Department of Mathematics Annual Report

Drexel University

College of Arts & Sciences

2008 – 2009

Message From the Department Head

Dear Alumni and Friends,

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

Again, the department has enjoyed recognition by awards to our faculty and students. Teaching Professor Patricia Henry Russell received the Harold M. Myers Distinguished Service Award for her years of extraordinary service to the department, college, and the whole university community. Our teaching assistants Dimitrios Papadopoulos and Yun Yoo received the Albert J. Herr Teaching Assistant award and the Assistance Excellence award respectively. J. Douglas Wright, one of our outstanding junior faculty, received the Antelo Devereux Award for demonstrating exceptional potential in research.

The accomplishments of our undergraduates also gained special recognition. At the annual honors day last spring, Erica Freed and Erin Hamalainer won the Robert J. Bickel Award; Michael Chirico, Mackenzie Bergstrom, Francis Ryan, Sajjan Mehta, Andrew Eshelman, and Dixant Rai won the Harry Muchnic award; and Sean Ballentine won the Frank Williams prize.

Our department continues to grow in size as well. This year Assistant Professor David Ambrose joined the department who immediately made great contributions to the departmental research environment. Our undergraduate teaching mission received fresh support from several new faculty members: Jason Aran, Esfandier Navayazsani, John Vogel, and Kenneth Swartz.

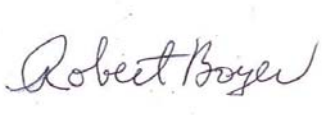
The departmental programs enjoy growth as well. After several years of planning, the department introduced a Bachelor of Arts degree to complement our long-standing Bachelor of Science degree. The BA program has the flexibility in its requirements to let our students explore any number of different subjects and disciplines.

Last year's distinguished lecture series brought to campus two outstanding mathematicians: Professor George E. Andrews of Penn State, who is the current president of the American Mathematical Society, and Professor Richard P. Stanley of MIT. Their visits to the department included meetings with faculty and students in addition to their public lectures that attracted people throughout the region. Further, the department hosted a workshop on Topology and Physics with participants from Penn, Princeton, Rutgers, and Virginia Tech.

Our Mathematical Resource Center is increasingly playing a central role in our beginning undergraduate courses. About one third of all students taking mathematics courses come to the center with an average of 226 visits per week. This represents over a thirty percent increase from the previous academic year.

I expect that after you read our annual report you will understand the level of excitement that everyone in the department feels. I invite you to tell us about your reactions and help by joining in the mission of the department.

Thank you and Best Wishes,



Dr. Robert Boyer
Professor and Interim Department Head

Tenured / Tenure-Track Faculty

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

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

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

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

R. Andrew Hicks, Ph.D. (University of Pennsylvania) Associate 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) Assistant Professor. Operator theory, systems theory, complex analysis, C*-algebras and harmonic analysis.

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

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

Tenured / Tenure-Track Faculty

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

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

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

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

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

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

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

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

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

Teaching Faculty

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

Avinash Dalal, M.S. (University of Maryland) Instructor.

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

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

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

Abed Elhashash, Ph.D. (Temple University) Assistant Teaching Professor.

Daryl Falco, M.S. (Drexel University) Instructor. Discrete mathematics and automata theory.

Raymond J. Favocci, III, M.S. (Drexel University) Instructor.

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

Teaching Faculty

Robert Immordino, M.S. (Drexel University) Instructor.

William Keith, Ph.D. (Pennsylvania State University) Assistant Teaching Professor.

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

Elaine Kyriacou, M.S. (Rutgers University) Instructor. Mathematics curriculum content and methods of instruction.

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

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

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

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

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

Teaching Faculty

Judy T. Smith, M.A. (West Chester University) Instructor.

Jeanne Steuber, M.S. (Boston University) Instructor.

Kenneth Swartz, Ph.D. (Harvard University) Assistant Teaching Professor.

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

John Vogel, M.S. (Drexel University) Instructor.

Adjunct Faculty

John Coppola, M.S. (Widener University)
Harold Gilman, M.S. (Temple University)
June Gordon, M.S. (Drexel University)
Boris Kheyfets Ph.D. (Drexel University)
Elana Koublanova, Ph.D. (Leningrad State University)
Wanda Kunkle, M.S. (Drexel University)
Leo Lampone, Ph.D. (Drexel University)
Theodore Theodosopoulos, Ph.D. (Massachusetts Institute of Technology)
Kathy Yang, B.S. (HaiNan University , Western Sydney University)
Sergio Zefillipo, M.A. (Villanova University)

Emeritus Faculty

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

Staff

Byron Greene
Administrative Assistant

David Shen
Math Resource Center Manager

Margaret A. Mercer
Budget Coordinator

C. Gene Phan
Computer Specialist

Malinda Gilchrist
Graduate Program Coordinator

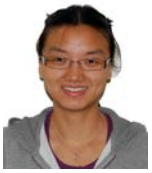
Teaching Assistants and Research Assistants

Lei Cao

Anson Carter

Lingqiong Guo

Derek Heilman



Li Huilian

Dan Jordan

David Kimsey

Kimberly Kilgore

Selcuk Koyuncu

Dmitry Leiderman

Timur Milgrom

Christopher Novak

Dmitrios Papadopolus

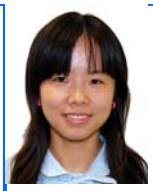
Min Rong

Teaching Assistants and Research Assistants

Caroline Shapcott

Jonah Smith

Yun Yoo



Le Yu

Svitlana Zhuravytska

Top Row: Kenneth Swartz, Hugo Woerdeman, Richard White, Michael Daniel, Abed Elhashash, Taylor Kingsbury, David Ambrose, David Shen, Lei Cao, James Donnelly

Standing Row: Alex Dolgolposky, Thomas Yu, David Kimsey, Andy Hicks, Yun Yoo, Robert Boyer, Ray Favocci, Robert Immordino, Ratricia Russell, Anson Carter, Malinda Gilchrist, Huilan Li, Gene Phan, Esfandier Navayazdni, Pavel Grinfeld, Anatolii Grinshpan

Sitting: Ronald Perline, Daryl Falco, Shari Moskow, Oksana Odintosova, Margaret Mercer, Marna Mozeff, Yixin Guo, Derek Heilman, Kimberly Kilgore, Lingqiong Guo

Floor: Min Rong, Jonah Smith, Le Yu, Caroline Shapcott, Daniel Jordon, Dmitrios Papadopoulos, Dmitry Kaliuzhnyi-Verbovetskyi, Jason Aran

New Faculty Profiles

David Ambrose

David Ambrose earned a BS in Mathematics and Economics and an MS in Mathematics from Carnegie Mellon University in 1997. He subsequently attended Duke University, where he earned an MA in Mathematics in 1999 and a PhD in Mathematics (with his thesis written under the supervision of J. Thomas Beale) in 2002. After leaving Duke, he was a Courant Instructor at NYU's Courant Institute from 2002-2005 and an assistant professor at Clemson University from 2005-2008. His research area is analysis and computing for nonlinear systems of partial differential equations

Jason Aran

Jason Aran earned a BS in Mathematics at the University of Pittsburgh and an MS in Mathematics from Drexel University. During his time as a teaching assistant at Drexel, Jason earned a TA excellence award and the Al Herr Award in 2007. Jason is now a full time instructor at Drexel.

Esfandier Navayazsani

Esfandiar Navayazdani received his MS in Mathematics from the Technical University of Berlin and his PhD from the University of Kassel in Germany. His areas of interest are differential geometry, mathematical Physics, analysis and scientific computing. He is also a Microsoft certified professional and worked 4 years as database and software developer. He was also a visiting assistant professor at the University of Massachusetts at Amherst and research fellow of the Austrian Science Fund.

John Vogel

John Vogel earned a BS in Mathematics and Mathematics Education while at the University of Scranton. After graduating, Jack earned a MS in Mathematics at Drexel University and is now a full time instructor at Drexel.

