2014-15

#GraduateMath@UD

Visit our site: www.mathsci.udel.edu/graduate

- MS and PhD in Mathematics and Applied Mathematics.
- Guaranteed financial support for full time PhD students, including summer and travel support.
- Twenty regular graduate courses in Algebra, Analysis, Combinatorics, Numerical methods, Applied Mathematics, and Probability.

Inside this issue:

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was prepared by M. Hassell, S. Meng, and F.J. Sayas

Who we are, what we do

Over the past half-century, the Department of Mathematical Sciences at the University of Delaware has awarded well over one hundred doctoral degrees in Mathematics and Applied Mathematics. In 2010, the NRC rankings of doctoral programs ranked our program in the range 11-40 among all U.S. programs in mathematics, while the Academic Ranking of World Universities consistently identifies us as a top 100 department in mathematics worldwide. We offer five-year financial aid packages combining teaching, research, and fellowship opportunities, a beautiful campus in a lively town, and a central location in the mid-Atlantic on the Eastern seaboard. Our faculty contains internationally recognized researchers in core areas of mathematics and its applications. As such, we offer a wide range of potential research topics for PhD candidates. Graduates from our program have gone on to prestigious postdoctoral research positions, tenure-track positions combining research and teaching, and jobs in industry, commerce, and in government agencies.

The department currently offers master's and doctoral degrees in Mathematics and Applied Mathematics.

Our **research areas** span

Algebra

Combinatorics

Inverse Problems

Mathematical Biology

Numerical Analysis

Physical Applied Mathematics

Probability

Scientific Computing

Stochastics

Five regular research seminars complement the academic offerings of the graduate program.

Here today, there tomorrow

Some of our students spend time away as part of their educational experience. Shixu Meng had a nine month working visit in Paris, funded by a Chateaubriand STEM fellowship and the Ecole Polytechnique. Jiange Li and Peng Xu followed their adviser for a semester at the Institute of Mathematics and Applications in Minneapolis, while Jake Rezac enjoyed a summer of work at Oak Ridge National Laboratory in Tennessee. On the other side of the Atlantic ocean, Matt Hassell spent a summer month working at the School of Aerospace Engineering in Madrid.

Tom Brown & Matt Hassell surrounding Prof. Antil from GMU in a place of La Mancha, summer 2015.

Our graduates

Isaac Harris, class of 2015, moved on to a postdoc position in Texas A&M.

PhD graduates

Christopher Castillo. A method for constructing groups of permutation polynomials and its application to projective geometry. (Advisor. Prof. Coulter)

Rui Fang. Stochastic analysis of ant-based routing and probabilistic modeling of medium access control in wireless local area network. (Advisor. Prof. Rossi)

Isaac Harris. Non-destructive testing of anisotropic materials. (Advisor. Prof. Cakoni)

Zhenyu He. High order smoother particle hydrodynamic methods for slightly compressible bounded flow. (Advisor. Prof. Rossi)

Shi Jin. Gaussian processes: KL expansion, small ball probability and applications in time series models. (Advisor. Prof. Leung)

Weiqiang Li. Algebraic methods in graph theory. (Advisor. Prof. Cioaba)

Michael Shoushani. Parameter recovery and transmission problems in poroelastic media. (Advisors. Prof. Gilbert and Guyenne)

Yan Song. Numerical schemes for coarse-graining of stochastic lattice dynamics. (Advisor. Prof. Plechac)

Yu Sun. Modeling and analyzing large swarms with cover leaders. (Advisor. Prof. Rossi)

Jiahua Tang. Determining the twist of an optical fiber. (Advisor. Prof. Rakesh)

Jason Vermette. Spectral and combinatorial properties of friendship graphs, simplicial rook graphs, and external expanders. (Advisor. Prof. Cioaba)

Fan Yang. Scattering and inverse scattering in the presence of complex background media. (Advisor. Prof. Monk)

Yun Zeng. Stochastic modeling of soft materials. (Advisor. Prof. Cook.)

MS graduates

Haripriya Chakraborty, Patrick Dozier, Doris Fakeh, Nicholas Kaufman, James Moore, Atena Sadeghi, Brandon Schlenker

Our department's HQ, Ewing Hall.

Our courses

Every academic year the department offers around 20 graduate courses in mathematics in the fall (F) and spring (S) semesters. Additionally, two sections of Topics in Mathematics are offered every spring.

