



# Department of Mathematics Annual Report



Drexel University  
College of Arts & Sciences  
2007 – 2008

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Message From the Department Head	3
Tenure-Track Faculty	4
Auxiliary Faculty	6
Adjunct Faculty	8
Emeritus Faculty	8
Staff	8
Teaching and Research Assistants	9
New Faculty Profiles	10
New Staff Profiles	11
Faculty Awards	12
Service Awards	12
Faculty Grants	13
Faculty Appointments / Conference Organizations	14
Faculty Publications	15
Faculty Presentations	17
New Courses	21
Honors Day Awards	22
Undergraduate Awards	24
Albert Herr Teaching Assistant Awards	25
Student Presentations and Papers	26
Degrees Awarded	27
MAA EPaDel Meeting	28
Fall Term Colloquium	29
Winter Term Colloquium	30
Spring Term Colloquium	31
Analysis Seminar	32
Dean's Seminar	34
Departmental Committees	36
Mathematics Resource Center	38
Freshmen Courses	40
Student Activities	41
Donations	43
Social Events	43

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## Message From the Department Head

Dear Alum and Friend,

It is a pleasure to inform you each year on the department's accomplishments. A huge change for us has been the decision to **teach all our freshmen courses in small sections** (of up to 35 students). It has been greatly rewarding to see how our students perform so much better under this new format. This new commitment required that we had to attract many new faculty members and it has been gratifying that we were able to attract excellent new members.

Another major event this past year was that **we hosted the Mathematics Association of America's local section meeting**. We had renowned speakers at this event including Gilbert Strang from MIT and Philip Holmes from Princeton. In addition, a math contest for high school students was conducted with a grand prize of a scholarship to Drexel.

This year, as in previous year, we were fortunate to have several prize winners in the department. **Dr. Robert P. Boyer received the Crawford Award** from the Mathematical Association of America for his 30+ years in dedication of teaching. He received his award based on an extraordinary level of praise Dr. Boyer has received from his students. In many ways, Dr. Boyer has contributed to the educational mission of the department, including his strong support to our graduate program, his innovative Financial Mathematics courses, his constant mentoring of our students (both undergraduate and graduate), etc. **Dr. Yixin Guo**, one of our talented young faculty members, **was awarded with the Antelo Deveraux Award for Young Faculty**. The award was based on her proposal on the mathematical modeling of deep brain stimulation, with the purpose of trying to find solutions to Parkinson's disease.

Also our students have done very well. Our graduate students **Wei Wang and Caroline Shapcott were the recipients of the AI Herr award**. Our undergraduates have been successful as well with our award winning students Heather Hoenninger, Ian Johnston, Jonah Smith, John L. Stake, recipients of the Harry E. Muchnic Award; Daniel Jordan, recipient of the Frank Williams Prize; and Andrew Jerista, winner of the Robert Bickel Award.

As a department we continue to grow rapidly. This year Associate Professor Shari Moskow and Assistant Professor J. Douglas Wright have joined our department. As you will be able to tell from this report, both **Dr. Moskow and Dr. Wright are great assets to our department** with their research and teaching accomplishments. Also our undergraduate teaching mission is greatly enhanced by the new auxiliary faculty members, Professors Avinash Dalal, Michael Daniel, Abed Elhashhash, William Keith, Taylor Kingsbury, and Richard White.

**Dr. William (Bill) Y. Goh retired this past year** after 20 years of dedicated service to Drexel University. Dr. Goh has a distinguished career as a researcher with numerous publications in his name. He was a demanding educator which was very inspiring to those students who enjoyed the challenge. Dr. Goh is currently teaching and continuing his research in his country of birth, China.

Our Mathematics Resource Center continues to grow in popularity. This year we have been able to hire a full time manager, David Shen. He has been doing a terrific job in enhancing the services of the resource center. **Overall we served Drexel's students with 5000+ student tutoring hours.**

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

Thank you and Best Wishes,



Dr. Hugo J. Woerdeman  
Professor and Department Head

## Tenured/Tenure-Track Faculty



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



**William M.Y. Goh, Ph.D.** (Ohio State University) Associate Professor. Number theory, approximation theory and special functions, combinatorics, asymptotic analysis.



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



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



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



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



**Dmitri Kalyuzhnyi-Verbovetskii, 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.



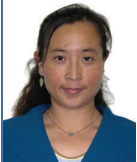
**Ronald K. Perline, Ph.D.** (University of California at Berkeley) Associate Professor. Applied mathematics, numerical analysis, symbolic computation, differential geometry, mathematical physics.



**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

## Auxiliary Faculty



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



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



**Alexander Dolgopolsky, Ph.D.** (Case Western Reserve University) Senior Lecturer. Applied mathematics.



**James W. Donnelly, M.S.** (Drexel University) Senior Lecturer. Math foundations of engineering.



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



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



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



**Patricia Henry, M.S.** (Drexel University) Associate Head of the Mathematics Department, Senior Lecturer. Probability and statistics.



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

## Auxiliary Faculty



**William Keith, Ph.D.** (Pennsylvania State University) Instructor.



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



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



**Marna A. Mozeff-Hartmann, M.S.** (Drexel University) Advisor, Instructor.



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



**Oksana P. Odintsova, Ph.D.** (Omsk State University) Senior Lecturer. Math education.



**Adam C. Rickert, M.S.** (Drexel University) Instructor.



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



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

## Auxiliary Faculty



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

## Adjunct Faculty

**Olga Alexandrova**  
**John Coppola**  
**Harold Gilman**  
**Boris Kheifets**  
**Elana Koublanova**

**Wanda Kunkle**  
**Leo Lampone**  
**David Shen**  
**Sergio Zefillipo**

## Emeritus Faculty

**Loren N. Argabright, Ph.D.** (University of Washington) Professor Emeritus. Functional analysis, wavelets, abstract harmonic analysis, the theory of group representations.

**Robert C. Busby, Ph.D.** (University of Pennsylvania) Professor Emeritus. Functional analysis, C\*-algebras and group representations, computer science.

**Ewaugh Finney Fields, Ed.D.** (Temple University) Dean Emeritus, Professor Emeritus. Mathematics education, curriculum and instruction, minority engineering education.

**Herman E. Gollwitzer, Ph.D.** (University of Minnesota) Associate Professor Emeritus. Applied mathematics, differential equations, data analysis, user interface design, visualization, scientific computing.

**Charles J. Mode, Ph.D.** (University of California at Davis) Professor Emeritus. Probability and statistics, biostatistics, epidemiology, mathematical demography, data analysis, computer-intensive methods.

**Chris Rorres, Ph.D.** (Courant Institute, New York University) Professor Emeritus. Applied mathematics, scattering theory, mathematical modeling in biological sciences, solar-collection systems.

**Jet Wimp, Ph.D.** (University of Edinburgh) Professor Emeritus. Applied mathematics, special factors, approximation theory, numerical techniques, asymptotic analysis.

## Staff



**Byron C. Greene**  
Administrative Assistant



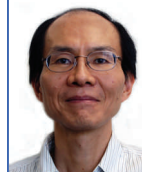
**Margaret A. Mercer**  
Budget Coordinator



**Alissa Morris-Alexander**  
Graduate Program  
Coordinator



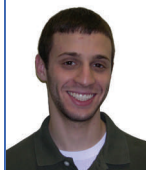
**C. Gene Phan**  
Computer Specialist



**David Shen**  
Resource Room  
Coordinator



## Teaching Assistants and Research Assistants



**Jason Aran**



**Lei Cao**

**Meredith Coletta**



**Derek Heilman**



**David Kimsey**



**Emek Kose**



**Selcuk Koyuncu**



**Dmitry Leiderman**



**Christopher Novak**



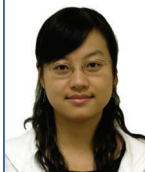
**Nattapol Ploymaklam**



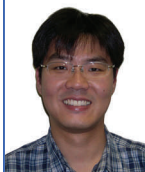
**Caroline Shapcott**



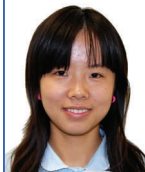
**John Vogel**



**Wei Wang**



**Yun Yoo**



**Le Yu**



**Svitlana Zhuravytska**

## New Faculty Profiles

**Avinash Dalal** earned his B.A. in Mathematics and B.S. in Computer Engineering from Drexel University in 2001. He received his M.S. in Applied Mathematics from the University of Maryland at College Park in 2003.



During his graduate career he worked as a Teaching Assistant and was researching Cryptography. After graduate school he worked at Raytheon and Sirius Satellite Radio and was teaching part time at a local community college as an adjunct. He now teaches as an auxiliary faculty member in the Mathematics Department at Drexel.

**Michael Daniel** earned his BA in Mathematics at Cornell University in 1990. He traveled extensively before continuing his studies at University of Colorado at Boulder. He earned PhD in Mathematics from that university in 2007.



Mike is a Number Theorist specializing in Modular Forms and Function Fields. He is currently teaching Calculus.

**Abed Elhashash** received his B.A. in Mathematics from the American University of Beirut, and he received his Masters and Ph.D. in Mathematics from Temple University. While doing his graduate studies at Temple University, he worked as an adjunct faculty member in various institutions and departments in the Philadelphia area including the Mathematics, Physics, and Computer Science department in the University of the Sciences and Temple University's Statistics department.



His specialty is matrix theory and his research interests include: Generalizations of Nonnegative Matrices, the Perron-Frobenius Theory Generalizations and Extensions to Cones in Hilbert and Banach Spaces, Generalizations of M-Matrices and ODE's on manifolds.