Kenneth Swartz

Kenneth Swartz received AB and AM degrees in Physics from Harvard College in 1973, and a PhD in theoretical plasma Physics from Harvard University in 1981. He also received an MS in Statistics from Temple University in 2004. Dr. Swartz has held research positions in plasma physics at the University of Texas, Austin and the University of Rochester, NY. He has consulted professionally in medical and legal statistics. He has taught mathematics and statistics at the Fox and Le Bow business schools.

New Staff Profiles

Malinda Gilchrist

Prior to employment with Drexel Malinda was the Director of Programs for Center in the Park, a community organization serving active older adults through educational and recreation activities, social events, travel and healthy living. During her 14 years at the center Malinda was the marketing personality for the organization, promoting the center's activities through print, radio and television.

Faculty Awards

Patricia Russell was the 2008—2009 recipient of the Harold M. Myers Distinguished Service Award.

Patricia Russell received her BS in Mathematics from LaSalle University in 1988. She received her Masters in Mathematics from Drexel University in 1991. Mrs. Russell has been the Associate Department Head for the Mathematics Department since 1992 except for one year when she was Assistant Dean in the College of Arts and Sciences. Her area of concentration is Probability and Statistics. Mrs. Russell is very interested in teaching freshman math courses and helping students gain an enjoyment for Math.

Mark Greenberg, Patricia Russell, and John DiNardo

J. Douglas Wright was the 2008-2009 recipient of the Antelo Deveraux Award for Young Faculty.

J. .Douglas Wright completed his Ph.D. in Mathematics at Boston University in 2003. He was a post-doctoral fellow at the Fields Institute for Research in Mathematical Sciences and a Dunham Jackson Assistant Professor in the School of Mathematics at the University of Minnesota before joining Drexel University in 2007.

Mark Greenburg, J. Douglas Wright, Gordon Richards, and Donna Murasko

Dr. Thomas Yu Receives Tenure

Dr. Thomas Yu received tenure in 2009. He received both a B.S. degree in computer science and a M.S. degree in mathematics from Purdue University in 1993. He received his Ph.D. in Scientific Computing and Computational Mathematics from Stanford University in 1997. In 1997-1998, he was a post-doctoral fellow at the department of Statistics of Stanford University. He taught at the department of Mathematical Sciences at Rensselaer Polytechnic Institute from 1998-2005 before he joined Drexel. Thomas Yu works in the area of multiscale method for geometric modeling and nonlinear signal processing. In 2000, he was granted a NSF CAREER Award for his work in this area.

Service Awards

The Drexel University Employee Service Awards Ceremony was held on Monday, December 8, 2008 in the George D. Behrakis Grand Hall in the Creese Student Center. The following members of the Drexel Mathematics department were recognized for their service at Drexel University.

Elaine Kyriacou, Instructor
Five Year Award Recipient

Patricia Henry Russell, Teaching Professor
Twenty Year Award Recipient

Eric Schmutz, Associate Professor
Twenty Year Award Recipient

Justin Smith, Professor
Twenty Five Year Award Recipient

Robert Boyer, Professor
Thirty Year Award Recipient

Faculty Grants

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

Andrew Hicks, ACIN, 9.12 Biometrics, 2009-2010, $5,000

Faculty Grants

Andrew Hicks, (PI), National Science Foundation, DMS 0908299, Distributions of Optical Design, 2009-2011, $264,000

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

Jennifer Morse, Anne Schilling, Mark Shimozono, National Science Foundation, DMS 0652641 FRG: Collaborative Research: Affine Schubert Calculus: Combinatorial, Geometric, Physical, and Computational Aspects, 2007-2010, $671,270

Jennifer Morse, National Science Foundation, DMS 0652668, FRG: Affine Schubert Calculus: Combinatorial, Geometric, Physical, and Computational Aspects, 2007-2010, $103,528

Jennifer Morse, National Security Agency, H98230-08-1-0035, Formal Power Series and Algebraic Combinatorics, 2008, $13,875

Shari Moskow, National Science Foundation, DMS 0749396, Asymptotics at Resonant Scales: Applications to Inhomogeneous Material Simulation, Discretization and Inversion, 2006-2009, $192,451

Hugo J. Woerdeman, National Science Foundation, DMS 0500678, Multivariate Moments and Factorization and Other Problems in Analysis, 2005-2009, $89,000

J. Douglas Wright, National Science Foundation, DMS 0908299, Distributions of Optical Design, 2009-2011, $264,000

J. Douglas Wright, (co-PI), National Science, Foundation, DMS 0807738, Dynamics and Interactions of Free Fluid Interfaces, 2008-2011, $110,000

Thomas Yu, National Science Foundation, DMS 0542237, Multiscale Data Representatives in Geometric and Nonlinear Settings, 2005-2009, $149,982

Faculty Appointments / Conference Organizations

David Ambrose
- Organizer, Sixth IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory, Athens, GA, March 23-26, 2009
- Reviewer for American Mathematical Society Mathematical Review/MathSciNet
- Panel Review Member, National Science Foundation Applied Mathematics

Robert P. Boyer
- Member, Executive Committee, Mathematics Association of America

Andrew Hicks
- Organizer, SIAM Minisymposium on Partial Differential Equations and Optical Design, Denver, CO, July 9, 2009

Pawel Hitczenko
- Advisory Committee, International Joint Journal Conference in Engineering
- Panel Review, NSF Probability Program, January 26-28, 2009

Faculty Appointments / Conference Organizations

Dmitry Kaliuzhnyi-Verbovetskyi
- Reviewer, AMS Mathematical Reviews
- Reviewer, Zentralblatt fur Mathematik

Gregory Naber
- Editor of *Journal of Dynamical Systems and Geometric Theories*
- Editor of *Journal of Geometry and Symmetry in Physics*

Georgi Medvedev
- Editorial Board Member, AIMS, Discrete and Continuous Dynamical Systems - Series B

Jennifer Morse
- Executive Committee, Formal Power Series and Algebraic Combinatorics
- Co-organizer, Drexel/Penn/Swarthmore Algebraic Combinatorics/Geometry Seminar
- Organizer, Combinatorics and Physics of k-Schur Function Workshop, Drexel University, Philadelphia, PA, March 25-29, 2009

Shari Moskow
- Panel Reviewer, National Science Foundation

Li Sheng
- International Program Committee Member, Seventh International Conference on machine Learning and Applications, San Diego, CA, December 11-13, 2008
- Reviewer for Seventh International Workshop on Machine Learning in Biomedicine and Bioinformatics

Hugo Woerdeman
- Associate Editor of SIAM J. Matrix Anal. Appl., 2002-present
- Editor of International J. of Information and System Sciences

Faculty Publications

David Ambrose and Nader Masmoudi, The Zero Surface Tension Limit of Three-Dimensional Water Waves. *Indiana U. Math . J*., vol. 58, (2009), 479-521.

David Ambrose, Singularity Formation in a Model for the Vortex Sheet with Surface Tension, *Math. Comp.* 80, (2009), 102-111

Robert Boyer and **William Goh**, Polynomials Associated with Partitions: Their Asymptotics and Zeros, *Contermporary Mathematics*, Volume 471, (2008), 22-45

Pavel Grinfeld, Shape Optimization and Electron Bubbles, *Numerical Functional Analysis and Optimization*, 30, (2009), 689-710

Pavel Grinfeld, Generalization of Hadamard's Laplace Eignvalue Formula to Deforming Manifolds, *J. Geom. Sym. Phys*., 15, (2009) 43-52

Pawel Hitczenko and **Georgi Medvedev**, Bursting Oscillations induced by Small Noise, *SIAM J. Appl. Math*., 69, (2009), 1359-1392

Faculty Publications

Dmitry Kaliuzhinyi-Verbovetskyi, I.M. Spitkovsky, and **H.J. Woerdeman**, Matrices with Normal Defect One, *Operators and Matrices 3*, (2009), no. 3, pp. 401-438

Dmitry Kaliuzhinyi-Verbovetskyi, **A.Grinshpan**, V. Vinnikov, and **H.J. Woerdeman**, Classes of Tuples of Commuting Contractions Satisfying the Multivarialbe von Neumann Inequality, *J. Funct. Anal.* 356, (2009), no. 9, pp. 3035-3054

Dmitry Kaluzhnyi-Verbovetskyi and V. Vinnikov, Singularities of Rational Functions and Minimal Factorizations: the Noncommutative and the Commutative Setting, *Linear Algebra and Its Applications*, 430, (2009), no. 4, pp. 869-889

Jennifer Morse and Luc Lapointe, Quantum Cohomolgy and the k-Schur Basis, *Transactions of the American Mathematical Society*, 360, (2008), 2021-2040

Shari Moskow and J. Schotland Convergence and Stability of the Inverse Scattering Series for Diffuse Waves, *Inverse Problems*, 24, (2008), no. 6, 065005, 16 pp.

