

Duke University

Math News

September 23, 2015



• ◆ • Fall 2015 EDITION • ◆ •

Welcome

It's a great pleasure to welcome everyone to the Duke University Department of Mathematics. I especially want to welcome all newcomers and visitors to our department, as well as returning faculty, staff, and students.

On June 30, 2015, Harold Layton completed an amazing six year run as chair of our department. I'd like to thank him for his excellent service. In contrast, I'm acting as interim chair for a mere six months until Jonathan Mattingly takes over on January 1, 2016. I will continue to be the Associate Chair.

Rick Durrett continues as Director of Graduate Studies and Les Saper is the new Director of Undergraduate Studies. I'd like to thank Chad Schoen for his service as DUS the past five years. Clark Bray will remain the Supervisor of First-year Instruction.

I would like to highlight the arrival of our new Associate Professor Colleen Robles. A short biography will be found in the pages below.

Also, I welcome Felina Grissom and Melissa Blakey who have recently joined our administrative staff.

I hope everyone takes advantage of and enjoys our department's multifaceted activities, and I wish everyone a very productive year.

- Paul Aspinwall

Events

Triangle Lectures in Combinatorics

The semi-annual conference on combinatorics will be held on October 3 at Duke. The speakers will be Yuliy Baryshnikov (UIUC), Susan Holmes (Stanford), Dana Randall (Georgia Tech), and John Shareshian (Washington University in St. Louis). In addition, Persi Diaconis will speak in the Math Colloquium at NC State on Friday October 2 at 4pm. <https://www.math.ncsu.edu/courses/TLC/>

The conference has been organized by [Sayan Mukherjee](#), chair (Duke), [John Harer](#) (Duke), [Patricia Hersh](#) (NCSU), and [Mauro Maggioni](#) (Duke) and is supported by grants from the NSF and NSA.

These talks should be of interest to faculty and students in Math, Statistics and Computer Science.

Collective Dynamics

The Department of Mathematics will host a KI-Net conference on Collective Dynamics in Biological and Social Systems, to be held November 19 to 22, 2015. The conference is organized by Alina Chertock, (NCSU), and Jian-Guo Luo and Jianfeng Lu (Duke).

http://www.ki-net.umd.edu/content/conf?event_id=394

Celebrate 100 years of General Relativity

Talks by Marcus Werner and Paul Aspinwall, Friday Oct 16 at 4:30 in Math Physics 128.

Conference for Undergraduate Women

The Southeastern Conference for Undergraduate Women in Mathematics will be held November 7-8, 2015, at Duke. This conference is organized by Emily Braley and Sarah Schott with support from a TENSOR grant from the Mathematical Association of America.

The plenary speakers will be Laura Miller, Associate Professor of Mathematics and Biology at UNC, and Lillian Pierce, Assistant Professor of Mathematics at Duke.

Registration is open through October 6th, and can be done by visiting the conference website: <http://sites.duke.edu/scuwm2015/>

Women in Math Mentoring

We will host a hike on Saturday, October 3rd for students and faculty in the math department. Come join us for this wonderful opportunity to get to know others in the department as we take a walk by the beautiful Eno River. Sign up at: <http://doodle.com/a73vegth8nzyxqnb>

Hope to see you there!

Also, there will be a math picnic in Duke Gardens in the upcoming weeks. Be on the lookout for the date! Contact Anne Talkington (amt47@duke.edu) for more information.

Undergraduates

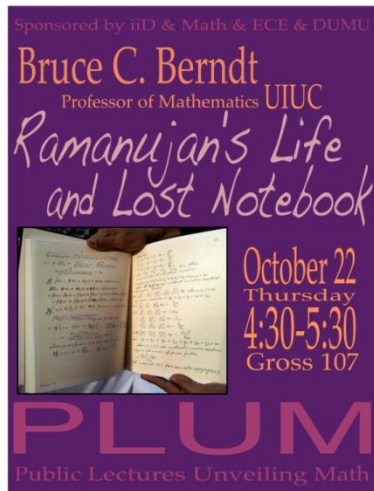
DUMU

The Duke University Mathematics Union invites all undergraduates to participate in various math related events this year. These include lectures, social events, competitions, information panels, and games nights. To sign up for the math union listserv, send a note to DUMU president Andrew You andrew.you@duke.edu.