**Taylor Kingsbury** received his bachelor's degree in Mathematics from Penn State University in 2005. He then proceeded to attend graduate school at Drexel University where he worked as teaching assistant for the TDEC and Calculus course sequences.



In 2007, after earning an M.S. in Mathematics, Taylor joined the Drexel University Mathematics Department faculty as an instructor.

**William J. Keith** earned B.S. degrees in Mathematics and Physics from the University of Texas at Austin in 1999. He attended graduate school at the Pennsylvania State University, choosing to study mathematics, and earned his Ph.D. in 2007. During his time at Penn State he taught a wide range of undergraduate classes, such as pre-calculus, calculus, and linear algebra.



William joined Drexel's faculty in the Fall Quarter of 2007 as a Senior Lecturer and has been teaching calculus courses and staffing in the Math Resource Center. His research is in partition theory.

## New Faculty Profiles

**Shari Moskow** received her Ph.D in Applied Mathematics from Rutgers University in 1996. After that she held a joint postdoctoral appointment with the University of Minnesota and Schlumberger-Doll Research, an oil services company. She has since then been at the University of Florida, and has had visiting appointments at Ecole Polytechnique in France and Rice University.



Her research interests include applied PDEs and numerical analysis, in particular homogenization theory, inverse problems, and related asymptotic and numerical methods.

**Richard D. White, Jr.** received his B.S. in Mathematics Education from St. Joseph's University in 1975 and received his M.S. in Mathematics Education in 1986. Throughout the years he has worked in various high schools as a mathematics teacher, registrar, and admissions director as well as numerous colleges and universities as an adjunct professor of mathematics.



**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.



His research interests include partial differential equations, particularly the behavior of nonlinear waves in systems arising in hydrodynamics, optics and cell biology.

## New Staff Profiles

**Byron Greene** received his B.S. in Mathematics from Delaware State University in 2006. Prior to pursuing a B.S. in Mathematics Byron was an Aviation Science student earning a private pilot license.



At Delaware State University Byron served as a student manager for the Delaware State University Men's Basketball team. As a student manager, Byron was a NCAA and NIT Tournament participant. In 2005 and 2006 he served as a Mathematics teacher in the Classic Upward Bound Program.

**David Shen** earned his B.A. in Holistic Education and B.S.E. in System Science & Engineering from the University of Pennsylvania in 1980. He worked 18 years at Philadelphia University and 5 years at Temple University. He won two teaching awards at Philadelphia University.



Since 2005, he has worked at Drexel University and in the fall of 2007 became the manager of the Math Resource Center. He most enjoys instilling math confidence in students who haven't had math in 20 years or more. In 1994, he won a grant in fiction from the Pennsylvania Council on the Arts for his book China. Home.

## Faculty Awards

**Dr. Yixin Guo** was the 2008 recipient of the Antelo Deveraux award for Young Faculty.

**Yixin Guo** received her PhD in Mathematics from the University of Pittsburgh in 2003. Yixin spent three years in postdoctoral training in mathematical biology. Her research focus is computational neuroscience and dynamical systems. Her most recent and ongoing project is on modeling Parkinson's disease and Deep Brain Stimulation. She joined the Mathematics Department at Drexel University in 2006. Her papers have appeared in SIAM Journal on Applied Dynamical Systems and Journal of Neurophysiology.



Donna Murasko and Yixin Guo



Robert Boyer

**Dr. Robert Boyer** was the 2008 recipient of the Crawford Award from the Mathematical Association of America.

Robert Boyer received his PhD in Mathematics from the University of Pennsylvania in 1979. Robert is Professor of Mathematics and Graduate Advisor for the programs in mathematics at Drexel University. His research interests are in group representation theory, the mathematics of computer vision, and approximation theory. His research in representation theory has been supported multiple times by the National Science Foundation. His papers have appeared in Advances in Applied Mathematics, Journal of Operator Theory, Journal of Functional Analysis, Duke Mathematical Journal, and Applied Numerical Analysis. He's a member of Sigma Xi and the Society of Industrial and Applied Mathematics.

## Service Awards

The Drexel University Employee Service Awards Ceremony was held on Thursday, December 13, 2007 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.

- **Georgi Medvedev**
- **William Goh**
- **Marci Perlstadt**

**Five Year Award Recipient**  
**Twenty Year Award Recipient**  
**Twenty Five Year Award Recipient**

## Faculty Grants

**R. Andrew Hicks**, National Science Foundation, IIS 0413012, Micromirror Arrays for Imaging Sensors, 2004-2008, \$340,000

**Pawel Hitczenko**, National Security Agency, MSPF-08G-020, Probabilistic Properties of Permutation Tableaux and Other Combinatorial Structures, 2008-2010, \$66,506

**Georgi Medvedev**, National Science Foundation, IOB 0417624, Irregular firing patterns in dopamine neurons and related problems, 2004-2008, \$263,114

**Jennifer Morse**, Anne Schilling, Mark Shimozone, 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

**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 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, 2005-2008, \$149,982

## Faculty Appointments / Conference Organizations

### **Robert P. Boyer**

- Member, Executive Committee, Mathematics Association of America
- Organizer Regional Mathematical Association of America meeting, Drexel University, November 10, 2007

### **Alexander Dolgopolsky**

- Member of Organizing Committee, International Conference on Plasma Medicine (ICPM) –I, Corpus Christi, TX, October, 2007

### **Dmitry Kaliuzhnyi-Verbovetskyi**

- Organizer, International Symposium on Mathematical Theory of Networks and Systems, Multidimensional System Theory, Minisymposium Multivariable Operator Theory, and Applications, Blacksburg, VA, July 28 – August 1, 2008

## Faculty Appointments / Conference Organizations

### **Gregory Naber**

- Standing Committee, 10<sup>th</sup> International Conference on Geometry, Integrability and Quantization
- Editor for Journal of Dynamical Systems and Geometric Theories
- Editor for Journal of Geometry and Symmetry in Physics

### **Georgi Medvedev**

- Co-organizer, AIMS 7<sup>th</sup> International Conference on Synchronization Oscillations and Synchronization in Neuronal Networks, Arlington, TX, May 2008

### **Jennifer Morse**

- Organizer, Formal Power Series and Algebraic Combinatorics, Chile, 2008
- Co-organizer, Drexel/Penn/Swarthmore Algebraic Combinatorics/Geometry seminar

### **Shari Moskow**

- Organizer, SIAM Conference on Analysis of PDE, Mesa, Arizona, December 10-12, 2007
- Organizer, Minisymposium at SIAM Conference on Analysis of PDE, Mesa, Arizona, December 10-12, 2007
- NSF Reviewer

### **Li Sheng**

- Co-Organizer, Sixth International Workshop on Machine Learning in Biomedicine and Bioinformatics, Cincinnati, Ohio, Dec 13-17, 2007
- Reviewer for Sixth International Workshop on Machine Learning in Biomedicine and Bioinformatics
- Co-Organizer, DIMACS Workshop on Computational Methods for Predicting Outcome in Cancer, Rutgers University, Piscataway, New Jersey, May 29 – 30, 2007

### **Hugo Woerdeman**

- Organizer, International Workshop on Operator Theory and its Applications, Minisymposium "Matrix Completions, Moment Problems and Factorizations", Williamsburg, VA, July 2008
- Panel Review Member, National Research Council/National Academy of Sciences
- Editor of SIAM J. Matrix Anal. Appl., 2002-present
- Editor of International J. of Information and System Sciences

### **J. Douglas Wright**

- Co-Organizer (with G. van Baalen), SIAM Conference on Analysis of Partial Differential Equations, Minisymposium, "Long-Time Behavior in Damped Conservation Laws and Dispersive Equations", Phoenix, AZ, December 2007

## Faculty Publications

- Robert Boyer and William Goh**, Partition Polynomials: Asymptotics and Zeros, *Contemporary Math*, Volume 457, (2008), 99-112
- Abed Elhashash and Daniel B. Szyld**, Generalizations of M-matrices Which May Not Have a Nonnegative Inverse, *Linear Algebra and its Applications*, Volume 429, (2008), 2435-2450
- Abed Elhashash and Daniel B. Szyld**, On General Matrices Having the Perron-Frobenius Property, *Electronic Journal of Linear Algebra*, Volume 17, (2008), 389-413
- Pavel Grinfeld**, Applications of the Gunther Problem in Multiscale Systems, *Int. J. Mult. Comp. Eng.*, Volume 5, (2007), Issue 3-4, 249-260
- Yixin Guo, Jonathan Rubin, Cameron McIntyre, David Terman**, Thalamocortical relay fidelity varies across subthalamic nucleus deep brain stimulation protocols in a data-driven computational model, *Journal of Neurophysiology*, 99, (2008), 1477-1492
- R. Andrew Hicks**, Controlling a ray bundle with a free-form reflector, *Optics Letter* 33, (2008) 1672-1674
- Pawel Hitczenko and William Goh**, Gaps in samples of geometrically distributed random variables, *Discrete Mathematics*, 307, (2007), 2871-2890
- Pawel Hitczenko and William Goh**, Random partitions with restricted part sizes, *Random Structures and Algorithms*, 32, (2008), 440-462
- Pawel Hitczenko and Georgi Medvedev**, Bursting Oscillations Induced by Small Noise, *SIAM J. Appl. Math.*, accepted, 2008
- Dmitry S. Kaliuzhnyi-Verbovetskyi and J.A. Ball**, Conservative dilations of dissipative multidimensional systems: The commutative and non-commutative settings, *Multidimens. Syst. Signal Process*, 19, (2008), 79-122
- Georgi Medvedev**, Noise-Induced Bursting in Stochastic Models of Single Cells and Electrically Coupled Ensembles, *BMC Neuroscience*, 9(Suppl 1): 05., 2008
- Georgi Medvedev and Y. Yoo**, Chaos at the border of criticality, *Chaos*, 18, 033105, (2008)
- Jennifer Morse and Luc Lapointe**, Quantum cohomology and the k-Schur basis, *Trans. Amer. Math. Society*, 360, (2008), 2021-2040
- Jennifer Morse and Luc Lapointe**, A k-tableau characterization of k-Schur functions, *Advances in Math*, 213/1, (2007), 183-204
- J. Gopaladrishnan, Shari Moskow, F. Santosa**, Asymptotic and Numerical Techniques for Resonances of Thin Photonic Structures, *SIAM J. Appl. Math.*, Volume 69, Issue 1, (2008), 37-63
- S.Y. Bhat and Shari Moskow**, Linearization of a Nonlinear Boundary Condition Related to Corrosion Modeling, *Journal of Computational Mathematics*, Vol. 25, No. 6, (2007), 645-660