Eric Schmutz, Rational Points on the Unit Sphere, *Central European Journal of Mathematics*, 6(3), (2008), 482-487

Li Sheng, C. Garcia, E. Freeman, , M. Sammel, H. Lin, C. Frye, Allopregnanlone Levels Before and After Selective Serotonin Reuptake Inhibitor Treatment of Premenstrual Symptoms, *Journal of Clinical Psychopharmacology*, 29(4), (2009), 403-405

Li Sheng, D. Chen, K. Xing, D. Henson, A.M. Schwartz, and X Cheng, *Journal of Biomedicine and Biotechnology*, Volume 2009 (2009), article ID 632786, 7 pages

Li Sheng, D.E. Brown, and J. Richard Lundgren, A Characterization of Cycle-Free Unit Probe Interval Graphs, *Discrete Applied Math*., vol. 157, Issue 4, (2009), 762-767

Hugo J. Woerdeman, Estimates of Inverses of Multivariable Toeplitz Matrices, Operators and Matrices, *Operators and Matrices 2* (2008), 507-515

Hugo J. Woerdeman, The Higher Rank Numerical Range is convex, *Linear and Multilinear Algebra*, 56 (2008), 65-67

Hugo J. Woerdeman and *David P. Kimsey*, Minimal Normal and Commuting Completions, In: *Special issue "Matrix Analysis and Applications' of the International J. of Information & Systems Sciences 4* (2008), 50-59

Thomas Yu and Gang Xie, Smoothness Equivalence Properties of General Manifold-Valued Subdivision Schemes, *SIAM Journal on Multiscale Modeling and Simulation*, vol. 7, no. 3 (2008), 1073-1100

Faculty Presentations

David Ambrose, *On Weak Solutions for Interfacial flows with Surface Tension*, invited, Shanks Workshop on Dynamics of Interfaces and Structures in fluid Flows, Vanderbilt University, Nashville, TN, October 2008

David Ambrose, *Time-Periodic Solutions of the Benjamin-Ono Equation*, invited, Joint Meeting of the American Mathematical Society and the Shanghai Mathematical Society, Shanghai, China, December 2008

David Ambrose, *On Weak Solution for Interfacial Flows with Surface Tension*, invited, International Conference on Dispersive and Kinetic equations, China, December 2008

Davidi Ambrose, *Time-Periodic Interfacial Fluid Flows*, invited, AMS Central Section Meeting, Urbana, IL, March 2009

David Ambrose, *Two Problems in Interfacial Fluid Dynamics*, invited, Fluid Dynamic Seminar, NJIT, Newark, NJ, April 2009

David Ambrose, *Time-Periodic Interfacial Fluid Flows*, invited, Minisymposium on Mathematical hydrodynamics, SIAM Annual Meeting, San Diego, CA, July 2009

David Ambrose, *Time-Peridoic Solutions of the Benjamin-Ono Equation*, The Sixth IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory, Athens, GA, March 2009

Robert Boyer, *Asymptotics and Zeros for Polynomials from Combinatorcs*, invited, AMS National Meeting, January 2009

Yixin Guo, *Data Analysis of Thalamocortical Relay Responses for Parkinsoniamn Patients*, invited, Conference of Frontiers in Applied and Computational Mathematics, NJIT, Newark, New Jersey, June 2009

R. Andrew Hicks, *Integral Surfaces of Vector Fields and Optical Design*, SIAM Minisymposium on Partial Differential Equations in Optical Design, Denver, CO, July 2009

R. Andrew Hicks, *Designing Mirrors*, Scifoo 2009, Mountain View, CA, July 2009

Pawel Hitczenko, *Tails of Perpetuities*, invited, Sectional AMS Meeting, Vancouver, BC, Canada, October 2008

Pawel Hitczenko, *Tails of Perpetuities*, invited, Probability Seminar, New York, NY, December 2008

Pawel Hitczenko, *Renorming Divergent Perpetuities* ,invited, Probability Seminar, Warsaw University, Warsaw, Poland, December 2008

Jennifer Morse, *Schubert Calculus of Flag Varieties*, invited, University of Iowa, Iowa City, Iowa, June 2009

Faculty Presentations

Shari Moskow, *The Inverse Born Series for Diffuse Waves*, SIAM Annual Meeting, Denver, CO, July 2009

Shari Moskow, *The Inverse Born Series for Diffuse Waves*, University of Delaware, Newark, DE, August 2009

Li Sheng, *Group Testing in the Development of an Expanded Cancer Staging System* , The Seventh International Conference on Machine Learning and Applications, San Diego, CA, December 2008

Li Sheng, D. Chen, K. Xing, D. Henson, A.M. Schwartz, X. Cheng, and K. Batich, *Ensemble Clustering Algorithm Enhances TNM Prognostic Assessment in Lung Cander*, BIT's 2nd Annual World Cancer Congress Proceedings, June 22-25, 2009, Beijing, p. 430

Li Sheng, K. Xing, D. Chen, D. Henson, A. M. Schwartz, X. Chen, *A Clustering Aproach in Developing Prognostic Systems of Cancer Patients*, ICMLA08, Dec. 11-13, 2008, San Diego, CA

Li Sheng, K. Xing, D. Chen, D. Henson, *Group Testing in the Development of an Expanded Cancer Staging System*, ICMLA08, Dec. 11-13, 2008, San Diego, CA

Hugo J. Woerdeman, *Estimates of Inverses of Multivariable Toeplitz Matrices*, invited, Structured Linear Algebra Problems: Analysis, Algorithms and Applications Workshop, Cortona, Italy, September 2008

Hugo J. Woerdeman, *Matrices with Normal Defect One*, Workshop in Honor of Leiba Rodman 60th Birthday, Williamsburg, VA June 2009

Hugo J. Woerdeman, *Classes of Tuples of Commuting Contractions Satisfying the Multivariable von Neumann Inequality*, Workshop on Multivariate Operator Theory, Fields Institute, Toronto, Ontario, Canada, August 2009

J. Douglas Wright, *Linear Dispersive Decay Estimates for Vortex Sheets in 2 and 3 Dimensions*, IMACS Conference on Nonlinear Evolution Equaions and Wave Phenomena, Athens, GA, March 2009

J. Douglas Wright, *Shooting and Exit Manifolds for Pulse Interactions in One Dimensional reaction-Diffusion Equations*, CAM Seminar, University of Kansas, Lawrence, KS, October 2008

J. Douglas Wright, *Shooting Manifolds for Reaction-Diffusion Equations in d-dimensional Space, Workshop on Dynamics of Patterns*, Mathematisches Forschungsinstitut Oberwolfach, Germany, December 2009

J. Douglas Wright, *Shooting Manifolds in Lattice Systems*, SIAM Conference on Applicatins of Dynamical Systems, Snowbird, Utah, May 2009

Dr. Andrew Hicks Research

Dr. R. Andrew Hicks's research lies in the design of optical systems, based on partial differential equations and differential geometry. He has developed mirrors with unique properties such as his mirror with a large view with minimal distortion. This particular mirror caught the attention of the auto industry. Another mirror he designed is one that displays to the observer a non-reversed image of themselves. This mirror was highlighted in the media with articles and interviews. Dr. Hicks has also developed other technique that could be used in application such as the 360 degree panoramic vision system (one that he showcased during the 2007 alumni weekend at Drexel) and the design of lenses for thermal imaging. Dr. Hicks also designed a new type of camera based on micro-mirror arrays. The design has resulted in a U.S. patent application.

