# Mathematics Alumni Newsletter

## A Note from the Chair

Dear friends of the Department of Mathematics,

It is my pleasure to report that during the 2017/18 academic year, after three years of temporary housing, the Department of Mathematics has found a permanent home in Knudson Hall. This is an excellent occasion to resume the Mathematics Alumni Newsletter and update you on some of the many recent events that took place (see inside for more details):

- Several faculty joined the department, including the new university provost Jeremy Haefner.
- Liane Beights retired as the assistant to the chair and Susan Bolton, who some of you might remember from the Department of Computer Science, stepped in her place.
- We have organized a number of conferences and public lectures, including the Western Sectional Meeting of the American Mathematical Society with nearly 500 participants.
- Our teaching professors redesigned Business Calculus to better align with the needs of the Daniels College of Business.

In short, the department is more active than ever, thanks in large part due to your generous support and the leadership of the previous department chair Michael Kinyon.

We would be thrilled to see you back on campus! Please stop by to check out Knudson Hall, attend one of our public lectures, or come help us cheer on the Pioneers against Colorado College at the alumni hockey night on Saturday, January 19th.   We would also love to hear from you about your careers as alumni of the DU Math Department. Feel free to contact my assistant Susan Bolton at susan.bolton@du.edu with any news.

Best regards,
Petr Vojtěchovský

## Inside this issue

# New Faculty

**John Antonioli**

John Antonioli joined the math department in Fall 2016 as a teaching assistant professor. He completed his PhD at the University of Victoria in British Columbia, Canada. He has a masters and bachelors degree from Montana State University. His academic research is in ergodic theory and thermodynamic formalism. He also enjoys figuring out how to get humanities students interested in math.

**Thomas French**

Thomas French joined the department in Fall 2016 as a teaching assistant professor. He completed his bachelor degree at the University of Arkansas, and his masters and PhD right here at the University of Denver, working with Prof. Pavlov. His academic research is in one-dimensional symbolic dynamics. In his spare time, he enjoys video games and playing the piano.

**Shashank Kanade**

Shashank Kanade joined the department in Fall 2017 as an assistant professor. Shashank was born and raised in India and completed his undergraduate studies at the Indian Institute of Technology Kanpur in 2009. He then obtained his PhD in 2015 from Rutgers University and worked for two years as a post-doctoral scholar at University of Alberta, Canada, partially funded by a fellowship awarded by the Pacific Institute of Mathematical Sciences. Shashank's mathematical interests fall under the areas of representation theory and number theory, in particular, vertex operator algebras, tensor categories and integer partitions. In his spare time he enjoys learning languages. He is fond of the following quip by von Neumann: "In mathematics you don't understand things. You just get used to them."

**Katherine Perry**

Katherine (Kat) Perry joined the department in September 2017 as a post-doctoral scholar working with Prof. Horn. She received both her masters and PhD at Auburn University with a focus on graph theory, design theory, and combinatorics. While at Auburn, she taught several classes in the university's new active learning classrooms. When not working on math, she enjoys reading, movies, pottery, and summer weather.
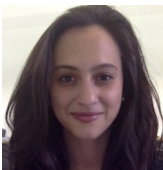
**Sara Ugolini**

Sara Ugolini joined the department in September 2018 as a post-doctoral scholar working with Prof. Galatos. She comes from Italy, where she received her master at the University of Siena and her PhD at the University of Pisa with a thesis in mathematical logic. Her research interests include algebraic logic, many-valued logics and the probability theory of many-valued events. In her free time, she is a reader, a writer and a ballet dancer.

**Seung Yeop Yang**

Seung Yeop Yang joined the department in September 2017 as a post-doctoral scholar working with Prof. Vojtechovsky. He earned his PhD degree in mathematics from the George Washington University in 2017. He conducts research on low-dimensional topology, particularly in algebraic topology related to knot theory, knotted surfaces in the 4-dimensional space, graph theory, and non-associative algebra. When he has some spare time he enjoys various coffee drinks, hiking, traveling and watching baseball games. He has recently accepted a permanent position at the Kyungpook National University, Korea.

# New Provost and Executive Vice Chancellor

*Jeremy Haefner*

Jeremy Haefner joined the university in July 2018 as a university provost and executive vice chancellor. Since Jeremy is a mathematician he was also appointed as a full professor at the Department of Mathematics.

We are happy to welcome Prof. Haefner to DU and we are looking forward to working with him.