## Faculty Publications

**Shari Moskow**, A generalized eigenproblem for the Laplacian which arises in lighting, *Journal of Mathematical Analysis and Applications*, Volume 314, Issue 2, (2008), 1028-1041

**Eric Schmutz**, Rational points on the unit sphere, *Central European Journal of Mathematics*, 6(3), (2008), 482-487

**Eric Schmutz**, Splitting Fields for Characteristic Polynomials of Matrices with Entries in a Finite Field, *Finite Fields and Their Applications*, 14, 2008, 482-487.

**Eric Schmutz**, The Expected Order of a Random Unitary Matrix, *Journal of Group Theory*, 11, (2008), 495-510.

**Eric Schmutz**, Symmetric range assignment with disjoint MST constraints, *DIAL M-POMC '08: Proceedings of the fifth international workshop on Foundations of mobile computing*, Toronto, Canada, 2008.

**Jennie Hansen, Eric Schmutz, Li Sheng**, Covering random points in a unit disk, *Advances in Applied Probability*, 40 (1), (2008), 22-30.

**E.W. Freeman, C.R. Gracia, G.W. Pien, D.B. Nelson, M.D. Sammel, Li Sheng**, Symptoms Associated with Menopausal Transition and Reproductive Hormones in Midlife Women, *Obstetrics and Gynecology*, 110(2), 2007, 230-240

**M. Hou, W. Miller, C.T. Nguyen, J. Shen, Li Sheng, Louxin Zhang**, Approximating the Spanning Star Forest Problem and Its Applications to Genomic Sequence Alignment, *SIAM J Comput.*, 38, (2008), 946-962.

**J. C. Hansen, Eric Schmutz, Li Sheng**, Covering Random Points in a Unit Disk, *Advances in Applied Probability*, Volume 40, Number 1, (2008), 22-30.

**Yvan Hachez and Hugo J. Woerdeman**, The Fischer-Frobenius transformation and outer factorization, In: "Operator theory, Structured Matrices and Dilation" (Eds: M. Bakonyi, A. Gheondea, M. Putinar and J. Rovnyak, *Theta Series in Advanced Mathematics*, Bucharest, (2007), 181-203.

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

**Jeffery S. Geronimo and Hugo J. Woerdeman**, Two variable orthogonal polynomials on the Bi-Circle and Structured matrices, *SIAM J Matrix Analysis*, 29, (2007), 796-825.

**Arnd Scheel and J. Douglas Wright**, Colliding dissipative pulses - The shooting manifold, *Journal of Differential Equations*, Volume 245, Issue 1, (2008), 59-79.

**Gang Xie and Thomas Yu**, Smoothness Equivalence Properties of Manifold – Valued Data Schemes based on the Projection Approach, *SIAM Journal on Numerical Analysis*, Volume 45, No. 3, (2007), 1200-1225.



## Faculty Presentations

**Robert P. Boyer**, *Partition Polynomials: Asymptotics and Zeros*, invited, Combinatorics/Number Theory Seminar, Pennsylvania State University, September 2007

**Robert P. Boyer**, *Partition Polynomials: Asymptotics and Zeros*, invited, Number Theory/Combinatorics/Modular Forms Seminar, Temple University, October 2007

**Robert P. Boyer**, *Asymptotics and Zeros for Appell Polynomials*, invited, Number Theory Seminar, Bryn Mawr College, July 2008

**Michael Daniel**, *Eisenstein Series in Rational Function Fields I*, invited, Seminar on Number Theory and Modular Forms, Temple University, Philadelphia, PA, November 2007

**Michael Daniel**, *Eisenstein Series in Rational Function Fields II*, invited, Seminar on Number Theory and Modular Forms, Temple University, Philadelphia, PA, January 2008

**Michael Daniel**, *Eisenstein Series in Rational Function Fields III*, invited, Seminar on Number Theory and Modular Forms, Temple University, Philadelphia, PA, February 2008

**Michael Daniel**, *Eisenstein Series with Polynomial Level in a Function Field of a Finite Field*, invited, Bryn Mawr Summer Seminar, Bryn Mawr College, Bryn Mawr, PA, July 2008

**Yixin Guo**, *Modeling Parkinson's Disease and Brain Stimulations*, invited, Seminar Talk held at HRL Laboratory, Malibu, CA, September 2008

**Yixin Guo**, *Multi-site Local Field Potential stimulation to Restore Thalamocortical Relay Fidelity*, Seminar, invited, Mathematical Neuroscience Seminar, Indiana University Purdue University Indianapolis, Indianapolis, IN, September 2008

**Yixin Guo**, *Differential Equations and Applications*, Conference, invited, AIMS International Conference on Dynamical Systems, Arlington, TX, May 2008

**Yixin Guo**, *Desynchronization of Subthalamic Bursting Clusters and the Application in Parkinson's Disease*, Conference, invited, International Conference on Cognitive Neurodynamics, Shanghai, P.R. China, November 2007

**Yixin Guo**, *Modeling Parkinson's Disease and Brain Stimulations*, invited, College of Arts and Science Dean's Seminar, Drexel University, Philadelphia, PA, October 2007

**Robert A. Hicks**, *Exterior Differential Systems for Optical Design*, Conference, invited, Lehigh University Geometry and Topology Conference, Bethlehem, PA, October 2007

**Pawel Hitczenko**, *Statistics on Permutation Tableaux*, Session, invited, Special Session on Algorithmic Probability and Combinatorics, Chicago, IL, October 2007

**Pawel Hitczenko**, *Random Partitions with Parts in the Range of Polynomial*, Seminar, invited, Probability Seminar, Technical University of Warsaw, Warsaw, Poland, January 2008

## Faculty Presentations

**Pawel Hitczenko**, *Statistics on Permutation Tableaux*, Seminar, invited, Combinatorial Optimization and Distributed Algorithms Seminar, LIPN, Université Paris-Nord, Paris, France, February 2008

**Pawel Hitczenko**, *Random Partitions with Parts in the Range of Polynomial*, Seminar, invited, Computation Discrete and Applicalbe Mathematics Seminar, London School of Economics, London, United Kingdom, February 2008

**Pawel Hitczenko**, *Computing Walsh-Hadnard Transform*, Seminar, invited, Probability Seminar, Warsaw University, Warsaw, Poland, March 2008

**Pawel Hitczenko**, *Partitions with Restricted Part Sizes*, Oberseminar Stochastik, invited, Unvesitaet Hannover, Hannover, Germany, April 2008

**Pawel Hitczenko**, *Applications of Martingales*, Seminar, invited, Combinatorial Optimization and Distributed Algorithms Seminar, LIPN, Université Paris-Nord, Paris, France, May 2008

**Pawel Hitczenko**, *Tails of Perpetuities*, Conference, invited, X Conference on Probability, Bedlewo, Poland, May 2008

**Pawel Hitczenko**, *Statistics on Permutation*, Conference, invited, V Conference on High Dimensional Probability, Luminy, France, May 25 – June 1, 2008

**Dmitry Kaliuzhnyi-Verbovetskyi**, *Singularities of Rational Functions and Minimal Factorizations: The Noncommutative and the Commutative Setting*, Symposium, invited, International Symposium Mathematical Theory of Networks and Systems, Blacksburg, VA, July 28 – August 1, 2008

**Georgi Medvedev**, *Noise-induced Bursting in Electrically Coupled Ensembles of Neural Oscillators*, Workshop on Complex Dynamics in Large Coupled Systems, Weierstrass Inst. For Applied Analysis, Berlin, Germany, November 2008

**Georgi Medvedev**, *Noise-induced Bursting in Stochastic Models of Single Cells and Electrically Coupled Ensembles*, 17<sup>th</sup> Annual Comutational Neuroscience Meeting, CNS, Portland, OR, July 19 - 24, 2008

**Georgi Medvedev**, *Noise-induced Bursting*, American Institute of Mathematics' Seventh International Conference on Dyn. Systems, Arlington, TX, May 2008

**Georgi Medvedev**, *Multimodal Oscillations: from Dopamine Neurons to Solid Fuel Combustion*, Physics Colloquium, Drexel University, Philadelphia, PA, May 2008

**Georgi Medvedev**, *Using One-Dimensional Maps for Analyzing Neuronal Dynamics*, Dynamical Systems Colloquium, Georgia Tech, Atlanta, GA, October 2007

