# Saint Louis University
# Department of Mathematics and Statistics

January, 2019

The inaugural Saint Louis Academy of Mathematical Sciences dinner in DuBourg Hall.

## Message from the chair

The theme this Fall was regional cooperation. In September, representatives of twelve local colleges and universities convened on the SLU campus to discuss the formation of the Gateway Regional Math Alliance. The national Math Alliance has the goal of ensuring that every underrepresented or underserved American student with the talent and the ambition has the opportunity to earn a doctoral degree in a mathematical science. Our department is committed to supporting this goal.

In November, our department and the Washington University mathematics department co-hosted the inaugural meeting of the Saint Louis Academy of Mathematical Sciences, held in the Pere Marquette gallery of DuBourg Hall. Envisioned as a venue for cooperation among research mathematicians in the Saint Louis Area, approximately forty-five faculty from area institutions attended. The keynote was given by Dr. Efim Zelmanov of the University of Chicago. Dr. Zelmanov, a 1994 Fields Medalist, spoke about “Infinite Dimensional Algebras and Superalgebras”.

We hope that both of these endeavors lead to a spirit of cooperation that will strengthen the mathematical sciences in the region.

Bryan Clair
Chairperson, Department of Mathematics and Statistics

# Haijun Gong wins NIH grant

The National Institutes of Health has awarded a $454,500 grant to Dr. Haijun Gong for “A Systems Biology Approach to Investigate the Structure Changes of Biological Network”. The award is the largest in department history.

The central aim of Dr. Gong’s grant is to use statistical techniques to understand biological networks that change over time. Biological networks are highly complex, and require statistical inference to reconstruct from experimental data. In past work, researchers have only been able to handle static networks. Gong plans to model time-varying structures, and eventually to apply these models to the study of how T-cells change as cancer tumors form. Another exciting aspect of Dr. Gong’s work is his plan to take model checking techniques traditionally used in computer science for integrated circuit design and apply them to biological networks.

Dr. Gong joined the department in 2012, and has already supervised 15 students in statistical and bioinformatics research. He is spending this year on sabbatical at Australian National University in Canberra, Australia.

# New faculty join the department

Tim Keller

The department welcomes three new faculty this year: Tim Keller, Andrew Eisenberg, and Charles Burnette. Dr. Keller joins SLU after a career of more than 22 years as a mathematical statistician with the USDA in Washington, D.C. At the USDA, Dr. Keller applied optimization techniques to achieve sampling objectives, particularly stratified random samples subject to constraints. While working for the government, Dr. Keller also taught mathematics and statistics at George Washington University and at George Mason University.

Dr. Eisenberg works in the area of combinatorial and geometric group theory, focusing on geometry and algorithms in infinite discrete groups. He received his Ph.D. in 2015 from Tufts University under the direction of Kim Ruane, and was previously a Visiting Assistant Professor at Oklahoma State University.

Andrew Eisenberg and Charles Burnette

Dr. Burnette received his Ph.D. in 2017 from Drexel University, and joins SLU after spending one year at the Institute of Statistical Science at Academia Sinica in Taipei, Taiwan. His research is in analytic combinatorics, especially through the use of probabilistic methods and asymptotic enumerations.

# Alumni spotlight

## Nate Williams, MA ‘11, BA ‘09

Nate Williams is married with three children, and in his fourth year working at Allstate as an actuary. He lives outside Chicago, and seems very domestic: he is buying mouse traps. His house backs up to the woods, and the field mice set up shop in his garage. Nate says he doesn't mind the mice, but they attract snakes and the snakes drop down from the garage door when it opens. So, he's at a hardware store buying mouse traps, and while shopping, he told us what else he’s been up to since graduation.

In 2009, Nate matriculated with degrees in mathematics and physics. As an undergraduate, Nate took probability and statistics courses, but it didn't really click until he taught introductory statistics while a student in the SLU graduate mathematics program. At that point, Nate decided to become an actuary. As a second year Master's student, Nate twice took the first actuarial exam, but readily admits that he didn't study enough and failed both times. With graduation coming, Nate looked into teaching and found a job teaching mathematics at MICDS high school.

Nate says he enjoyed teaching, and liked his year at MICDS, but was still set on an actuarial career. He discovered he could see results from his prior attempts on the exam, and armed with that information, he set himself to studying seriously. He took the exam in December of 2012, and passed. By February, he had landed an actuarial job at a health insurance company in Albuquerque, New Mexico. After a year, his company was purchased by a Blue Cross affiliate and he moved to Seattle. Unsatisfied with his prospects for advancement in Seattle and hoping to move closer to his family in St. Louis, Nate reentered the job market. He found a position at Allstate working on personal lines insurance, and has remained there since.

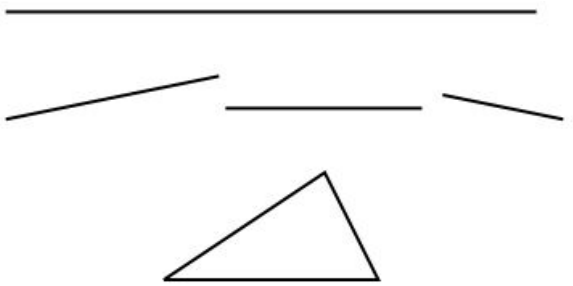
Personal lines insurance covers property and casualty for individuals, as opposed to businesses. One of the main aspects of Nate’s job is called “running an indication”. He studies historical losses, projects to the future, and sets rates for future policies. Nate says that the personal side of insurance is considerably smaller than automobile and homeowners, so he has more opportunities for creative analysis. He continues to take actuarial exams, which are necessary for advancement and deal with material he uses immediately in his job. Allstate provides support and study time for the exams, and Nate has nearly completed requirements for Associateship in the Casualty Actuarial Society.

A native St. Louisan and a DeSmet graduate, Nate originally chose SLU because of its Jesuit identity. He and his family still maintain a strong connection to SLU: his father is a longtime employee of the College Church, and all three of Nate's children were baptized there. Nate says he still lives the mission of service to others. At Allstate, he is involved in the “Bring Out The Good Month”, which encourages volunteerism and charitable giving. Nate says that his work as an actuary has real consequences for people and impacts their lives, and that responsibility makes his work interesting.

# The Billiken challenge

## Triangle Making

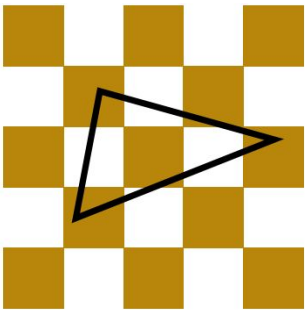
Randomly select any two points on a line segment, and cut the segment at those points.



What is the probability that the three resulting segments can be formed into a triangle?

## Triangle Placing

Given an infinite checkerboard colored light and dark, and an arbitrary triangle.



Is it always possible to place the triangle on the board so that all three of its corners lie on the interior of dark squares?

For solutions, see our department website at http://mathstat.slu.edu/about/newsletter

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