*From the Office of the Provost and Executive Vice Chancellor*. Retrieved from https://www.du.edu/provost/biography:
Dr. Jeremy Haefner is the Provost and Executive Vice Chancellor at the University of Denver where he oversees the academic enterprise and serves the campus in a broad leadership role. Prior to joining the University of Denver, Dr. Haefner served as provost and senior vice president for Academic Affairs at Rochester Institute of Technology (RIT) for 10 years. As provost, Dr. Haefner was in charge of the education and research missions of the university, overseeing nine colleges, two institutes, one school and three global campuses, and several university-level programs.

Before RIT, Dr. Haefner was at the University of Colorado at Colorado Springs where he served, over the course of 18 years, in several leadership roles including Dean of Engineering and Applied Science, Associate Vice Chancellor for Research, and Dean of the Graduate School.

Dr. Haefner's career is characterized by several themes – transformational change, cultivation and fundraising, student success, research and innovation, academic excellence, international education, faculty/staff success, and inclusive excellence.

He has held fellowships with the American Council on Education, the National Learning Infrastructure Institute, and the University of Murcia in Spain. His enthusiasm for using technology as a learning tool led him to receive the inaugural President's Faculty Excellence Award for Advancing Teaching and Learning through Technology (1998) from the University of Colorado System and the inaugural Innovations in Teaching with Technology (1998) from the University of Colorado at Colorado Springs.

As a mathematician, Dr. Haefner studies integral representation and module theory and his research has been supported by the National Security Agency, the National Science Foundation, the Air Force Office of Scientific Research, and the government of Spain.

# Liane Beights has retired

Liane Beights retired in September from the position of assistant to the chair. We offer reflections from Prof. Ball and Prof. Gudder on this occasion.

*By Rick Ball*:  Liane Beights has been the face of the DU Math Department for the last twenty years. During this period the Department has undergone significant change—the Department spun off Computer Science as a separate entity—and significant growth, from 4 tenured faculty, 2 instructors, 3 graduate students and 25 majors to 13 tenure track faculty, 4 teaching professors, 3 postdoctoral scholars, 30 graduate students and more than 100 majors. Throughout these changing circumstances, the Department has provided a welcome home to students of mathematics from all parts of University life, and this welcoming friendliness is a direct reflection of Liane's cheerful presence and unfailing competence.

Speaking as one of the many faculty members who has had the privilege of handling the chairmanship for a few years, I can say that I could not have done it without Liane. Her lengthy experience and vast network of staff contacts made her a trove of institutional wisdom. Because of her level-headedness and deep concern for our students, I often sought her advice.

Liane's responsibilities grew with the Department and she was able to handle the increased load in part by adroitly organizing a phalanx of work study students to handle some of the demands of departmental administration. The Math Department became a model to the rest of the University for the successful integration of these deserving undergraduates. The contribution of the work studies to morale, the social glue that holds the Department together, is considerable, and it would not exist except for Liane.

I am sure that I speak for many others when I express my profound appreciation for Liane's contributions to the Department over the years. Many of us cherish her friendship and all of us wish her well in the years to come.

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*"For over twenty years, Liane Beights was the heart of our department."*

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*By Stan Gudder*: A mathematics department can be a very intimidating place. You see white boards filled with complicated equations. You see faculty and graduate students discussing impressive issues. Sometimes they are so involved in their deep thoughts that they hardly look up when you enter the room. You see undergraduate students encompassed in lively, animated conversations. This is all very good and it is what math departments are about. But many math departments lack a heart. For over twenty years, Liane Beights was the heart of our department. When you entered her office, she would always greet you warmly. She always made time to talk and make you feel at home. It didn't make a difference whether you were a freshman student or a full professor. It didn't make a difference whether you were there just to say hello or you had an urgent problem. She always made you welcome. She made the department a comfortable place where you could be at ease.

On a personal note, I can tell you that Liane could not help me with my math problems. She didn't know anything about functional analysis or quantum field theory. However, she did know everything about complicated university procedures. If you had an academic or budget issue, she was the person to see. If she couldn't answer your question, she knew immediately who to call. On various occasions I had problems with salary, budget, policy or governance procedures. Liane was the first person I thought of to solve the problem. A university is covered in red tape and Liane had very large scissors. If students, faculty and administrators are the body of a department, Liane was the soul. She will be greatly missed.
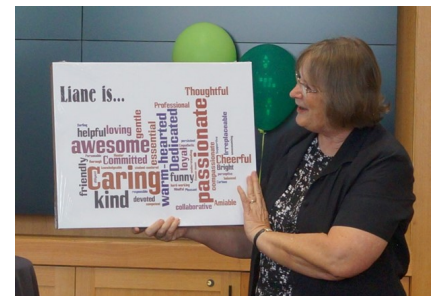
## Alumni Hockey Night - DU vs CC

Mark your calendars for **Sat., January 19, 2019**, reception at 5:30pm, puck drops at 7:05pm!