**Georgi Medvedev**, *Noise-Induced Bursting*, *Conference on Mathematical Neuroscience*, Centre de Recherche Mathématique, Université de Montreal, Montreal, Quebec, September 2007

## Faculty Presentations

**Jennifer Morse**, *Algebraic Combinatorial Geometry*, Conference, invited, AMS Spring Eastern Meeting, Courant Institute, New York, NY, March 2008

**Jennifer Morse**, *Applications of Macdonald Polynomials*, invited, Banff International Research Station, September 2007

**Shari Moskow**, *An Approximation Method for Scattering and Resonances of Thin Photonic Structures*, Applied Inverse Problems Conference, Vancouver, BC, June 2007

**Shari Moskow**, *An Approximation Method for Scattering and Resonances of Thin Photonic Structures*, Society of Engineering Science Conference, College Station, TX, October 2007

**Shari Moskow**, *An Approximation Method for Scattering and Resonances of Thin Photonic Structures*, Analysis Seminar, invited, Temple University, Philadelphia, PA, December 2007

**Shari Moskow**, *Approximation Method for Scattering and Resonances of Thin Photonic Structures*, Conference, invited, SIAM PDE Conference, Mesa, AZ, December 2007

**Shari Moskow**, *Spectrally Matched Grids for Anisotropic Problems*, Conference, invited, SIAM PDE Conference, Mesa, AZ, December 2007

**Shari Moskow**, *Convergence and Stability of the Inverse Born Series for Diffuse Waves*, Conference, invited, SIAM SEAS Conference, Orlando, FL, March 2008

**Shari Moskow**, *An Approximation Method for Scattering and Resonances of Thin Photonic Structures*, Analysis Seminar, invited, University of Maryland, College Park, MD, March 2008

**Shari Moskow**, *Convergence and Stability of the Inverse Born Series for Diffuse Waves*, Colloquium, invited, University of Maryland Baltimore County, Baltimore, MD, April 2008

**Shari Moskow**, *Spectrally Matched Grids for Anisotropic Problems*, Seminar, invited, Schlumberger-Tufts Joint Seminar, Boston, MA, May 2008

**Eric Schmutz**, *Central Limit theorems in Combinatorics*, Probability Seminar, University of Delaware, Newark, DE, September 2007

**Hugo Woerdeman**, *Estimates of Inverses of Multivariable Toeplitz Matrices*, Minisymposium, invited, International Workshop on Operator Theory and Its Applications, Williamsburg, VA, July 2008

**Hugo Woerdeman**, *Classes of Tuples of Commuting Contractions Satisfying the Multivariable Von Neumann Inequality*, Minisymposium, invited, International Workshop on Operator Theory and Its Applications, Williamsburg, VA, July 2008

**J. Douglas Wright**, *Gravity Induced Dispersion for Nearly flat Vortex Sheets*, Applied Mathematics Seminar, University of Delaware, Newark, DE, September 2007

## Faculty Presentations

**J. Douglas Wright**, *Gravity Induced Dispersion for Nearly flat Vortex Sheets*, SIAM Conference on Analysis of Partial Differential Equations, Phoenix, AZ, December 2007

**J. Douglas Wright**, *Gravity Induced Dispersion for Nearly flat Vortex Sheets*, AMS Spring Eastern Sectional Meeting, Courant Institute, New York, NY, March 2008

**J. Douglas Wright**, *Gravity Induced Dispersion for Nearly flat Vortex Sheets*, NSF/CBMS Regional Conference, Howard University, Washington, D.C., May 2008

**J. Douglas Wright**, *Gravity Induced Dispersion for Nearly flat Vortex Sheets*, SIAM Conference on Nonlinear Waves and Coherent Structures, Rome, Italy, July 2008

**J. Douglas Wright**, *Shooting and Exit Manifolds of Pulse Interactions in One Dimensional Reaction-Diffusion Equations*, Dynamical Systems Seminar, Boston University, April 2008

**J. Douglas Wright**, *The Shooting Manifold for Reaction-Diffusion Equations in  $d$ -Dimensional Space*, SIAM Conference on Nonlinear Waves and Coherent Structures, Rome, Italy, July 2008

**Thomas Yu**, *Smooth and Accurate Approximation of Manifold-Valued Data*, Workshop on Subdivision and Refinability, Pontignano, Siena, Italy, May 1-4, 2008

**Thomas Yu**, *Subdivision Vector Field*, Seventh International Conference on mathematical Methods for Curves and Surfaces, Tønsberg, Norway, June 26- July 1, 2008

## New Courses

### Winter 2007

#### MATH 680 – Topics in Matrix Analysis

Instructor: Hugo J. Woerdeman

This course is a follow up on Math 504: Linear Algebra and Analysis. Central to this course are the following ten theorems, which will be treated along with their background, consequences and applications: Toeplitz-Hausdorff Theorem, Ando's characterization of the numerical radius unit ball, Lyapunov's Theorem, Fischer's Inequality for M-matrices, Birkhoff's Theorem, A. Horn's Matrix Product Theorem, A. Horn's Sufficiency Theorem, Solvability Theorem for  $AX+XB=C$ , Schur Product Theorem, Lie Product Formula

#### MATH 680 – Bifurcations and Chaos

Instructor: Georgi Medvedev

The language and techniques from the dynamical systems theory are used in the fields as diverse as physics, economics, and biology. The goal of this course is to present several important topics from this theory in a setting that is as simple as possible. Specifically, we shall study the basic theory for the dynamics of iterated one-dimensional maps. The topics include structural stability, bifurcations, symbolic dynamics, and chaos. The only prerequisite for this course is a solid background in calculus.

#### MATH 640 – Functional Analysis I

Instructor: Dmitry Kaliuzhnyi-Verbovetskyi

Graduate students who took a walk around the three-dimensional space of Multivariate Calculus and then traveled to higher-dimensional spaces of Linear Algebra are invited to undertake a new journey: to infinite-dimensional spaces of Functional Analysis. In the winter term I will guide you through Hilbert spaces.

### Spring 2008

#### MATH 645 – Transform Theory I

Instructor: Thomas Yu

What do modern digital image compression, X-Ray tomography, and the analytic solution of heat equation have in common? They are all based on special linear transformations applied to the underlying objects of interest. This course will focus on the mathematical foundation of these transforms, and will discuss some of the applications of the theory.

#### MATH 641 – Functional Analysis II (=Fourier Analysis)

Instructor: Dmitry Kaliuzhnyi-Verbovetskyi

Fourier (or harmonic) analysis is a discipline which lies in the intersection of classical and functional analysis and has many applications to differential equations, operator theory, probability and statistics, number theory, and many other areas of mathematics, physics, and engineering.

## 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. Bikel Award* – **Andrew Jerista**

*Harry Muchnic Award* – **Heather Hoenninger, Ian Johnston, Jonah Smith, John L. Stake**

*Frank Williams Prize* – **Daniel Jordan**

**Andrew Jerista** enrolled at Drexel in September 2005 as a Physics major, but later that year decided to pursue a degree in Mathematics instead. He had one co-op experience at Select Greater Philadelphia as an economic development research assistant, where he worked with the Research department in compiling information for companies located in the Greater Philadelphia area. With three terms of classes left, he hopes to pursue a minor in finance and upon graduation in June 2009 plans on attending graduate school to study Financial Mathematics. Andrew received the Robert J. Bickel award for his outstanding academic performance.



**Heather Hoenninger** started at Drexel in September 2004. She always knew that she was going to study mathematics in college. She is graduating in June 2008 with a BS in Mathematics with a minor in Finance. She had her only co-op experience at SEI, in Oaks, on the Investment and Case Analysis Team. She will be returning to SEI at the end of July with a full-time position on the Global Strategy Team. Heather received the Harry E. Muchnic Scholarship for outstanding academic performance, leadership and industry performance.

**Ian Johnston** came to Drexel in September 2005 wanting to explore careers in applied mathematics through the university's co-op program. From 2006 to 2008, he served as a research assistant three times studying topics such as oceanography and computer vision. Ian is expected to graduate with a bachelor's degree in Mathematics, and a minor in Japanese in the summer of 2010. He received the Harry E. Muchnic scholarship as well as First Honors for his extraordinary academic performance.



**Jonah Smith** started at Drexel in September, 2006. After debating whether to major in music, philosophy, or mathematics, he decided to pursue mathematics which he had concentrated on at community college. He enrolled as a non-co-op student desiring only to learn more about mathematics, one of his many interests. After Jonah graduates (in June 2008) he will be attending Drexel for graduate study in mathematics. Jonah was awarded the Harry E. Muchnic Scholarship for his outstanding academic performance.

## Honors Day Awards

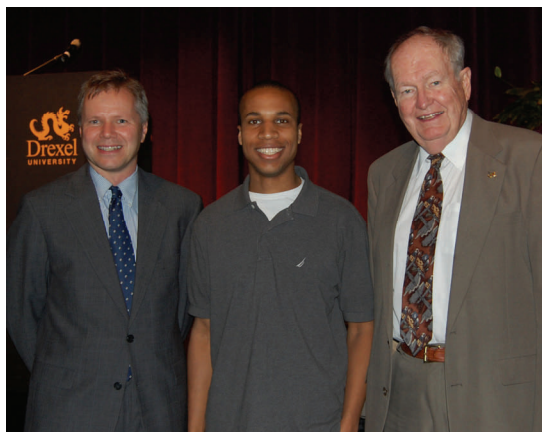
**John. L Stake** started attending Drexel in September 2005. He always knew he would study mathematics and eventually work in a math intensive career, but he wasn't sure what type of job would be the right one for him. He decided to attend Drexel because of their co-op program. Mr. Stake spent his first co-op working at Susquehanna International Group as an assistant trader in the energy department. He designed, built, and managed Excel trading books for trade entry and position monitoring and was responsible for reconciling ten multimillion dollar accounts. Mr. Stake's current co-op is at Penn Mutual Life Insurance Company, working as an assistant actuarial analyst. Mr. Stake says he could see himself starting a career in either of these two distinct fields and is excited to try a third and final co-op in spring 2009. He knows that his co-op experiences at Drexel will allow him to make an educated choice and one that he will be able to enjoy when finally selecting his future career.