PLUM Lecture

With the cooperation of the math, iiD and ECE programs, DUMU will present the first *Public Lecture Unveiling Mathematics* with Professor Bruce C. Berndt of the University of Illinois at Urbana-Champaign. He will talk at 4:30-5:30 on Thursday Oct 22 in Gross Hall 107 on *Ramanujan's Life, His Earlier Notebooks and His Lost Notebook*

Ramanujan was born in southern India in 1887 and died there in 1920 at the age of 32. He had only one year of college, but his mathematical discoveries, made mostly in isolation, have made him one of the 20th and 21st centuries' most influential mathematicians. An account of Ramanujan's life will be presented. Most of Ramanujan's mathematical discoveries were recorded without proofs in notebooks, and a description and history of these notebooks will be provided. In 1976, George Andrews found Ramanujan's "lost notebook" in the library at Trinity College, Cambridge. A history and description of this lost



notebook will also be provided. The lecture will be accompanied by photographs of Ramanujan, his home, his school, his notebooks, and those influential in his life, including his mother and wife Janaki.

This talk should be of interest to undergraduates and MAT students as well as graduate students and faculty.

Competitions

All undergraduates are welcome to participate in various national math competitions this fall. The Virginia Tech Math Contest will be held on Saturday morning, October 24. The more challenging Putnam Competition, a six hour event, will take place on Saturday December 5.

The Problem Solving Seminar, Math 281S, is designed to prepare students for these and other competitions. All students are welcome to come to the sessions on Thursday evenings from 6:15 until about 7:45.

Contact Alex Milu (aam47@duke.edu) or David Kraines (dkrain@math.duke.edu) for more information.

Duke Math Meet

The 2015 Duke Math Meet will take place on Saturday, November 21. Last fall the Meet attracted nearly 250 high school students from North Carolina and surrounding states.

Mike Ma will be the coordinator this year with the assistance of Andrew You and other DUMU officers. Duke student volunteers are needed to help create problems, register students, serve meals, and grade solutions.

Contact Mike Ma [<yanmin.ma@duke.edu>](mailto:yanmin.ma@duke.edu) or Andrew You [<andrew.you@duke.edu>](mailto:andrew.you@duke.edu) for more information.

Undergraduate Research Programs

Undergraduates are encouraged to participate in one of the several mentored research programs next summer.

Data+

Last summer, 40 Duke undergraduates worked for 10 weeks on data science projects as part of the Data+ Program, partially sponsored by an NSF grant to the Mathematics Department, and hosted by the Information Initiative at Duke (iiD).

The students broke off into multi-disciplinary teams of 2-3 and worked on data-driven projects to people outside the traditional campus setting. For example, an economics major and two ECE/math majors found patterns in donor

data provided by Fidelity Charitable, while a political science major and a math/stats major assessed the quality of workforce incentives programs using data provided by the North Carolina Justice Center.

To see all 14 projects from last year, please go to <http://bigdata.duke.edu/data>; information about upcoming projects for Summer 2016 will be posted there soon!

PRUV

Now in its 16th year, the PRUV program continues to support mentored summer research leading to Graduation with Distinction in Mathematics. For more information, see <http://www.math.duke.edu/vigre/pruv/>

The six current PRUV Fellows, Fuchsia Chen, Bryan Liu, Tony Qiao, Samadwara Reddy, Kyle Casey, and Paul Ziquan Yang, will give short talks on their projects later in September. All interested students are encouraged to attend. Those who might like to apply to the program are urged to attend some of the talks.



Samadwara Reddy, Tony Qiao, Paul Ziquan Yang, Bryan Liu, and Kyle Casey (not pictured: Fuchsia Chen)

Other undergraduates who received support for their research projects include Oscar Li, Anne Talkington and Rachel Yin.

New Course

Math 304, Introduction to Cryptography

This course studies the mathematical techniques of cryptography, accompanied by an analysis of its historical and societal consequences. Along the way, students will consider the following questions: Do we really need mathematics for our daily life? Could our modern digital society exist without codes and encryption? What is a code, anyway?

Mathematical topics include elementary combinatorics, number theory, classical ciphers, the Enigma machine, and public channel cryptography.

With funding from the *Math+* initiative, the course will include a three week module on the ethics of privacy, taught by visiting guest lecturer Professor Kimberley Brownlee (University of Warwick School of Law).

This course will be offered in Spring 2016 and will carry codes QS and STS. The prerequisite is successful completion of any 200 level math course. Instructor: Lillian Pierce

Graduate Students

Awards

Orsola Capovilla-Searle was awarded a Dean's fellowship from Duke and a National Science Foundation Graduate fellowship.

Shalla Hanson has been awarded the NESCent sponsored Triangle Graduate Fellowship in Evolutionary Medicine to support her research this fall on *Optimal Strategies in Anti-Cancer Therapy: Targeting Evolution*.

This spring, she will be involved in a collaborative project with the Duke Math Department and the Jacques-Louis Lions Laboratory at the University of Pierre and Marie Curie in Paris. She was awarded the Chateaubriand Fellowship from the Office of Science and Technology in the French Embassy, and INRIA to support her research.

Robert Ravier won a prestigious NDSEG fellowship that will support him for his last three years here.

Kevin Stubbs has been awarded a J.B. Duke fellowship.