This year's Alumni Hockey Night is a premium match against Colorado College. Susan Bolton will be sending out a link to register and pay discounted price for the Alumni Hockey Night mid October with a link for on-line registration and payment options.

We only have 100 tickets reserved for the math department. Please register as soon as the announcement is received!

If you have any questions, please do not hesitate to contact Susan Bolton at susan.bolton@du.edu or at 303-871-3344.

*Photo credit: denverpioneers.com Men's Ice Hockey | 9/10/2018 11L00AM*

# Howe Lecture Series



*Prof. Vitaly Bergelson*

The Herbert Howe lecture series is a public lecture series aimed at promotion of research mathematics and astronomy, organized jointly by the Department of Mathematics and the Department of Physics and Astronomy.

The lecture series started in 2015 and it brings prominent mathematicians and astronomers to the University of Denver on annual basis.

The most recent speakers were Prof. Vitaly Bergelson (Ohio State University) who talked on "The Many Facets of the Poincaré Recurrence Theorem" and Dr. Harold Levinson (SouthWest Research Institute) who presented a talk "The Formation of Planets from the Direct Accretion of Pebbles & the Lucy Mission to the Trojan Asteroids."

More details about the lecture series can be found at the departmental website in section "Research." We are extending a warm welcome to students and alumni to attend the next Howe lecture.



*Dr. Harold Levinson*

## Herbert Howe Lecture Series

The series is named in honor of *Herbert Alonzo Howe*, a 19th century Professor of Mathematics and Astronomy at the University of Denver and Denver's first astronomer.

For more information about the Howe lectures, please visit the website at https://www.du.edu/nsm/department/mathematics/research/howe/index.html or you can contact the Math Office at math-office@du.edu, 303-871-2911

# Recent Student Awards



*Dr. D'Ann Campbell presents*
*Valerie Yen with Campbell Award*

### Eleanor L. Campbell Award

| 2016 | Madeline Doering |
|------|------------------|
| 2017 | Samantha Brooker |
| 2018 | Valerie Yen |

### Herbert J. Greenberg Award

| 2016 | Zachary Adams |
|------|---------------|
| 2017 | David Chan |
| 2018 | Samantha Brooker |

### GTA Excellence in Teaching Award

| 2016 | Wesley Fussner |
|------|----------------|
| 2017 | Lauren Nelsen |
| 2018 | Adam Purcilly |

## Student Awards

**Eleanor L. Campbell Memorial Award in Mathematics**
The purpose of the award is to recognize outstanding female undergraduates majoring in mathematics at the University of Denver and shall be given to an outstanding female senior at the University graduating with a degree in mathematics.

**Herbert J. Greenberg Award for Outstanding Achievements in Mathematics**
This award was established by the Mathematics Department to recognize top students graduating with a degree in mathematics, in honor of Herbert J. Greenberg, founder of the Mathematics and the Computer Science Departments and long time chair of the department.

# New Building



*Clarence M. Knudson Hall*

Clarence M. Knudson Hall used to house the departments of Electrical & Computer Engineering and Mechanical & Computer Engineering. After the engineers relocated to the newly constructed Ritchie School of Engineering & Computer Science building, Knudson Hall underwent extensive renovations.

With the exception of the exterior bricks, windows and one lab on the main floor, the entire building has been remodeled. There is a new roof, elevator, heating and cooling systems, etc. There are now seven classrooms, offices housing all faculty and GTAs, a student lounge, study rooms, kitchenette, even a ping-pong table.

On the inside, Knudson Hall is unmistakably a home to mathematicians. The walls are covered in whiteboards, mathematical art (created and donated by Prof. Gudder) can be found throughout, and mathematical cartoons, some even funny, lurk in unexpected places.



## Business Calculus Redesign

### Business Calculus Redesign Committee

**John Antonioli**
Teaching Assistant Professor
PhD 2013 (Univ. of Victoria)
Email: john.antonioli@du.edu

**Kelly Flaherty**
Teaching Associate Professor
PhD 2003 (Univ. of Kansas)
Email: kelly.flaherty@du.edu

**Thomas French**
Teaching Assistant Professor
PhD 2016 (Univ. of Denver)
Email: thomas.french@du.edu

**Allegra Reiber**
Teaching Instructor
MS 2006 (Univ. of Notre Dame)
Email: areiber@du.edu

**Adam Purcilly**
Graduate Teaching Assistant

**Alex Stevens**
Graduate Teaching Assistant

In the spring of 2016, the Department of Mathematics decided to revise the Calculus for Business and Social Sciences (Math 1200) course to better meet the needs of the students who take the course. The committee for the revision consisted of Dr. John Antonioli, Dr. Kelly Flaherty, Dr. Thomas French, Ms. Allegra Reiber, Adam Purcilly and Alex Stevens.