Marna Mozeff, Pat Henry, Lorraine Stake, John Stake

Mr. Stake passed the first actuary exam in February 2007 and has taken the second actuary exam last week. He is a member of the Pennoni Honors College and despite Drexel's plus and minus grading system has a current 3.95 GPA. He is currently considering a double major in Mathematics and Finance.

At this year's College of Arts and Sciences, Honors Day, Mr. Stake received the Harry E. Muchnic Scholarship for his outstanding performance in Mathematics. Mr. Stake is honored to have been an award recipient each of his three years at Drexel, first in 2006, as a first-year student achieving a 4.0 GPA and in 2007 receiving The Dr. Richard and Professor Dorothy Sasin Endowed Scholarship Fund for Students of Math and Chemistry.



Hugo Woerdeman, Daniel Jordon, Don Williams

**Daniel Jordon** enrolled at Drexel in the Fall of 2003 as an Architectural Engineer but later changed his major to Mathematics. He completed one co-op at the Philadelphia Streets Department and two co-ops at Susquehanna International Group as a trading assistant, where he worked on the fixed income trading desk developing tools for trade analysis and reporting. He will be going back to Drexel in Fall of 2009 to pursue a Ph.D in Mathematics. Daniel received the Frank H. M. Williams Award in recognition of his outstanding academic achievement in mathematics. Frank William's son, Don Williams presented the award to Daniel.

## Undergraduate Awards

### First-Year Students Achieving 4.0 GPA

- Justin Mangiaracina

### Senior First Honors

- Ian Johnston

### Senior Second Honors

- Nathaniel Beers





## 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.



**Wei Wang and Caroline Shapcott** recipients of the 2008 Albert Herr Teaching Assistant Award.

**Caroline Shapcott** graduated from Shippensburg University in 2003 with a B.S in Mathematics. Before entering graduate school, Caroline spent several years teaching secondary math courses and writing curriculum for an online school in Philadelphia. Her experience there ignited an enthusiasm for both math and education which led her to Drexel's Applied Math PhD program in 2006. In addition to earning a Dean's Fellowship, Caroline serves as a teaching assistant for the Math Department and was selected for the 2008 Al Herr Teaching Assistant Award.



Robert Boyer and Caroline Shapcott

**Wei Wang** graduated from Wuhan University, China in 2006 with a BS degree in Mathematics and a Minor in Finance. She joined the Math Department in 2006 and graduated in June 2008 with a Master's degree. During her stay at Drexel, she worked as a Teaching Assistant and received the Albert Herr Award in 2008. Currently, she is working at Kepler Asset Management Inc. as a Portfolio Administrator Assistant and Research Analyst.



Robert Boyer and Wei Wang

## Student Presentations and Papers

**Daniel Jordon and Daniel Szymkowiak**, undergraduate students, presented "A Mathematical Model of Gliomas Brain Tumors Using Dendritic Treatments for Cytotoxic T Lymphocytes Stimulation" at the Mathematical Association of America EPaDel (Eastern Pennsylvania and Delaware Section) Conference, Drexel University, November 2007. The project was performed under the guidance of Dr. Yixin Guo.

**Emek Kose Can**, graduate student, presented "Double Mirror Catadioptric Sensors Which Are Rectifying," at the Mathematical Association of America EPaDel (Eastern Pennsylvania and Delaware Section) Conference, Drexel University, November 2007.

**Emek Kose Can**, graduate student, presented "A Method For Catadioptric Sensor Design". at the Annual Meeting of the Society for Industrial and Applied Mathematics (SIAM), San Diego, July, 2008. The paper was joint work with joint work with Dr. Ronald Perline.

**David Kimsey**, graduate student, presented "Minimal normal and commuting completions" at the International Workshop on Operator Theory and its Applications (IWOTA), Williamsburg, VA, July 2008. The paper was joint work with Hugo J. Woerdeman.

**Selcuk Koyuncu**, graduate student, presented "A Toeplitz Solver for the Multivariable Case" at the Eighteenth International symposium on Mathematical Theory of Networks and Systems (MTNS2008), Blacksburg, VA, July 2008. The paper was joint work with Lei Cao and Hugo J. Woerdeman

**Svitlana Zhuravytska**, graduate student, participated in the 2008 Summer Graduate Program at the Mathematical Biosciences Institute in Columbus Ohio, July 2008. With fellow participants Einat Bergman, Sam Hsiao, Robert McDougal, she worked under the guidance of Dr. Andrew Oster, on the project "Development of the primary visual cortex: ocular dominance, competition for neurotrophins, and the cortical laminae"

## Bachelor of Science Degrees Awarded

### Mathematics Majors

Jonathan Hopkins  
Rebekah Isaak  
Stephen Burghart – *Magna cum Laude*  
Jeffrey Hayes  
Ashley Horton  
Adam Prince  
Kyle Binder  
Benjamin Burton – *Magna cum Laude*  
Brain Chmielews  
Steven Guyardi  
Heather Hoenninger  
Daniel Jordon  
Joshua Karstendick  
Sarah Linn  
Vincent Liong  
Jacy Moreno – *Magna cum Laude*  
Megan O'Donnell  
Jonah Smith – *Summa cum Laude*  
Thomas Wise – *Cum Laude*

### Mathematics Minors

Boris Block  
Thomas Long  
David Turner  
Jason Puckey  
Bryan Pyles  
Philip Aidoo  
Oguzhan Ayakta  
Joesph Babiasz  
Olivia Biban  
Kai Chan  
Derek Ciocca  
Kathleen Ericson  
Nathan Fried  
Paul Fryzel  
Vitaliy Koval  
Michael Kozak  
John O'Meara  
Jeffrey Patti  
Elena Price  
Jeremy Rosenburg  
Matthew Stocum  
Elizabeth Thomas  
Marcin Trela  
David Turner  
Pamela Villagra

## Masters of Science Degrees Awarded

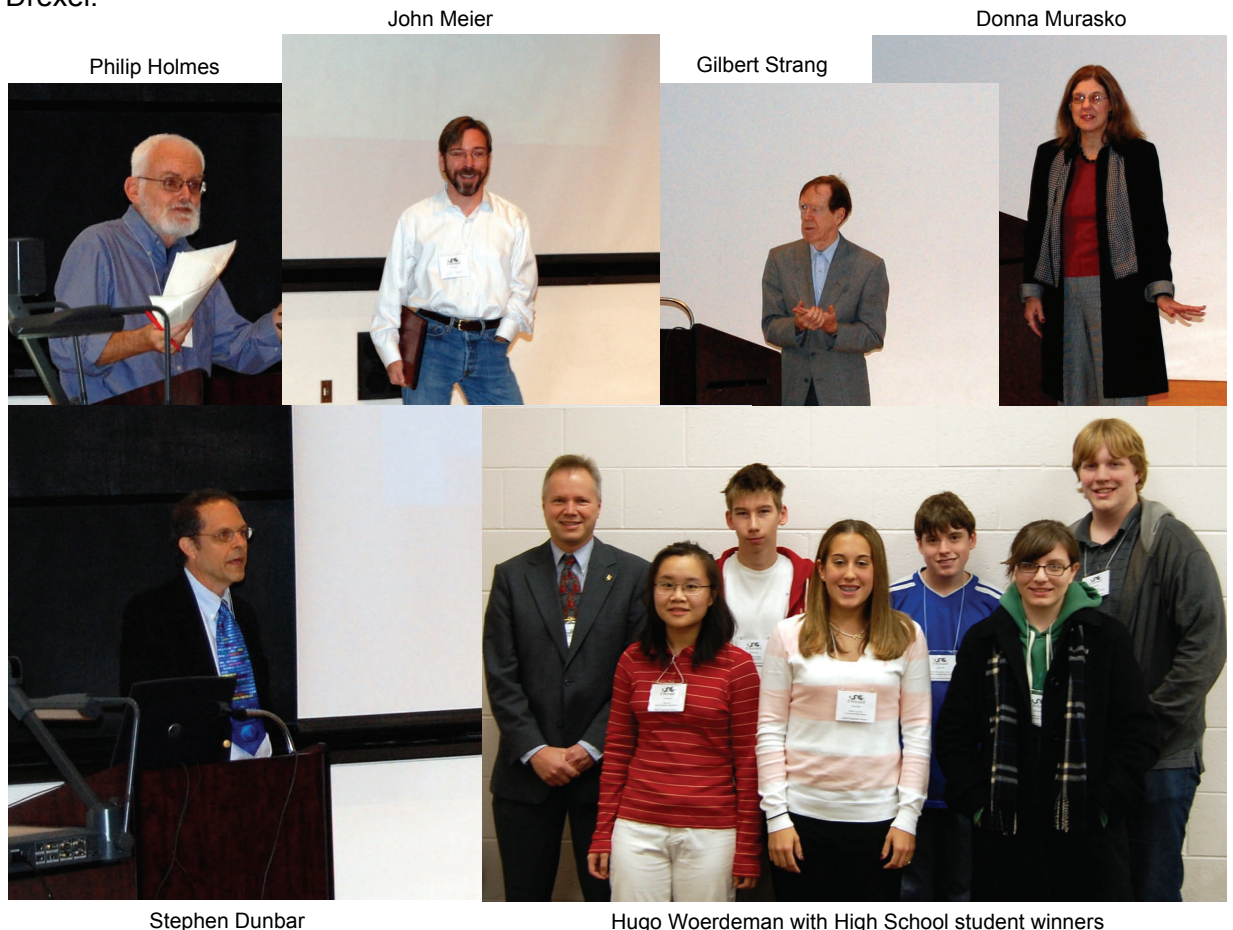
Salvador Rodriguez-Martin  
Mianyu Wang  
Jason Aran  
Kyle Binder  
Henry Chen  
Gabriel Feinberg  
Christopher Novak  
Nattapol Ploymaklam  
John Vogel  
Wei Wang

## MAA EPaDel Meeting

The department was the host of the fall meeting of the Eastern Pennsylvania and Delaware Section (EPaDel) of the Mathematical Association of America on Saturday, November 10, 2007. This biannual meeting attracted nearly 160 mathematicians including more than 85 students. The conference used the facilities of the Bossone Research Enterprise Center on Market Street.