◄ Dr. Hicks' 360 degree panoramic vision system

Dr. Hicks' non-reversed image ►

Bachelor of Arts in Mathematics

The Department of Mathematics is please to introduce the addition of a Bachelor of Arts degree in mathematics. The main consideration is to offer interested students a more flexible plan of study than that provided by the BS in mathematics.

The Bachelor of Arts will address the fact that the mathematics major serves students who have extremely diverse goals and needs. The department has students who go on to attend graduate school in a variety of areas including mathematics, statistics, biostatistics, and law to mention a few. It also includes students planning careers in the actuarial field, in the financial services industries, in computer science, in teaching, as well as many other areas. There are many components of this population that are not well-served by the current BS degree as it allows them little flexibility to pursue their individual interests due to the paucity of free electives.

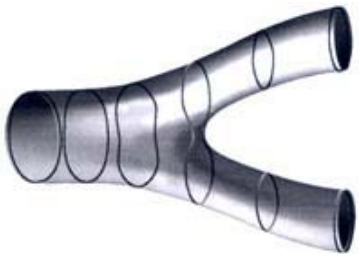
In addition, there are a number of students in the university who currently minor or double major in mathematics. The largest group has traditionally come from computer science, but since they have left the College of Arts and Science, it is much more difficult for these students to complete the double major requirements. The same holds for other students, especially those who might be interested in a double major and are in departments outside the College of Arts and Science. We would like to make the double major less of a burden.

To accomplish these goals, the new BA degree decreases the number of required mathematics courses and gives students some flexibility in choosing which math courses to take. Students are required to take only two quarters of science, but are required to take additional courses in fields related to math. These additional courses can come from areas as diverse as science, economics, finance, computer science, and engineering and will be chosen according to student interests.

The department feels that there are features of the BA program that will be very attractive to both prospective and existing Drexel students. The degree has a depth requirement in mathematics and provides a strong general mathematics background while still allowing students to create a program tailored to their interests. We anticipate that this will be extremely useful for students pursuing careers in teaching, the actuarial profession, and those interested in the MS in biostatistics offered at Drexel.

Workshop on Topology and Physics

The Drexel University Departments of Mathematics and Physics sponsored a *Workshop on Topology and Physics* on September 8-9, 2008. The purpose of the workshop was to bring together mathematicians, physicists and students interested in the interactions between topology and physics. There were thirty- five registered participants from universities in the Philadelphia area as well as Rutgers, Yale, Princeton, the University of Pittsburgh, Virginia Tech, SUNY Stony Brook, and Washington University in St. Louis. Six invited lectures covered Topological Quantum Field Theory, The Topology of the Universe through Cosmology, The Topology of DNA, The Topology of Chaos, Heterotic Mirror Symmetry, and Topological Defects in Soft Matter. In addition, there were poster sessions for graduate students and extended discussion periods to provide the participants with the opportunity to exchange ideas and establish contacts and collaborations.



Topological Quantum Field Theories and Duality
Tony Pantev
University of Pennsylvania

Topology of the Universe through Cosmology
Amir Hajian
Princeton University

Topology of DNA
Wilma Olson and Irwin Tobias
Rutgers University

Topology of Chaos
Robert Gilmore
Drexel University

Heterotic Mirror Symmetry
Eric Sharpe
Virginia Tech

Geometry of Topological Defects in Soft Matter
Randall D. Kamien
University of Pennsylvania

Special Topics Courses

Fall 2008

MATH 279 Pre-Calculus Practicum
Instructor: Marisol Rodriguez

MATH 498 Actuarial Math
Instructor: Marci Perlstadt

Winter 2009

MATH 680 Number Theory
Instructor: Eric Schmutz

MATH 680 Numerical Linear Algebra
Instructor: Thomas Yu

Spring 2009

MATH 279 Calculus Workshop
Instructor: Patricia Russell

MATH 680 Algebraic Topology
Instructor: Greg Naber

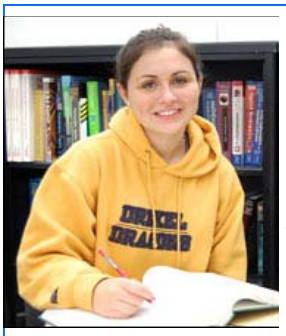
MATH 680 Matrix Groups
Instructor: Robert Boyer

MATH 680 Math Finance - Derivatives
Instructor: Pavel Greenfield

Honors Day Awards

The Drexel University College of Arts and Sciences Honors Day was held on May 22, 2008 in the Mandell Theater**.** This year's winners are:

Robert J. Bickel Award – **Erica Freed, Erin Hamalainer**
Harry Muchnic Award – **Michael Chirico, Mackenzie Bergstrom, Francis Ryan, Sajjan Mehta, Andrew C. Eshelman, Dixant Rai**
Frank Williams Prize – **Sean Ballentine**



Erica Freed began her career as an engineering student in 2004, but realized that her math courses were what really interested her. She switched her major to mathematics in her sophomore year. Erica was able to combine her interest in mathematics and education when she was accepted to World Teach, a Harvard run organization that sends teachers all over the world. Erica had the opportunity to teach English in a rural village in Costa Rica. Currently, Erica is on path to become a certified secondary math teacher. She is a member of the Pennoni Honors college and has earned a 3.84 GPA. Erica has received the Harry E. Muchnic Scholarship of excellence in mathematics.

Erin Hamalainer began her relationship with Drexel as a high school student in the College of Engineering Summer Mentorship Program. She entered Drexel as a chemical Engineering major in the fall of 2006 and was awarded a Presidential Scholarship. She switched her major to Mathematics and after one year of classes she is sure that this is the perfect fit. Erin is a pre-junior co-oping with the Philadelphia School District's Office of Assessment and considering a graduate degree in psychometrics. In her spare time she plays violin with the Drexel Orchestra. She is a member of the Pennoni Honors College and has a 3.9 GPA.

Michael Chirico is a second-year senior in the Pennoni Honors College with a 3.92 GPA dual majoring in Mathematics and Economics, and considering adding a major in Finance and a minor in Japanese. He has been tutoring at the Math Resource Center since Fall quarter of his freshman year. He also tutored 9th graders at Philadelphia Electrical & Technology Charter High School in Center City. Michael is currently part of the Lindy Scholars Program where he tutors 5th grade students in math and literacy. He is currently pursuing a career as a post-secondary instructor after completing graduate study in economic theory.

Mackenzie Bergstrom transferred into Drexel in September 2007. She tried different studies, including physics and architectural engineering, before she realized her heart belongs to mathematics. Mackenzie's first co-op was for Susquehanna International Group, working on the Fixed Income desk. Drexel provided Mackenzie with real work experience that has enabled her to discern what she wants – and what she doesn't want – for her future. And so with confidence, and the encouragement of her family, she has decided to pursue further education in math upon graduation next year.

Honors Day Awards

Francis Ryan is a third year Mathematics major. After a term at Drexel as a Mechanical Engineering major in the fall of 2006, He decided there wasn't enough math and soon switched majors. Francis spent his first co-op at the Federal Aviation Administration as a mathematician and programmer. His second co-op was with Group One Trading. Francis also is interested in learning German and hopes to study in Germany this fall. Afterwards, he will return to Drexel to pursue his math major while planning to add German and Computer Science minors.

Sean Ballentine started at Drexel in the fall of 2007 as a 4 year student but, quickly switched to 5 year after hearing wonderful things about the co-op. In his first year he was awarded a music scholarship and has participated in the University Chorus and Chamber Singers. Sean has worked as a tutor in the Drexel Learning Center. In his second year at Drexel Sean helped create the newly founded Drexel Actuarial Science Student Association and currently serves as vice president. He has been accepted to the Pennoni Honors College and Nation Society of Collegiate Scholars. Sean's first co-op was at Susquehanna International Group on the Convertibles Desk helping with trade operations.

Sajjan Mehta started at Drexel University in September 2007. He is majoring in Physics and Mathematics and is pursuing a Master's degree in Mathematics through the BS/MS program. Sajjan was selected as a STAR scholar and was able to participate in research in the summer after his freshman year. He studied the astrometric redshifts of quasars with Dr. Gordon Richards, and has had his work recognized by being included on a refereed paper to be published in the Astronomical Journal. Sajjan is currently on his first co-op at the Institute of Astronomy at the University of Cambridge in England. His research is in computational astrophysics, specifically studying the multi-wavelength properties of quasars. He is a member of the Pennoni Honors College and was honored in his freshman year with the Walter R. Coley Award for academic excellence.