New graduate students

Below is the list of incoming graduate students, their previous institution and their mathematical interests.

- Matthew Beckett, (Waterloo) *Geometric analysis, gauge theory*
- Yu Cao, (City U Hong Kong) *Stochastic Processes*
- Orsola Capovilla-Searle, (Bryn Mawr) *Topology, geometry.*
- William Duncan, (Carnegie Mellon) *Math biology*
- Didong Li, (Beijing Inst Tech) *Applied Geometry, Topology*
- Erika Ordog, (Pepperdine) *Algebra, algebraic geometry*
- Kevin Stubbs, (Maryland) *Harmonic analysis, high dimensional data analysis*
- Do Van Tran, (Vietnam National U) *Differential and symplectic geometry*
- Huong Tran, (Georgia Tech) *Applied math, number theory*

- Zhe Wang, (Peking U) Applied Math, *Stochastic Processes, PDE*

Teaching Award

Caitlin Levenson and Brian Fitzpatrick were selected as winners of the L. P. and Barbara Smith Award for Excellence in Teaching. They will receive a substantial award from a fund provided by the Smiths.

Levenson was praised for consistently demonstrating extraordinary interest in the education and well-being of her students, for having spent generous extra time helping them learn the material to the high standards set by this department, and for how these efforts resulted in excellent lectures and motivated students.

Fitzpatrick was commended for consistently excelling in his teaching at Duke, showing patience in working with students and talent for connecting with those who need help, earning his students' appreciation and consistently high teaching evaluations. His valuable contributions in teacher meetings have helped other instructors improve their own lectures.

Faculty News

New Faculty

Associate Professor



Colleen Robles received her Ph.D. from the University of British Columbia in 2003 under the supervision of David Bao (University of Houston) and Richard Froese. Following a post-doctoral position at the

University of Rochester she joined Texas A&M University. Robles has held visiting positions at the University of Utah and the Institute for Advanced Study. She is delighted to join the Duke faculty.

Colleen Robles is a differential geometer. Her research interests have included Finsler geometry (which is a generalization of Riemannian geometry), calibrated geometry (the study of special classes of minimal submanifolds), and various rigidity questions for both rational homogeneous varieties and Schubert varieties. Her recent work addresses questions in complex geometry and representation theory that are motivated by Hodge theory.

Elliott Assistant Research Professorships

These three year positions were created to honor professor emeritus William W. Elliott (1898-1993), the first professor to teach at Duke who had received a Ph.D. (Cornell 1925).

Lei Li comes to Duke from the University of Wisconsin. He works in applied mathematics, including computational mathematics and fluid-body interaction.

Caroline Turnage-Butterbaugh received her doctorate from the University of Mississippi in 2014 and had a post-doc at North Dakota State University. She works in analytic number theory.

Visiting Assistant Professors

- Michael Abel, (Ph.D. UNC Chapel Hill) will be working with Lenny Ng
- Justin Allman, (Ph.D. UNC Chapel Hill) will be working with Paul Aspinwall
- Ying Chen, (Ph.D. UC Irvine) will be working with Anita Layton
- Tingran Gao, (Ph.D. Duke) will be working with Ingrid Daubechies
- James Murphy, (Ph.D. U Maryland) will be working with Mauro Maggioni
- Stefano Vigogna, (Ph.D. Univ Genoa) Univ Genoa will be working with Mauro Maggioni
- Haizhao Yang, (Ph.D. Stanford) will be working with Jianfeng Lu

News

Anita Layton, Robert R. and Katherine B. Penn Professor of Mathematics, was elected to a three-year term as chair of the Arts & Sciences Council, effective May 2015. The council serves as Duke faculty's primary institution for governance, and is charged to advise the Deans of Trinity College of Arts & Sciences on issues such as college priorities, faculty development, and undergraduate education. In the coming year, the A&S Council will focus on the development of new undergraduate curricula, here at Duke and at the Duke-Kunshan University.

Assistant professor Jianfeng Lu has been awarded an NSF CAREER Fellowship for Research and Training. His work will be in advanced computational methods for quantum and statistical mechanics.

Duke Math News

The Duke Math News is published several times a year and is distributed to those in the Duke Mathematics community. For previous editions and other news, see <http://www.math.duke.edu/news/>. We welcome items of interest for our next issue. Send them to dept@math.duke.edu or dkrain@duke.edu

To read about other news, honors and events concerning mathematics at Duke, visit <http://www.math.duke.edu/news/>. The on-line calendar at <http://www.math.duke.edu/mcal> lists both regular and special seminars and colloquia for the upcoming weeks. The department maintains video archives of talks, lecture series and special conferences at Duke, many of which are available online.

See <http://www.math.duke.edu/computing/broadcast.html> for more information.

-David Kraines, DMN Faculty Sponsor

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