Dean Donna Murasko and John Meier (EPaDel President) opened the conference with their welcoming remarks. The keynote speakers were Professor Stephen Dunbar, University of Nebraska, who spoke on "The American Mathematics Contests;" Professor Gilbert Strang, MIT, who gave the talk: "Everyone Can Teach Applications"; and, in the afternoon session, Professor Philip Holmes of Princeton University, who gave the lecture: "What Do Poems and Differential Equations Share? Some Thoughts on Metaphors and Models," which included some of his own poetry.

There were parallel sessions for both undergraduate and graduate student paper presentations as well as a panel discussion on choosing a graduate program in mathematics. The panel included Professors Charles Weibel (Rutgers), Rhonda Hughes (Bryn Mawr), Jennifer Morse (Drexel), and Murli Gupta (George Washington). In addition, we conducted a math contest for high school students. The students Mark Welser (Winslow Township High School) and John Hanna (Raleigh Charter High School) claimed the top prize, a scholarship to Drexel.



## Fall Term Colloquium

September 27, 2007

**Roger Horn**

University of Utah

“Matrix Analysis and Google’s PageRank”

October 4, 2007

**Grigori Olshanski**

University of Pennsylvania

“Representation Theory and Random Point Processes”

October 9, 2007

**Bernardo Galvao-Sousa**

Carnegie-Mellon University

“Phase Transitions in Thin Films”

October 18, 2007

**David Ambrose**

Clemson University

“Free Surface Problems in Fluid Dynamics”

October 25, 2007

**Jennifer Morse**

Drexel University

“Matrix Distance Problems”

November 15, 2007

**Herbert Wilf**

University of Pennsylvania

“The Lore of Coupon Collecting”

November 29, 2007

**John Schotland**

University of Pennsylvania

“Optical Tomography”

December 6, 2007

DISTINGUISHED VISITOR LECTURE

**Yakov Sinai**

Princeton University

“The Littlewood Conjecture and Ergodic Theory”



Yakov Sinai and Hugo Woerdeman

## Winter Term Colloquium

January 17, 2008

**Michael Daniel**

Drexel University

“Eisenstein Series in a rational Function Field”

January 24, 2008

**Alexander Volberg**

Michigan State University

“Analytic Capacity and Geometric Measure Theory”

January 31, 2008

**Victor Vinnikov**

Ben-Gurion University

“Von Neumann Inequality and its Generalizations”

February 7, 2008

**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 11, 2008

**Robert Boyer**

Drexel University

“Asymptotics for Appell Polynomials”

February 21, 2008

**William Keith**

Drexel University

“Signed Partitions: New Theorems for Old”

February 28, 2008

**Bud Mishra**

Courant Institute

“Algebra, Automata, Algorithms, Biology and Beyond”

## Spring Term Colloquium

May 29, 2008

**Abdul Rahman Elhashash**

Drexel University

“Perron-Frobenius Properties of General Matrices”

April 3, 2008

**Gitta Kutyniok**

Stanford University

“The Geometric Separation Problem”

April 10, 2008

**Victor Moll**

Tulane University

“Matching Images Beyond Correspondence”

April 24, 2008

**Issa Zakeri**

Drexel University

“My Adventures in Wonderland”

May 1, 2008

**Horatio Rotstein**

New Jersey Institute of Technology

“Dynamic Aspects of Medial Entorhinal Cortex Stellate Cell Activity”

May 22, 2008

**David Pettey**

Susquehanna International Group

“The Role of Risk in Understanding Capital Markets”

June 5, 2008

**Boris Kheifets**

(Drexel University)

“Two Techniques for Solving Recurrences Arising in compositions of Integers”

## Analysis Seminar

October 15, 2007

**Abed Elhashash**

“Characterizations and Properties of General  
Matrices Enjoying the Perron-Frobenius Property”

October 22, 2007

**Anatolii Grinshpan**

“Imbedding of Hermitian and normal matrices (after Fan and Pall)”

October 29, 2007

**Hugo Woerdeman**

“Schur complements”

November 5, 2007

**Hugo Woerdeman**

“Schur complements (continued)”

November 12, 2007

**Hugo Woerdeman**

“Christoffel-Darboux formula”

November 26, 2007

**Hugo Woerdeman**

“Gohberg-Semencul via Christoffel-Darboux”

December 3, 2007

**Anatolii Grinshpan**

“Some matrix inequalities (after Bhatia)”

January 7, 2008

**Dmitry Kaliuzhnyi-Verbovetsky**

“The operator-valued Schur class”

January 14, 2008

**Dmitry Kaliuzhnyi-Verbovetsky**

“The operator-valued Schur class (continued)”

January 28, 2008

**Dmitry Kaliuzhnyi-Verbovetsky**

“The operator-valued Schur class (continued)”

February 4, 2008

**Anatolii Grinshpan**

“The von Neumann Inequality in one and several variables”

February 11, 2008

**Hugo Woerdeman**

“The Hamburger moment problem”



## Analysis Seminar

February 18, 2008

**Tom Bella**

“Quasiseparable matrices and polynomials. Fast and accurate algorithms.”

February 25, 2008

**Robert Boyer**

“Asymptotics for Appell polynomials”

March 3, 2008

**Robert Boyer**

“Asymptotics for Appell polynomials”

March 10, 2008

**Hugo Woerdeman**

“Representation of block Hankel matrices”

April 8, 2008

**Abed Elhashash**

“A survey of matrix functions preserving non-negative and related matrices”

April 15, 2008

**Thomas Yu**

“Uncertainty Principles and Sparse Representation”

April 22, 2008

**Ron Perline**

“Differential equations and the symmetric eigenvalue problem”

April 29, 2008

**Ron Perline**

“Differential equations and the symmetric eigenvalue problem (continued)”

May 6, 2008

**Selcuk Koyuncu**

“Inverse of multilevel Toeplitz matrices”

May 13, 2008

**Selcuk Koyuncu**

“Inverse of multilevel Toeplitz matrices (continued)”

May 20, 2008

**Greg Naber**

“Lomonosov’s invariant subspace theorem”

May 27, 2008

**Lei Cao**

“The saturation conjecture”

## Analysis Seminar

June 2, 2008

**Lei Cao**

“The saturation conjecture (continued)”

June 12, 2008

**Le Yu**

“Gershgorin disks and the field of values”

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Applied Dynamical Systems Seminar

In the winter and spring terms there was also an Applied Dynamical Systems Seminar with participants Yixin Guo, Georgi Medvedev, J. Douglas Wright and Svitlana Zhuravyska.

## Dean's Seminar

College of Arts and Sciences  
Dean's Seminar Series

**NONLINEAR WAVES:**  
*Where do they come from? What do they do?*

Not all systems react to input in a linear way. It is not always the case that if you put twice (or thrice) as much into a system, you get twice (or thrice) as much out. It might be that if you put twice (or thrice) as much in, you get four times (nine times) as much out. Or the relationship between in and out might be yet more complicated. It turns out that this sort of "non-linearity" is extremely important when investigating the propagation of signals and waves in many different physical settings, be they on the surface of the ocean or in an axon in your nervous system. Dr. Wright will discuss the crucial role non-linearity plays in the generation and behavior of these types of waves and the many examples of where these waves are useful (fiber optic communications), catastrophic (tsunamis), or just plain strange.

**Dr. J. Douglas Wright**  
Assistant Professor of Mathematics  
Drexel University

Wednesday, April 9, 2008  
3:30 p.m. to 5:00 p.m.  
Disque Hall  
Room 109

This event is free and open to students, faculty and staff.  
Refreshments will be served.

For more information, contact Amy Weaver, Communications Specialist, at [amw55@drexel.edu](mailto:amw55@drexel.edu)

**J. Douglas Wright**

April 9, 2008

“Nonlinear Waves”

Abstract: Not all systems react to input in a linear way. It is not always the case that if you put twice (or thrice) as much into a system, you get twice (or thrice) as much out. The relationship between in and out might be yet more complicated. It turns out that this sort of "non-linearity" is extremely important when investigating the propagation of signals and waves in many different physical settings, be they on the surface of the ocean or in an axon in your nervous system.