Undergraduate Awards

Senior First Honors
- Sajjan Mehta

Senior Second Honors
- Dixant Rai

◄ Marna Mozeff, Sean Ballentine, Michael Chirico, Dixiant Rai, Andrew Eshelman

▼Dixant Rai, Mackenzie Bergstrom, Micael Chirico, Andrew Eshelman, Francis Ryan, Donna Murasko, Hugo Woerdeman

▲
Donna Murasko, Sean Ballentine, Don Williams, Hugo Woerdeman

Donna Murasko, Erin Hamalainer, Hugo Woerdeman►

Albert Herr Teaching Assistant Award

Drexel University's Department of Mathematics has established an endowed Teaching Assistant Award in memory of Albert Herr, a distinguished and much-admired faculty member of over thirty years. It is awarded annually to a teaching assistant in the Mathematics Department. The first award was presented in the spring of 1997. Al's family gave a generous initial contribution to the award fund and we hope that Al's many friends, students, and colleagues will add to the fund so that this award will continue to be a worthy testament to Al's contribution to mathematics education.

Teaching Excellence Award

Yun Yoo received the Teaching Assistant Excellence Award in the Fourth Annual Graduate Student Day at Drexel University. Yun Yoo has been a calculus team member for last two years and received very positive comments by many calculus students. Currently, Yun Yoo is a Ph.D. candidate at the Department of Mathematics.

Yun Yoo

Teaching Excellence Award

Dmitrios Papadopolous received the Al Herr Teaching Excellence Award. Dmitrios was recognized at the department's End-of-Year Reception on June 12, 2009.

Dmitrios Papadopolous and Patricia Russell

Bachelor of Science Degrees Awarded

Mathematics Majors
Brittney Bryant
Dondi Butler
Edwin Hobbs
Kyle Hofier
Kyle Binder
Edwin Hobbs
Daniel Freeman
Mary Strassman
Dan Szymkowiak
Nathaniel Beers - *Magna cum Laude*
Joshua Butker
Kevin Cole
William Courchain
Elza Davydova
Erica Freed - *Magna cum Laude*
Jon Kerrigan
Andrew Jerista
Malarie Knox
Cindy Laynez
Francis Letizia
Meagan Magee
Gina Rowe
Alexander Sedkov
Anthony Tyler - *Cum Laude*

Mathematics Minors
Dhruv Salhotra
David Tumer
Jeffrey Wildman
Anahita Buhariwala
Nishad Deshpande
Bevan Reitz
Brian Buchheit
James Dura
Dan Finehart
Ariela Keene
Jinhwan Kim
Pak Kau Lim
Donald Naegely
Brant Olsen
Daniil Osipov
Xiantong Ou
Jonathan Reidinger
Georgi Simeonov
Paul Sinatra
Patrick Smith
Anthony Tagilone
Jeffrey Wildman
Alyssa Wilson
Siu Lin
Stephen Zakrewsky

Masters of Science Degrees Awarded

Zachary Heiland
Le Yu
Crystal Stepkovitch

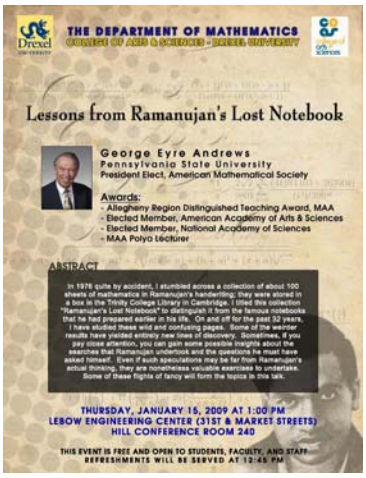
Doctor of Philosophy Degree Awarded

In June of 2009, Ms. Meredith Coletta presented and defended with success her Ph.D. thesis entitled "*Integrability in Optical Design*". Her Ph.D. advisor was Dr. R. Andrew Hicks.

In July of 2009, Mrs. Emek Köse Can presented and defended with success her Ph.D. thesis entitled "Catadioptric Sensors". Her Ph.D. advisor was Dr. Ronald Perline.

Distinguished Visitor Lecture Series

January 15, 2009
George Eyre Andrews
Pennsylvania State University
"Lessons from Ramanujan's Lost Notebook"



Abstract: In 1976 quite by accident, I stumbled across a collection of about 100 sheets of mathematics in Ramanujan's handwriting; they were stored in a box in the Trinity College Library in Cambridge. I titled this collection "Ramanujan's Lost Notebook" to distinguish it from the famous notebooks that he had prepared earlier in his life. On and off for the past 32 years, I have studied these wild and confusing pages. Some of the weirder results have yielded entirely new lines of discovery. Sometimes, if you pay close attention, you can gain some possible insights about the searches that Ramanujan undertook and the questions he must have asked himself. Even if such speculations may be far from Ramanujan's actual thinking, they are nonetheless valuable exercises to undertake. Some of these flights of fancy will form the topics in this talk.

George Andrews

William Keith, Jet Foncannon, George Andrews, Hugo Woerdeman, Jennifer Morse, Thomas Yu

Distinguished Visitor Lecture Series

April 21, 2009
Richard P. Stanley
Massachusetts Institute of Technology
"Increasing and Decreasing Subsequences"

Abstract: An increasing subsequence of a permutation a1, a2, …, an of 1, 2, …, n is a subsequence ai(1) < ai(2) < … < ai(k) (so 1 ≤ i(1) < i(2) < … < i(k) ≤ n); a decreasing subsequence is defined similarly. We will survey the theory of increasing and decreasing subsequences. Topics will include the connection with Young tableaux and the Robinson-Schensted-Knuth (RSK) algorithm, the expected length of the longest increasing subsequence of a random permutation of 1, 2, …, n (due to Logan-Shepp and Vershik-Kerov), the limiting distribution of the length of the longest increasing subsequence (due to Baik-Deift-Johansson), and some variations concerned with alternating subsequences, matchings, etc.

Richard P. Stanley

Hugo Woerdeman and Richard P. Stanley

Colloquiums

October 2, 2008
Gregor Kovacic
Rensselaer Polytechnic Institute
“Random Soliton Dynamics in Lambda Configuration Resonant Optical Media”

October 16, 2008
Jacek Wesolowski
Technical University of Warsaw
University of Cincinnati
“Perfect Matchings in Bipartite random Graphs and Multiple Wiener-Ito Integral”

October 23, 2008
David Terman
Ohio State University
“Transient Synchrony and Multiple Attractors in a Neuronal Networks Model”

October 30, 2008
Dmitri Vainchtein
Georgia Tech
Temple University
“Resonance Phenomena: a Tool for Mixing, a Tool for Control”

November 6, 2008
Daniel Szyld
Temple University
“an Optimal Block Iterative Method and Preconditioner for Banded Matrices”

November 13, 2008
Shari Moskow
Drexel University
“Scattering and Resonances of Thin Photonic Structures”

December 4, 2008
Boris Kheyfets
Drexel University
“Two Techniques for Solving recurrences Related to Compositions of Integers”

January 15, 2009
DISTINGUISHED VISITOR LECTURE
George Eyre Andrews
Pennsylvania State University
"Lessons from Ramanujan's Lost Notebook"

Hugo Woerdeman and George Eyre Andrew

Colloquium

February 12, 2009
Victor Matveev
New Jersey Institute of Technology
“Neural Circuits and Coupled Oscillator Dynamics Beyond Weak Coupling: Loss of Synchrony and Bursting in a Two-Cell Inhibitory Network”

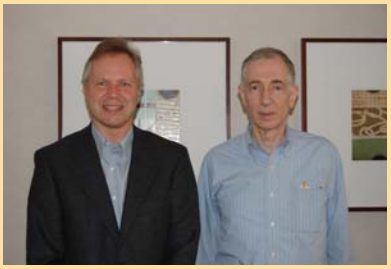
February 19, 2009
Robert Boyer
Drexel University
“Asymptotics for Appell Polynomials”