600 level courses

600. Fundamentals of Real Analysis (F)

602. Measure, integration, and complex variables (S)

611. Introduction to numerical discretization (S)

612. Computational methods for equation solving and function minimization (F)

616. Modeling in Applied Mathematics (F)

617. Techniques in Applied Mathematics (S)

630. Probability theory and applications (F)

631. Introduction to stochastic processes (S)

650. Algebra I (S)

672. Vector spaces (F)

688. Combinatorics and Graph Theory I (F)

800 level courses

806. Functional Analysis (F)

810. Asymptotic and perturbation methods (S)

817. Introduction to numerical methods for Partial Differential Equations (F)

835. Evolutionary Partial Differential Equations (F)

836. Elliptic Partial Differential Equations (S)

838. Finite Element and Boundary Element Methods (S)

845. Algebra II (F)

850. Theory of probability (F)

888. Combinatorics II (S)

Topics courses

Spring 2015. Distributions and Fourier Transforms (Prof. Rakesh). Hot topics in Finite Fields and their Applications (Prof. Coulter)

Spring 2016. Introduction to data mining and analysis (Prof. Guillot). Linear and semidefinite programming in combinatorial optimization (Prof. Cioaba)

Special courses

667. Projects in imaging, networks, and signals

The fish was this big! Jake Rezac explains scattering to innocent bystanders.

AWM, SIAM, HGSS, MPI, MSRI, IMA, ... the list never ends

Networking, learning about career paths, and developing your mathematical skills are all good reasons to join one of the student groups and seminars, or to participate in summer activities.

The **Association for Women in Mathematics** and the **Society for Industrial and Applied Mathematics** have student chapters at UD. Both are active groups that organize discussions, meetings, and outings. Amy Janett and Lan Zhong are the current (2015-16) respective presidents of these local chapters.

Every Wednesday, pizza and math draw the graduate students together for the **Hallenbeck Graduate Student Seminar**, currently coordinated by Jake Rezac and Zach Bailey.

Among the many learning opportunities offered every summer, the workshop on **Mathematical Problems in Industry** (held at UD in 2015) is a classic widely enjoyed by our community. The Mathematical Sciences Research Institute (Berkeley, CA) and the Institute of Mathematics and Applications (Minneapolis, MN) fund summer schools that are regularly attended by UD graduate students.

Members of the UD AWM chapter attending a conference in College Park MD.

We know what you did last summer

May graduation day is departure day for most of UD's undergrad population. The summer is not a quiet time for graduate students and faculty though.

Many grad students choose to teach in the summer session. Freshmen grad students juggle preliminary exam preparation and first year research experiences: the Groups Exploring the Mathematical Sciences (GEMS) and the UNIDEL programs. The incoming class gets to see all the hustle and bustle through the faculty and graduate student led GRIPS program, which gets them acquainted with life in the department, while problem solving review sessions sharpen everyone's skills.

Senior students combine teaching, research on their thesis projects, and attending one of the many summer schools and conferences where academics flock with the warm weather.

The summer of 2015 took some of our students to American destinations (Berkeley CA, Raleigh NC, and Worcester MA to name a few) or more distant getaways (Montreal, Helsinki, Paris, Ciudad Real, Beijing, and Vancouver).

Amy Janett and the Kevins (Cotter and Aiton) participated in the GEMS experience.

The Winter Research Symposium and more

The beginning of the spring semester is always underlined by the arrival of the annual Winter Research Symposium, a showcase of our graduate student research. Senior students give talks or present posters in a relaxed atmosphere on a Friday afternoon. Two posters get a special award with travel funds. A graduate alumn from the department (Dr. Keith Mellinger from University of Mary Washington was the 2015 speaker) gives a keynote address during the WRS. Additionally, the recently instituted Wenbo Li Scholarship for Graduate Research is awarded during the WRS.

First year students get to share the progress of their GEMS or UNIDEL funded summer experience during the friendly Summer Research Symposium.

This past year was marked by the creation of WHIMS, the workshop on What's Hot In Mathematical Science, where faculty and graduate students offer insight into interesting problems in their fields.

Irene De Teresa, her poster, and Mike Stapf playing the role of the audience.

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Hungry graduate students waiting for the grill masters to finish their duties during the fall departmental picnic.

Led by Allan Hungria (third from the right), UD's SIAM chapter sent a large contingent of volunteers to DC's National Math Festival.

Seven members of the 2015 Mathematical Sciences doctoral crop pose after the hooding ceremony.

Students and faculty mill around the buffet and poster session at the 2015 Winter Research Symposium.