Dr. Wright will discuss the crucial role non-linearity plays in the generation and behavior of these types of waves.

## Dean's Seminar

**Thomas Yu**  
January 16, 2008

“Multiscale Data Representation”

Abstract: The current "data deluge" inundating science and technology is remarkable not only for the overwhelming volumes of data, but also for the rapid proliferation in new data types. In any case, multi-scale data representation has been an indispensable tool for efficient manipulation of such data, leading to state-of-the-art methods for compression, transmission, noise removal, classification, etc. of data.

The poster features a grid background with the title "MULTISCALE DATA REPRESENTATIONS" in large blue letters. Below the title is a 3D visualization of four overlapping, semi-transparent planes with different patterns and colors (green, yellow, orange, blue). The speaker's name "Dr. Thomas Yu" and affiliation "Department of Mathematics" are on the right. Logos for Drexel University and the College of Arts and Sciences are at the top. The date and time "Wednesday, January 16, 2008 3:30 p.m. to 5:00 p.m." are at the bottom left. Contact information for Christina O'Neill is at the bottom.

The poster has a dark background with a red brain scan image. Text includes "THE COLLEGE OF ARTS AND SCIENCES DEAN'S SEMINAR SERIES" at the top, "MODELING PARKINSON'S DISEASE AND DEEP BRAIN STIMULATION" in large white letters, and "YIXIN GUO MATHEMATICS" below. The date and time "WEDNESDAY, OCTOBER 3, 2007 DISQUE HALL, ROOM 109 3:30 P.M." are at the bottom. Logos for Drexel University and the College of Arts and Sciences are in the top corners.

**Yixin Guo**  
October 3, 2007

“Modeling Parkinson's Disease and Deep Brain Stimulation”

Abstract: The therapeutic effectiveness of deep brain stimulation (DBS) of the subthalamic nucleus (STN) may arise through its effects on inhibitory basal ganglia outputs, including those from the internal segment of the globus pallidus (GPi). Changes in GPi activity will impact its thalamic targets, representing a possible pathway for STN-DBS to modulate basal ganglia-thalamocortical processing. We use computational models to examine thalamocortical (TC) relay cell responses to an excitatory input train, under a variety of GPi inhibitory signals obtained from both single-unit experimental recordings and stochastic simulations. Specifically, inhibitory inputs featuring correlated bursts yielded compromised TC relay, whereas relay fidelity improved under relatively tonic inhibition. These results support the hypothesis that STN-DBS alters parkinsonian GPi activity in a way that may improve TC signal processing.

## Departmental Committees

### Tenure-Track Search:

Pawel Hitczenko, Chair (fall),  
Robert P. Boyer, Chair (winter, spring)  
Jennifer Morse  
Georgi Medvedev  
Advisory Member: Hugo J. Woerdeman

### Tenure and Promotion:

Justin Smith, Chair  
Pawel Hitczenko, Vice Chair  
All tenured faculty members

### Graduate Program:

Jennifer Morse, Chair  
Thomas Yu  
Li Sheng  
Graduate Advisor: Andrew Hicks  
Qualifying Exam Subcommittee appointed by Graduate Program Committee

### Undergraduate Program:

Marci Perlstadt, Chair  
Dmitry Kalyuzhnyi-Verbovetskii  
Douglas Wright  
Undergraduate Advisor: Marna Mozeff

### Actuarial Science/ Financial Math Program Committee:

Hugo J. Woerdeman, Chair  
Robert P. Boyer  
Pavel Grinfeld

### Computer:

Andrew Hicks, Chair  
Georgi Medvedev  
Justin Smith  
Yixin Guo  
Computer Specialist: Gene Phan

### Grants:

Shari Moskow, Chair  
Ronald Perline  
Pawel Hitczenko  
Li Sheng

### Auxiliary Search:

Marci Perlstadt, Chair  
Marna Mozeff  
Patricia Henry  
Hugo J. Woerdeman

### Colloquium Coordinator:

Gregory Naber

### Library Liaison:

Dmitry Kalyuzhnyi-Verbovetskii

## Departmental Committees

Resource Center Coordinator:  
Li Shen

CoAS Undergraduate Program representative:  
Marci Perlstadt

CoAS Graduate Program representative:  
Jennifer Morse

CoAS Space representative:  
Patricia Henry

CoAS Tenure and Promotion representative:  
Robert P. Boyer

School of Education Liaison:  
Patricia Henry

Goodwin Liaison:  
Marna Mozeff

University 101 representative:  
Marci Perlstadt (Fall), Ronald Perline (Winter)

Math 121-122-200 coordinator:  
Ronald Perline

Math 123 coordinator:  
Marci Perlstadt

Math 101-102 coordinator:  
Marna Mozeff (COB), Adam Rickert

Math 100 coordinator:  
Judy Smith

Math 110 coordinator:  
Patricia Henry

Math Competition coordinator:  
William Goh

PiMuEpsilon Liaison:  
Pavel Grinfeld

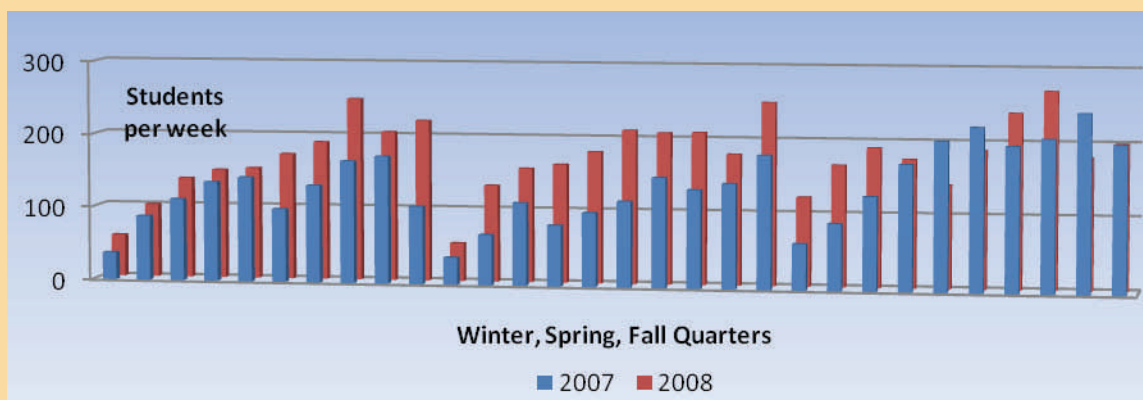
EPaDel Meeting coordinator:  
Robert P. Boyer

Barbara G. Hornum Teaching Excellence Award Committee Member:  
James W. Donnelly, Marna Mozeff

Dragon Drive Coordinator:  
Margaret Mercer

## Mathematics Resource Center

The Mathematics Resource Center (MRC) continues to have success after success. Open 42 hours per week, utilizing 48 tutors, the MRC seems to have become a very effective complement to classroom instruction. A main ingredient is the fact that the tutors in the MRC are faculty members and teaching assistants who themselves teach the courses, making the tutoring very effective and to the point. This year the MRC helped 1196 students--27 % of all students who took math courses at Drexel. On average we saw 175 students per week, an increase of 29% from 2007 (see chart below). Students return on average 4 times. In total we provided 5135 student tutoring hours.



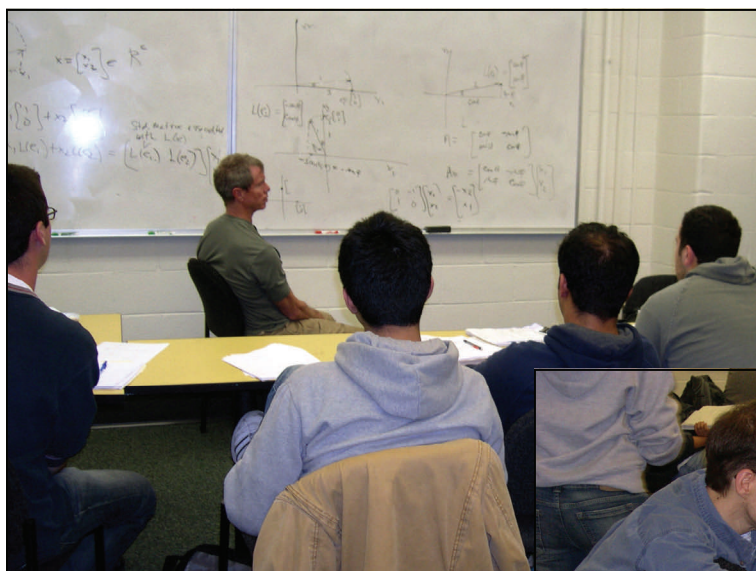
New in September 2007 was the center's **first full-time manager, David Shen**. He was able to improve the services the center offered, organizing tutors more effectively and implementing a system identifying when help was available in upper level math courses. In addition to freshmen courses, there was now also extensive tutoring in sophomore courses such as Differential Equations and Linear Algebra.

Another big change was that we moved to the larger room Korman 247. We did this in the spring of 2007. With the funds from the University for the MRC, we were able to put new carpet in the room and place partitions, and make an office for the fulltime manager. Though these were great improvements, there was still a large problem. During busy periods, with 8 tutors and 20+ students at the same time in the center, it came to the point where the students could not hear the tutors anymore, and where tutors nearly had to shout to make themselves heard. Using the **generous donations of our alumna Carol SangtINETTE**, we were able to order sound absorption panels which were installed in the summer of 2008. This has significantly reduced the noise during busy periods.