March 5, 2009
William Keith
Drexel University
“Signed Partitions: New Theorems for Old”

April 9, 2009
Esfandiar Navayazdani
Drexel University
“Analysis of Subdivision Schemes in Manifold”

April 16, 2009
Victor Roytburd
Stanford University
“Propagation of Electromagnetic Pulses in Doubly—Resonant Optical Media”

April 21, 2009
DISTINGUISHED VISITOR LECTURE
Richard P. Stanley
Massachusetts Institute of Technology
“Increasing and Decreasing Subsequences”



Hugo Woerdeman and Richard P. Stanley

Colloquium

April 30, 2009
Cyrill Muratov,
New Jersey Institute of Technology
“A Variational approach to Front Propagation in Infinite Cylinders”

May 7, 2009
John B. Conway
George Washington University
“Subnormal Operators and Function Theory”

May 14, 2009
Alexander Burnstein
Howard University
“Permutation Patterns and Permutation ”Tableaux

May 21, 2009
David Pinto
University of Rochester
“Ictogenisis: The Dynamics of Epileptic Seizure Onset”

May 28, 2009
Lawrence Fialkow
State University of New York
“Abstract vs. concrete Solutions to Multivaraiate Truncated Moment Problems”

Analysis Seminar

October 6, 2008
Hugo Woerdeman
Drexel University
“Distance to Normality of a Tridiagonal Matrix”

October 20, 2008
Hugo Woerdeman
Drexel University
“On Numerical Ranges in Quantum Computing”

October 27, 2008
Hugo Woerdeman
Drexel University
“On Numerical Ranges in Quantum Computing” (continued)

November 3, 2008
David Kimsey
Drexel University
“Truncated Hamburger Moment Problem”

Analysis Seminar

November 17, 2008
Mihaly Bakonyi
Georgia State University
“Moment problems for real measures on the Unit Circle”

November 24, 2008
Anatolii Grinshpan
Drexel University
“On the Linear Polarization Constant for the Rd”

December 1, 2008
Anatolii Grinshpan
Drexel University
“On the Linear Polarization Constant for the Rd”

February 6, 2009
Lei Cao
Drexel University
On Uniquenesss in Alfred Horn’s Conjecture

February 13, 2009
Robert Boyer
Drexel University
Ergodic Unitarily Invariant Measures on the Space of Infinite Hermitian Matrices

February 16, 2009
Andrey Melnikov
Drexel University
Overdetermined 2D Systems Invariant in one Direction and Their Transfer Function

February 20, 2009
Ilya Spitdovsky
College of William and Mary
On the Current State of the Factorization Problem for Almost Periodic Matrix Functions

March 6, 2009
Yun Yoo
Drexel University
The Spectral Theorem and Diagonalization

March 13, 2009
Nicola Guglielmi
Università di L’Aquila
Finiteness Properties of Sets of Matrices and Finite Computation of the Joint Spectral Radius

April 13, 2009
Anatolii Grinshpan
Drexel University
The ‘Plank Problem”

Analysis Seminar

April 20, 2009
Hugo Woerdeman
Drexel University
On an Extension Problem for Polynomials

April 27, 2009
Sara Grundel
Courant Institute of Mathematical Sciences
Smoothing Splines and Reproducing Kernel Hilbert Space

May 11, 2009
Hugo Woerdeman
Drexel University
On an Extension Problem for Polynomials

May 18, 2009
David Kimsey
Drexel University
Generalizations of the Hamburger Moment Problem

June 1, 2009
Dan Cross
Drexel University
Solving the Schrodinger Equation with Lie Algebras

Applied Dynamical Systems Seminar

October 3, 2008
Gregor Kovacic
Rensselaer Polytechnic Institute
Applications of Kinetic Theory to Neuronal Network Dynamics

October 10, 2008
Georgi Medvedev
Drexel University
Noise-induced Bursting

October 24, 2008
Georgi Medvedev
Drexel University
Noise-induced Mixed-mode Oscillations

Applied Dynamical Systems Seminar

December 5, 2008
Sukbin Lim
New York University
Noise-induced Transitions in Slow Wave Neuronal Dynamics

January 9, 2009
Roy Goodman
New Jersey Institute of Technology
Fractural Structures in Solitary Wave Interactions

January 16, 2009
Cyrill Muratov
New Jersey Institute of Technology
Self-induced Stochastic Resonance: How new
Non-random Behaviors Can Arise From the Action of Noise

January 23, 2009
KongFatt Wong-Lin
Princeton University
Perturbing the Formation of a Decision

February 6, 2009
Pawel Hitczenko
Drexel University
Tails of Perpetuities

February 20, 2009
Svetlana Tlupova
New Jersey Institute of Technology
Domain Decompositon Methods for Solving Stokes-Darcy Systems Based on Boundary Integrals

March 6, 2009
Linda Cummings
New Jersey Institute of Technology
Mathematical Modeling of Bistable Liquid Crystal Display Design

March 13, 2009
Kathleen Hoffman
University of Maryland Baltimore County
Stability and Existence results of Elastic Rods Models with Self Contact

April 3, 2009
Peter Gordon
New Jersey Institute of Technology
KPP Type Fonts for Systems

Applied Dynamical Systems Seminar

April 17, 2009
Victor Roytburd
Rensselear Polytechnic Institute
RPI from BS to KS and Beyond: Dissipativity and Pattern

April 24, 2009
Philip Eckhoff
Princeton University
Mathematical Reduction of a Spiking Neuronal Network Model of Neuromodulation

May 22, 2009
David Pinot
University of Rochester
Multiscale Dynamics of Sensory Processing in Neorcortex

May 29, 2009
Svitlana Zhuravytska
Drexel University
Transitions to Bursting in the Stochastic Model of Electrically Coupled Beta Cells

PDE/Applied Mathematics Seminar

October 10, 2008
Diane Henderson
Pennsylvania State University
Stability of Surface Waves on deep Water

October 17, 2008
Phillippe Buyenne
University of Delaware
Numerical Simulations of Surface Water Waves

October 24, 2008
Michael Vogelius
Rutgers University
Cloaking and Near-Cloaking of Electromagnetic Waves

November 3, 2008
Charlie Epstein
University of Pennsylvania
Debye Sources and the Numerical Solution of Maxwell's Equation

November 13, 2008
Guillaume Bal
Columbia University
Physics-based Modeling of Measurement Correlations

PDE/Applied Mathematics Seminar

November 21, 2008
Margaret Beck
Brown University
Nonlinear Stability of Time-Periodic Viscous Shocks

December 5, 2008
Helena Nussenzveig Lopes
University of Campinas
The Vanishing Viscosity Limit for Incompressible Flows and the Expanding Domain Problem

February 2, 2009
Arnd Scheel
University of Minnesota
Diffusive Synchronization of Oscillations

February 9, 2009
Michael Siegel
New Jersey Institute of Technology
Efficient Numerical Computation of Fluid Interfaces with Soluble Surfactant

March 13, 2009
John Wesley Cain
Virginia Commonwealth University
Waves in Excitable Media with Periodic Forcing

April 13, 2009
Bing-Yu Zhang
University of Cincinnati
Non-homogeneous Boundary Value Problems of Nonlinear Dispersive Wave Equations

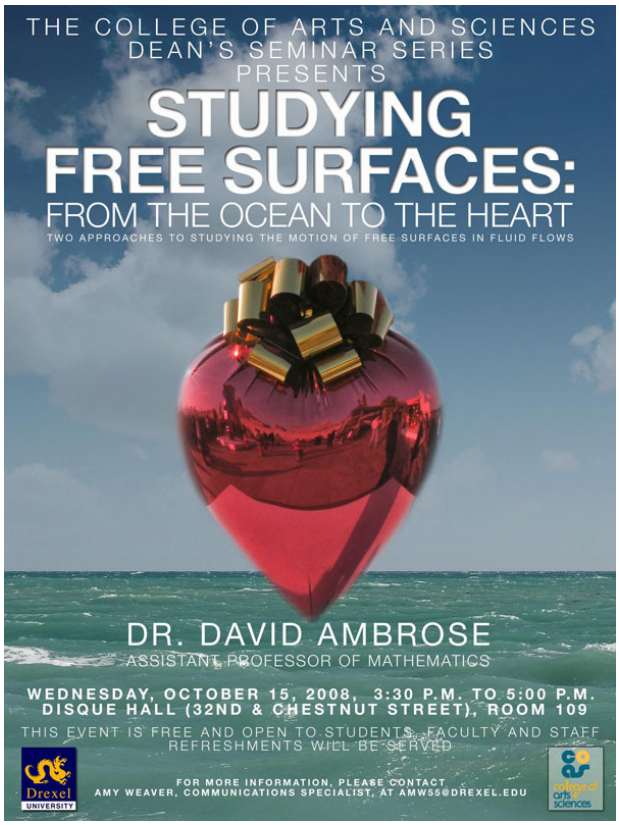
April 27, 2009
Nader Masmoudi
Courant Institute
Global Existence for Small Data Water Waves

