spring quarter.

Mathematics Resource Center

The number of student visits increases every year. The department encourages the tutoring center and provides all support.

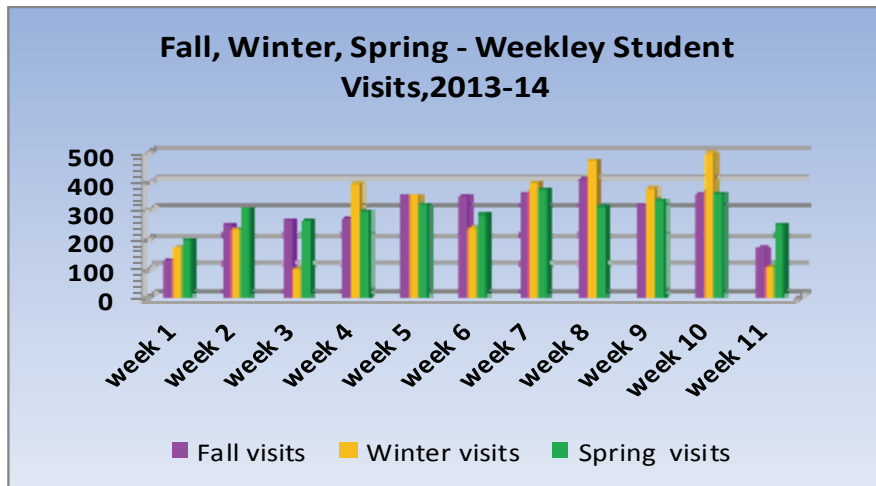I can come here any time of the day. The person teaching me knows what they are talking about.

Answer questions as I do my homework and help clarify concepts that are not clear in lecture.

I get all the help I need. There is always a person to help me, so I never have to wait.

The MRC does a great job facilitating students' needs regardless of their struggles, and the staff are all friendly and professional.

The following graph represents the student visits per week during each quarter in 2013-14 academic year. Week 11 is the exam week and the center open for limited hours during the exam week.

Fall, Winter, Spring - Weekley Student Visits,2013-14

L—Learn   E—Engage   A—Achieve   D— Develop

Activities
STUDENT

Math Bytes

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 2013-2014 academic year, MathBytes' officers were Charles Burnette, President; Sarah Rody, Vice President; Trevor Zaleski, Treasurer; and Chung Wong, Secretary.

MathBytes started the year with a Fall Social event where current members and new graduate students were able to socialize together. At the beginning of the winter term, MathBytes toured the Yards Brewing Company. MathBytes also co-sponsored a board game night with the Physics Graduate Student Association (PGSA), allowing students from the two groups to relax and mingle over food and friendly competition. Two new events – the e Day Celebration and Video Game Night – were introduced this year. Our 1st annual e Day Celebration occurred on February 7th, 2014. The festivities included foods starting with the letter "e" and an e-themed haiku writing contest. Video game night was held in the spring quarter and was possibly our most popular and successful event. At our end of year celebration, we congratulated our recent graduates and wished good luck to those preparing for qualifying and candidacy exams. For an unprecedented third year in a row, the annual volleyball / BBQ event sponsored by MathBytes and PGSA was rained out. So instead, we enjoyed an impromptu viewing of the World Cup and ordered BBQ to close out MathBytes' largest year to date.

L—Learn   **E—Engage**   Activities   **A—Achieve**   **D— Develop**

STUDENT

Pi Day

On Thursday, March 13, 2014, the Math Department was proud to celebrate our 9th 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. In fact, non-math majors came and decided to consider adding a math minor because our department has so much fun!

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! And, we continued to host math taboo.

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! This year, we had over thirty students participate in our fifth annual bee.

A great time was had by all at our 2014 Pi Day celebration. We are already looking forward to   Pi Day 2015!

L—Learn   **E—Engage**   **A—Achieve**   **D— Develop**

Activities

STUDENT

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 2013-2014 academic year, the officers of Drexel's Student Chapter of SIAM were Avinash Dalal and Michael Minner, Co-Presidents; Scott Rome, Vice President; Jingmin Chen, Treasurer; and Timothy Hayes, Secretary.


Our chapter held a biweekly seminar consisting of 10 individual talks from Drexel graduate students as well as a presentation from the mathematics department's own Gideon Simpson. This year we expanded our seminar to include graduate students from outside of Drexel. Eric Stachura and Matthew Lagro from Temple University, Isaac Harris from the University of Delaware and Sam Clearman from Lehigh University each spoke about their research. The 4th annual Epsilon Talks were held on June 5th and brought our seminar to a close for the year. We awarded the SIAM Student Chapter Certificate of Recognition to Michael Minner for outstanding service and contributions to the chapter.

L—Learn   E—Engage   A—Achieve   D— Develop

STUDENT Activities

Math Student Organization

Mathematics Student Organization (MSO) is a diverse club at Drexel meant to bring together students have a passion for Math. The mission of the MSO is to promote mathematics and related fields by providing a casual and relaxed environment conductive to learning. The MSO is committed to bringing together under-graduate students with a common interest in various aspects of mathematics.

The student members attended the Student Mathematics Conference at Moravian College, Bethlhem, PA in February , 2014. Dr. At different occasions, Dr. Eric Schmutz spoke about his research into Number Theory and Dr. Georgi Medvedev about his research work in mathematical neurosciences.
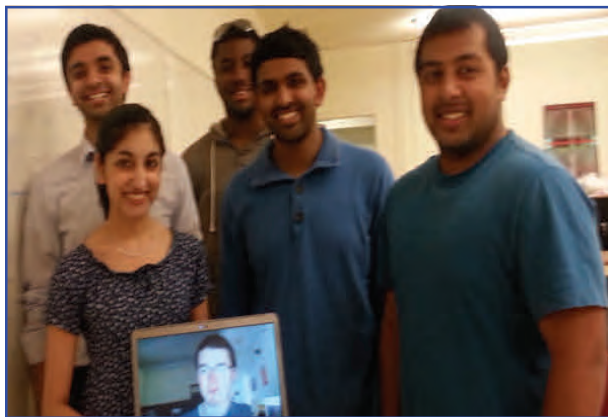
The students visited "School of The Future" and did Math tutoring for the high school students. The students organized fun activities to learn Math such as Math cartoons, board games and movies such as "Moneyball".

Student Activities

Student LIFE

PARTY time

Every Monday during the term at 3:00 pm, Faculty, Students and Staff gather to chat, eat and relax!!!

On Sunday December 15th, The Woerdemans held a pot luck at their home. On Monday June 9th, we had a BYOB get together to celebrate the end of the academic year.