## 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.

“During my first term at Drexel, I took Math 101 class and was able to receive an A+ for that class due to the Math Recourse Center. Having realized the great tutoring system available at the Math Recourse Center, I confidently switched to a higher Calculus I level of math in the following term. Even though I had some lacks in basic mathematical concepts prior to taking Calculus I, I was able to fill up all my gaps by constantly attending the Math Center and as a result received an A+ for Calculus I.”



“During my freshman year, I took Calc I and Calc II, having to withdraw once before I completed it the next term. I got a C- and a C....During my sophomore year, I decided to go to the MRC...[for help] in Calc III and Calc IV....I was able to practice every problem in the book and when I got stuck I asked for help....I ended up with A's in Calc III and Calc IV.”

“I would be doing a lot better in my other classes if they had tutoring centers similar to this one.”

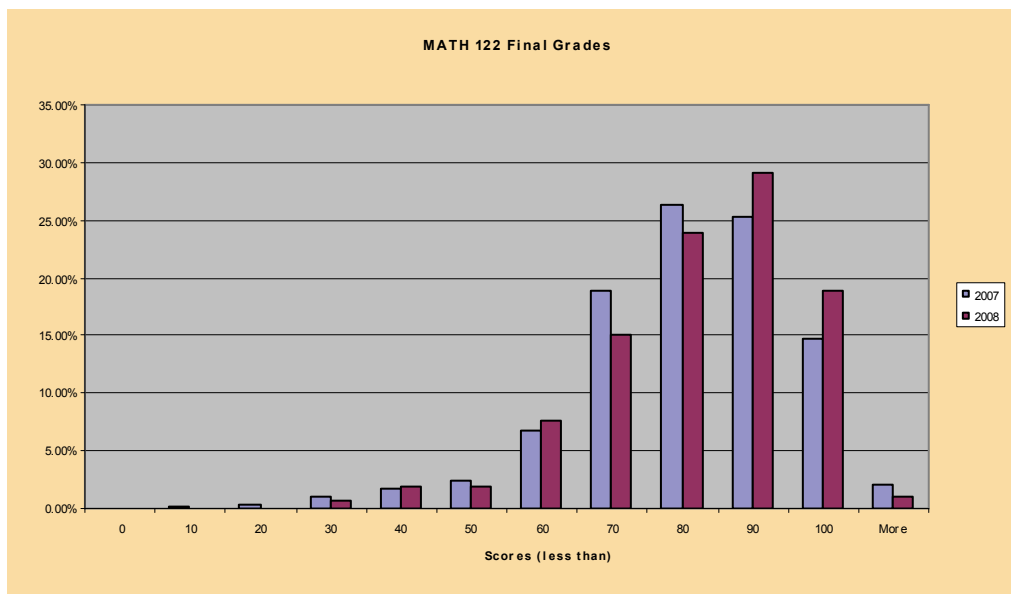
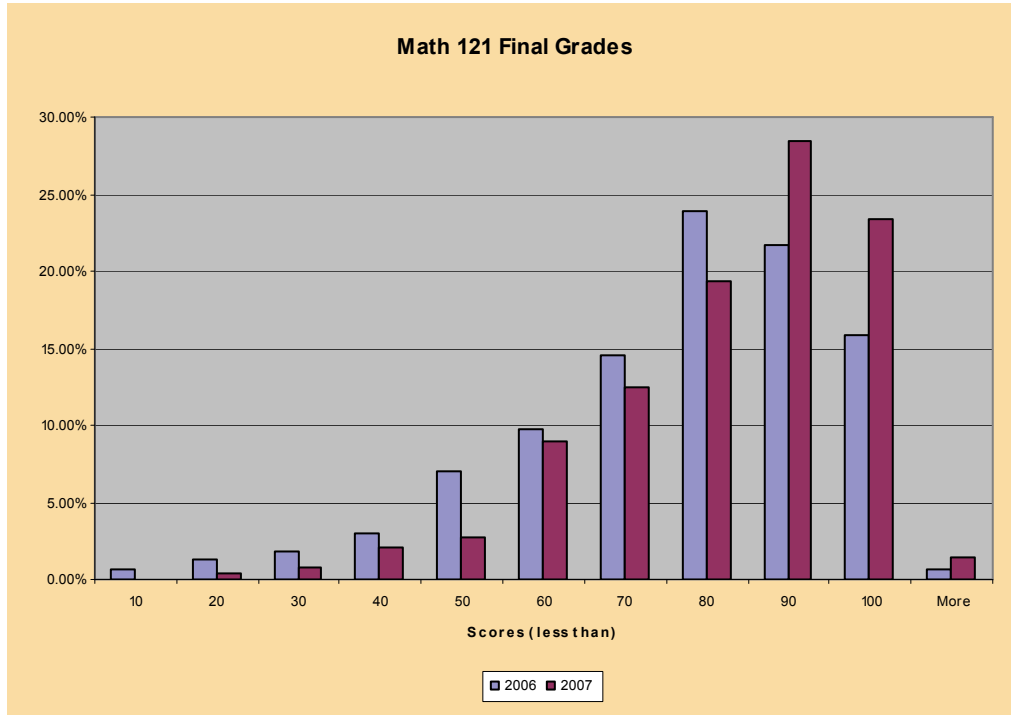


“I probably would not have gotten an “A” in math if it wasn't for the tutors.... Now, I always tell people to get help because I know it works! Some people have an innate talent towards math, but I struggle to receive grades which I am proud of.....Going to the center is a great use of time.”

“It's definitely the perfect compliment to math class.”

## Freshman Courses

Starting the fall of 2007 we were able to offer all of our Calculus courses in the small section format. We tried to keep the maximum number of students per section at 30. In doing so we found that more students earned higher grades and fewer students failed or withdrew. The two charts show a comparison of grades from 2006-07 when there were large lectures to 2007-08 when we taught the smaller sections. In order to do this, we increased our teaching faculty by an additional 6 instructors/senior lecturers.





## Student Activities

### SIAM Chapter

**Selcuk Koyuncu**, president of Drexel's SIAM Chapter, was a recipient of the SIAM Student Chapter Certificate of Recognition, which are awarded to students who have made outstanding contributions to their SIAM student chapters. Dr. Robert P. Boyer is the Faculty Advisor of the Chapter.



Selcuk Koyuncu and Robert Boyer

### Graduate Student Seminars

January 21, 2008

**Evandro Manica**

University of Pittsburgh

“The Role of Coupling and heterogeneity on a Small Network of pre-Botzinger Complex Cells”

February 8, 2008

**Svitlana Zhuravyska**

Drexel University

“Selected Topics from Probability Theory”

February 15, 2008

**Jason Aran**

Drexel University

“RSA Algorithms”

February 22, 2008

**David Kimsey**

Drexel University

“Matrix Completion Problem”

February 29, 2008

**Emek Kose**

Drexel University

“Catadioptric Sensor Design”

## Student Activities

### Graduate Student Seminars

March 7, 2008

**Derek Heilman**  
Drexel University  
"Fractals"

April 16, 2008

**Selcuk Koyuncu**  
Drexel University  
"Multilevel Toeplitz"

April 23, 2008

**Yun Yoo**  
Drexel University  
"Mixed-mode Oscillations with Folded Node Singularity"

May 7, 2008

**Lei Cao**  
Drexel University  
"Relationship Between Horn's Conjecture and Saturation Conjecture"

May 14, 2008

**Greg Naber**  
Drexel University  
"The Invariant Subspaces Theorem"

#### **Riemann Day**

May 28, 2008

A day in honor of Bernhard Riemann (1826-1866) with speakers  
Dr. Robert Boyer, Dr. Ronald Perline, and Dr. J. Douglas Wright.  
Drexel University

### Math Bytes

**President:** Svitlana Zhuravytska

Math Bytes held the following activities:

- October 5th, 2007. "Welcome" happy hour at Mad 4 Mex Restaurant.
- November 28th, 2007. "PhD and after", lunch with Dr. Wright.
- Nov 30th, 2007. Happy hour at Mad 4 Mex Restaurant.
- March 8th, 2008. Ririe-Woodbury Dance at the Nikolais Dance Theatre.
- May 17th, 2008. Kooza by Cirque du Soleil.
- June, 2008. End of the year happy hour at Ecco Qui.

## Donations

Donation of equipment to the Communities in Schools of Philadelphia.

Donation of print cartridges to St. Gabriel's Episcopal Church for their recycling program.

Donation of tea to St. Gabriel's Episcopal Church for their hospitality hour.

## Social Events

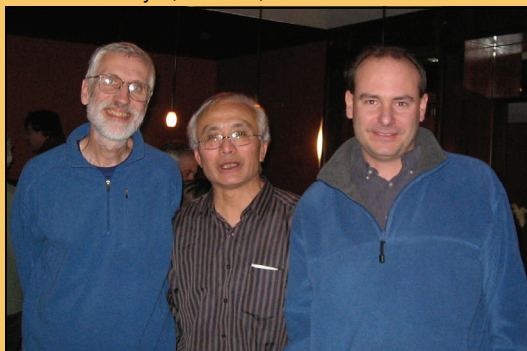
**On September 23, 2007 there was a brunch hosted by the Woerdemans**



## Social Events

**On December 7, 2007 the annual Holiday reception and recognition of William Goh's retirement was held at the Academic Bistro**

Bob Boyer, Bill Goh, Robert Immordino



Bill Goh, Oksana Odintsova, Alex Dolgopolsky

Thomas Yu, Ron Perline, Anatolii Grinshpan, Bill Goh

**On June 10, 2008 the annual End of Year reception was held at Slainte**