May 11, 2009
Ted Farnum
Kean University
Local Attractors in a Low-Dimension Model for Pulsed-Laser

June 8, 2009
Vladmir Druskin
Schlumberger-Doll Research
Optimal Finite-Difference Grids for Neumann-to-Dirichlet Operators

June 22, 2009
Pablo V. Negron-Marrero
University of Puerto Rico
Cavitation in Nonlinear Elasticity: Existence Theory and Numerical Methods

Dean's Seminar



David Ambrose
October 15, 2008

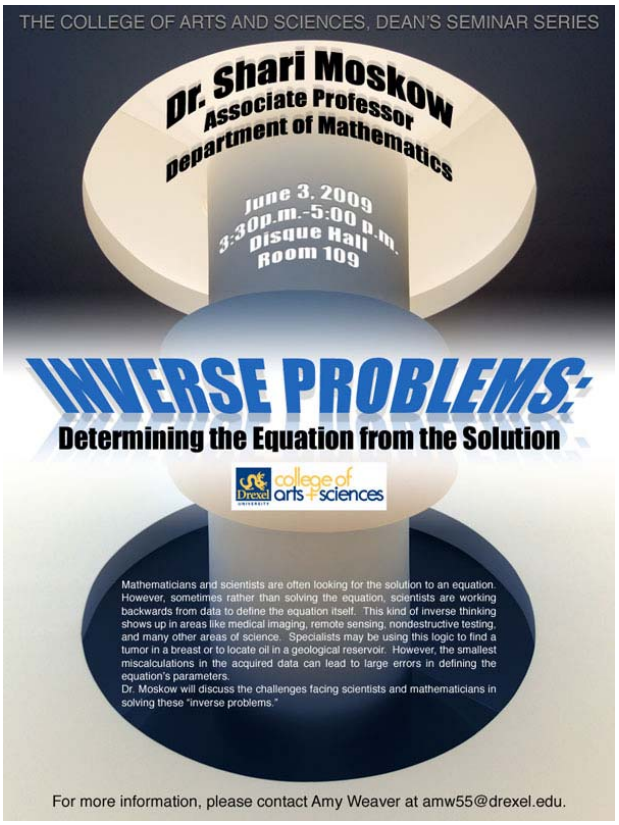
"Studying Free Surface"

Abstract: Many real-life fluid flows involve a free surface (a boundary of the fluid which is free to move); common examples include the top surface of the ocean, a water balloon, or even the wall of the heart. Many such flows are difficult to analyze when the surface tension force is accounted for, since surface tension acts only on the free surface and not in the bulk of the fluid. This difficulty can be eased somewhat by describing the free surface in interesting, geometrically motivated ways, rather than describing it just by giving its location in space. I will describe two such approaches to studying the motion of free surfaces in fluid flows; one of these methods is well-suited to flows in which the surface remains smooth, and one is more appropriate for motions which include features such as pinch-off of droplets.

Shari Moskow
June 3, 2009

"Inverse Problems:
Determing the Equation from the Solution"

Abstract: Mathematicians and scientist are often looking for the solution to an equation. However, sometimes rather than solving the equation, scientists are working backwards from data to define the equation itself. This kind of inverse thinking shows up in area like medical imaging, remote sensing, nondestructive testing, and many other areas of science. Specialists may be using this logic to find a tumor in a breast or to locate oil in a geological reservoir. However, the smallest miscalculations in the acquired data can lead to large errors in defining the equation's parameters. Dr. Moskow will discuss the challenges facing scientists and mathematicians in solving these "inverse problems".



Departmental Committees

Departmental Committees 2008-2009

Tenure-Track Search
- Robert Boyer, Chair
- David Ambrose
- Shari Moskow
- Thomas Yu
- Hugo Woerdeman (ex-officio)

Tenure and Promotion
- Pawel Hitczenko, Chair
- All tenured faculty members

Graduate Program
- Eric Schmutz, Chair
- Georgi Medvedev
- Yixin Guo
- Li Sheng
- Graduate Advisor: Andy Hicks
- Qualifying Exam Subcommittee
  - Appointed by Graduate Program Committee

Undergraduate Program (including Assessment)
- Marci Perlstadt, Chair
- Georgi Medvedev
- Dmitry Kalyuzhnyi-Verbovetzkii
- Douglas Wright
- Undergraduate Advisor: Mozeff

Actuarial Science/ Financial Math Program Committee
- Hugo Woerdeman, Chair
- Robert Boyer
- Pavel Grinfeld

Teaching Faculty Promotion (initial committee)
- Ronald Perline, Chair
- Justin Smith
- Marci Perlstadt
- Hugo Woerdeman (ex-officio)

Departmental Committees

Teaching Faculty Search
Jenifer Morse, Chair
Marna Mozeff
Patricia Henry Russell (ex-officio)
Hugo Woerdeman (ex-officio)

Departmental Grants Advisor: Pawel Hitczenko

Computer Systems Liaison: Justin Smith

Departmental Grants Advisor: Pawel Hitczenko

Colloquium Coordinator: Greg Naber

Distinguished Speaker Coordinator: Thomas Yu

Library Liaison: Dmitry Kalyuzhnyi-Verbovetzkii

Resource Center Coordinator: David Shen

CoAS Undergraduate Program representative: Marci Perlstadt

CoAS Graduate Program representative: Eric Schmutz

CoAS Tenure and Promotion representative: Pawel Hitczenko

Goodwin Liaison: Marna Mozeff

University 101 representative: Marna Mozeff

Math 121-122-123 coordinator: Ronald Perline

Math 101-102 coordinator: Marna Mozeff

Math 100 coordinator: Elaine Kyriacou

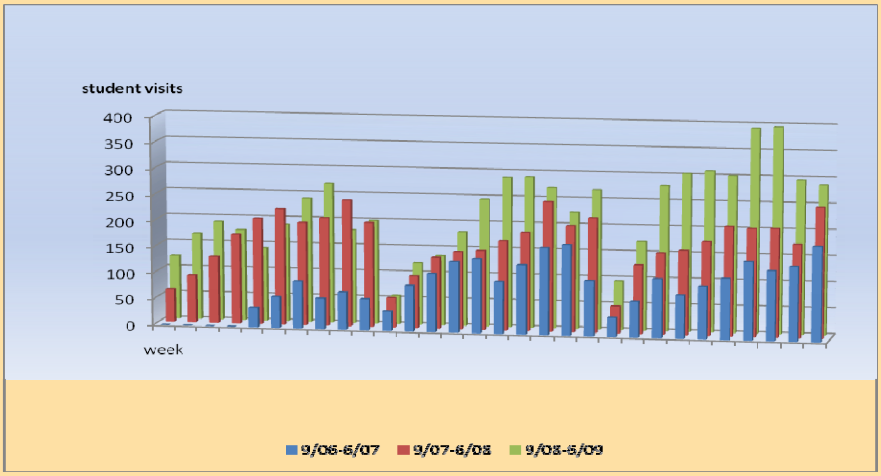
Math 110 coordinator: Jenifer Morse

Math Competition coordinator: Gregory Naber

PiMuEpsilon Liaison: Pavel Grinfeld

Mathematics Resource Center

The Math Resource Center (MRC) continues to provide valuable tutoring for an increasing number of students. The MRC is unique as a help center: its tutors are not undergraduates, but TA's and faculty. With office hours pooled together in the Math Resource Center, students now have access to 42 office hours per week– Monday thru Thursday 10-7, Friday 10-4. Our high quality, individualized instruction brings them back, on average, 4.27 times per year. Students who come regularly benefit the most: F's become C's, C's change into A's, and A's rise to A+'s. This year, 1563 students (33% of all students taking Math Department courses) used the MRC. On average, students visited 226 times per week. Respectively, there are increases of 31% and 33% over the previous year.