To inform the revision, the committee began by looking at best practices in teaching a course of this type. They then compiled a survey to be given to the faculty in both the business school and social sciences. Working with the deans from both schools, the faculty were surveyed. They found that the current course was not meeting the needs of the students being served. Over the 2016/2017 academic year, the committee worked to change the content of the course and the pedagogy.

The course now contains integration up to the Fundamental Theorem of Calculus and contains more applications that pertain to the students' areas of study using group work and projects.

The course was piloted in one section in the spring of 2017 and the new curriculum was implemented in all sections beginning fall 2017. The committee intends to survey the faculty of the business school and social sciences in January 2019 to assess whether the change to the curriculum has had an impact on student performance in the courses for which Calculus for Business and Social Sciences is a prerequisite.

- Kelly Flaherty

# Recent Conferences

## BLAST 2018



BLAST is a conference series focusing on boolean algebras, lattices, algebraic logic, quantum logic, universal algebra, set theory and set-theoretic topology. It was founded in 2008 by DU professors Natasha Dobrinen and Nick Galatos and it has been held annually since then at various U.S. universities. The tenth installment of the conference took place at DU in August 2018 with about 60 participants, including several DU graduate students. The conference is supported by a grant from the National Science Foundation.

## 4th Mile High Conference on Nonassociative Mathematics

The Mile High conferences cover all aspects of nonassociative mathematics, including quasigroups, loops, latin squares, Lie algebras, Jordan algebras, octonions, quandles and their applications. The conference takes place every 4 years at DU, organized by DU professors Michael Kinyon and Petr Vojtěchovský. The latest conference, supported by the National Science Foundation, took place in August 2017 and was attended by 55 participants from 15 countries. The conference proceedings will appear in the book series *Contemporary Mathematics* of the American Mathematical Society.



### Conferences

One of the primary indicators of the health of math departments is their ability to attract research visitors.

The DU Math Department hosts about 15 visitors every year and organizes a number of conferences. Here we report on two recent conferences that took place at DU.

Among other notable conferences associated with DU are the Pingree Park Dynamical Systems School (organized by Profs. Ormes and Pavlov) and the Rocky Mountains-Great Plains Graduate Research Conference in Combinatorics (Profs. Horn and Lopez).

## Research Spotlight
## Assistant Professor Mei Yin

My interest in mathematics and science started early. Through my mother, a university librarian, I had access to shelf after shelf of books. Two of my favorites growing up were biographies: one of physicist Marie Curie and the other of Niels Henrik Abel, a Norwegian mathematician whose name now adorns the mathematics equivalent of the Nobel Prize. Those books, and the lives they describe, undoubtedly influenced my decision to become a researcher and to use science—mathematics and physics, in my case—to help the world in whatever way possible.

*"My interest in mathematics an science started early. Through my mother, a university librarian, I had access to shelf after shelf of books."*

### Mei Yin

Assistant Professor

PhD 2010 (Univ. of Arizona)

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*Research interest:* Phase transitions, random graphs, lattice spin systems, cluster expansions, renormalization and spectral theory.

Of particular interest in my work are phase transitions, abrupt changes in the state of a system. Examples include the freezing of liquid water or the temperature at which a molten metal becomes magnetic. The math involved in modeling systems like these is quite difficult, requiring mathematical techniques for dealing with the immense quantities involved.

One of those models—and my current research focus—is called exponential random graphs. They are used to model networks in the real world, including social networks, power grids and the Internet. The models can also be used in statistical physics, which is what initially interested me. Like real-world systems they represent, exponential random graph models undergo phase transitions.

The questions that we consider have extensive connections and applications to diverse areas of mathematics such as probability, combinatorics and graph theory. Imagine a graph model of a power grid. Sprinkle a broken power line here or there on the graph and at some point large portions of the network go dark. That's a phase transition! Simply put, a small change in some local quantity in the graph may lead to some abrupt, large-scale change in a global quantity. Such an insight would have broad application, from understanding social interaction to modeling of disease outbreaks.

I received a grant from the National Science Foundation to develop a quantitative theory of those kinds of phase transitions in exponential random graph models from 2013-2017. Together with my colleagues Paul Horn and Mario Lopez, we have also been organizing a multiyear conference series for early-stage researchers in combinatorics and related areas, supported by the National Science Foundation and the Combinatorics Foundation since 2016.