Carol Sangtinette is a key contributor to the Mathematics Resource Center. Her contributions has enabled the MRC to grow in a positive direction. With her continued support and the support of others the MRC will continue to provide exceptional student services.

Patricia Russell, Hugo Woerdeman, Carol Sangtinette, and David Shen

Highlights of the past year:

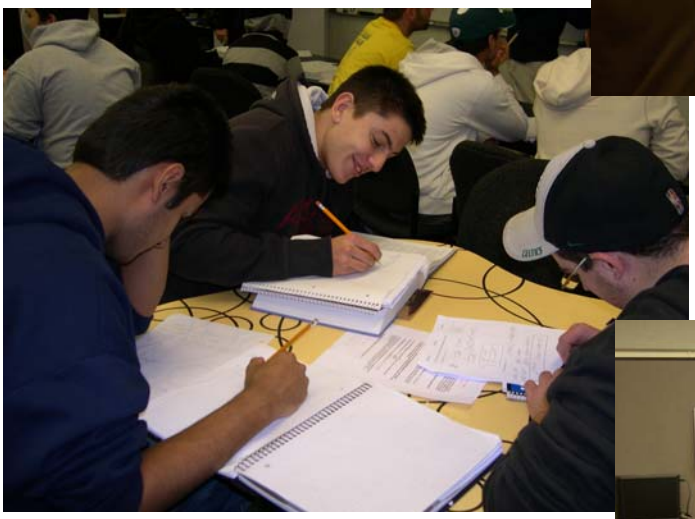
- Noise absorption panels have reduced unbearable noise to manageable levels
- With the improved organization of tutors, we can assist students in higher level math courses such as Linear Algebra and Differential Equations

Mathematics Resource Center

We like to think of the MRC as a great model to improve math achievement across a broad spectrum of students. The students comments we have received seem to confirm this.

"The MRC has been a big help. I received a D+ in Math121 and was assigned to attend the MRC for 3 hours a week in Math122. Going to the MRC has drastically improved my grades. I recently got a 92 on my Math122 midterm and am expecting a B or even higher in Math122 this term."

"I like that the tutoring is more or less one-on-one. It allows the student to feel more comfortable with the tutors than in class with professors…. It also allows the student to openly ask questions."



"I had a very difficult time in my math class this last term. Without the help from the center I would have failed the class…. Older students such as myself who have been out of school...need extra help. "

"As a student I have always felt treated as an equal at the math resource center. I had serious doubts that I could ever learn math, but the people at the MRC are very easy-going and even if you get matched up with someone who doesn't teach the way you're learning, it's easy as pie to get someone who fits better with you…. I wish there was a resource center like this for all the other subjects. "

Student Activities

Graduate Student Seminars

October 7, 2008
David Kimsey
An Exposition on Baire Category Theorem

October 14, 2008
Svitlana Zhuravytska
Ocular dominance in the visual cortex

October 21, 2008
Timur Milgrom
Some New Solutions to a Vortex

January 6, 2009
Esfandier Navayzadani
Analysis of Subdivision Schemes in Manifols

January 13, 2009
Esfandier Navayzadani
Analysis of Subdivision Schemes in Manifols(cont)

January 23, 2009
David Kimsey
Matrix Exponentials

January 30, 2009
Svitlana Zhuravytska

January 20, 2009
Christopher Novak
Subdivision Algorithm

Pi Day

The Department of Mathematics celebrates Pi Day, March 14, for the mathematical constant π. Students enjoy a day of activities and food.

Micheal Chirico, Daniel Jordon, and Jonah Smith

Student Activities

On March 12, 2009 Janice Giannini visited the Mathematics Department to present a Career Talk to the undergraduate Math majors. Janice has 25 years of corporate executive expertise from General Electric, Lockheed Martin and Arbitron. Janice is an accomplished public speaker with experience in a wide variety of business sectors and venues. She has addressed forums ranging from small groups to approximately one thousand participants. Her topics typically reflect her pragmatic outlook and style, ranging from aligning strategy with operations, to planning and motivation.

◄ Janice Giannini and Hugo Woerdeman

▲ Janice Giannini and students

◄ Janice Giannini

Social Events

On December 7, 2008 the annual Holiday reception was held at the Academic Bistro

On June 10, 2009 the annual End of Year reception was held at Slainte

Donations

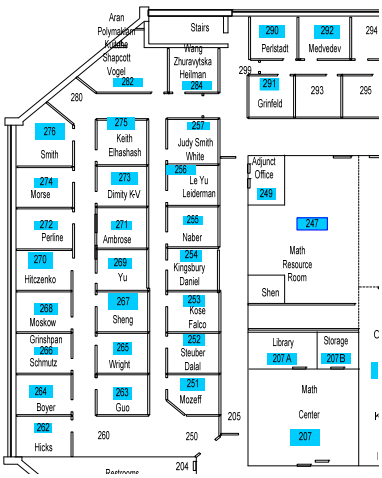
Donation of equipment to the Communities and Schools of Philadelphia.

St. Gabriel's Episcopal Church
St. Joseph Baptist Church

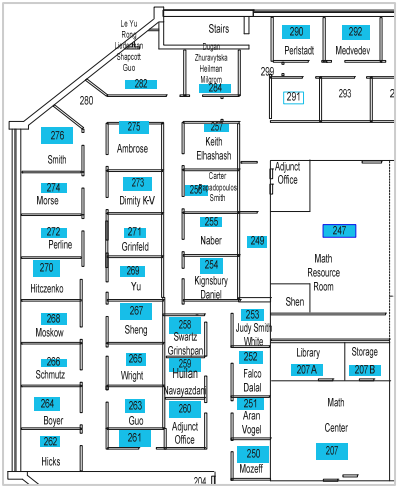
Renovations

The Department of Mathematics in conjunction with the Provost Office undertook a significant renovation project on the second floor of Korman. Three old offices (251-253) were taken down. By combining this space along with hallway space, seven new offices (250-253 and 257 -259) and a storage room were created. In addition, a part of the hallway became an appendix to the Mathematics Resource Center. Department members were able to move to their new offices during the winter term. The provost office obtained Korman 291 from the department to accommodate their new hire.

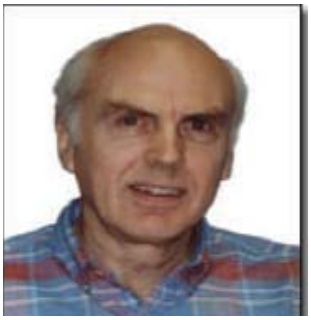
Pre-renovation map of the department



Post-renovation map of the department



In Memoriam: Dr. Herman Gollwitzer



Dr. Herman Gollwitzer, Associate Professor Emeritus of the Department of Mathematics, College of Arts and Sciences, died December 3, 2008, due to complications from a bone marrow transplant.

Dr. Gollwitzer joined Drexel University in 1969. From early on, Herman was a strong contributor to the development of the department. He was one of the first at Drexel to develop software for his classes when personal computers became a standard feature. In 1988, he received from EDUCOM/NCRIPTAL the Distinguished Software Award for the application "Phase Portraits". During his last year at Drexel, in March of 2006, Dr. Gollwitzer was one of the organizers of the Workshop on the Teaching of Linear Algebra with key note speakers Gilbert Strang (MIT) and Peter Lax (NYU). In September 2006 Dr. Gollwitzer retired from Drexel. He has had a distinguished career as a researcher, a teacher and a good citizen of the department. He will be remembered as a dedicated and challenging teacher and as an energetic mathematician.

Dr. Gollwitzer is survived by his wife, Judy Gollwitzer, their daughter Meghan and their grandchildren.