Welcome to Spring Term in the Math & Stats Department!

Winter is gone and spring is in the air! The snow has melted and Carleton residents of all stripes are now taking advantage of the sunshine and warmer temperatures as we begin the final term of this academic year. And we in the math & stats department are just as excited about the next ten weeks in the department as we are about the change in seasons!

Not only are students taking a whole slew of exciting classes (set theory, advanced statistical regression, and topics in combinatorics being only a few!), soon we'll be welcoming newly-declared sophomore math & math/stats majors into the department! Other things to look forward to include comps talks, the annual Math Across the Cannon event, and the department picnic. Get ready: this spring term is sure to be tons of fun!

Annual Departmental Student-Faculty Game Tournament

Ahhhh, the sweet days of springtime. Plenty of sunshine, everything's greening up, and . . . the departmental student-faculty board game tournament, of course! This year's game is Bananagrams. Don't know how to play? It's quick to learn, and there are two copies of the game available to use in the Math Skills Center for you to practice with. Sign up on the white board by noon on Monday (April 4); next week the tournament bracket will be announced. You can then set up a mutually convenient time to play your opponent and indicate the winner on the bracket! It's lots of fun; join in!

Mathematics & Statistics Comps Talk:

Thursday, April 7 at 4:00 - 4:30 p.m. in CMC 206

Title: Statistical Analysis of Streakiness in Sports
Speaker: Branden McGarrity
The concept of streakiness tends to come up often in the context of sports. A team on a “winning streak” is thought to have a better chance of winning their next game. A “streaky” player is expected to go through stretches of consecutive good/bad games. What does it mean to be truly streaky? Are some teams/players more streaky than others? Is streakiness an intrinsic characteristic of some teams’ abilities, or are streaks simply the result of random chance? This talk will examine the idea of streakiness in sports by focusing on the performance of major league baseball players and teams.

**Welcome to the Math & Stats Major!**

Tuesday, April 12 at 12:00 - 1:00 p.m. in CMC 206

Newly-declared and current majors are invited to join the Department of Mathematics and Statistics in welcoming our new students to the major on Tuesday, April 12th from 12:00-1:00pm! We will kick off our introduction to the major with some fun games, food and cake! This will also be an opportunity to learn about some of the upcoming events in the department. We hope to see you there, whether you're new to the department or not!

**Meet This Term's New Professor:**

Becky Patrias

This isn’t Becky's first term at Carleton: she also taught here last spring! She's currently finishing her PhD at the University of Minnesota, a program she entered immediately after graduating from Carleton with a degree in mathematics in 2010. The area of math she conducts her research in is algebraic combinatorics.

On math, Becky says “one of my favorite parts of math is how it's a constant process of encountering something new that looks impossibly complicated and chipping away at it until it seems completely natural. It's amazing! You don't often notice the transition until one day you look back and realize how far you've come.” She's also excited to be back this term: "I'm excited for the energy that Carleton students bring to the classroom! I taught Calc II last spring trimester, and I loved the interest and curiosity I saw in my students."

Becky is teaching both Calc II and Calc III this term, so even if you're not taking a class with her, you're likely to see her around!

**Carls Take Home Pizza Trophy at the Konhauser**

Near the end of last term three teams of Carls competed in the 24th annual Konhauser Problemfest, which was held at Macalester College. The results were not available when the last Gazette of winter term went to press, but we can now announce that the Carleton team of Raphael Liu, Derek Shang, and Frank Yang finished in first place out of twenty-one teams. Also making strong showings were the Carleton teams of Marshall Ma, Ian Seong, and Ben Stone, who finished in fourth, and Will Hardt, Anna Meyer, and Soren Schlassa, who finished in sixth. Because the first-place team was from Carleton, the pizza trophy (a handsome granite model of a dissection proof of a theorem in geometry) will spend the next year in the department reception area. Kudos to all who competed!
In recent years, law enforcement officials have been relying on a technique called geographic profiling to narrow down the possible identities of serial criminals. Geographic profiling was originally used in the field of epidemiology (first and most famously, during the 1854 Broad Street cholera outbreak in London): new cases of disease are plotted on a map in an attempt to identify potential geographic sources of infection. Criminal geographic profiling is based on a simple assumption: that serial criminals tend to commit crimes near their homes. Plotting out the locations of these crimes yields a doughnut shape on the map: offenses occur neither very close to the criminal's home, nor very far away.

To demonstrate recent advances in the technique, Steven le Comber (who works at the University of London) attempted to use geographic profiling to identify the street artist Banksy early last month. Le Comber's new method, called Dirichlet process mixture modeling, improves on older methods by allowing for multiple "sources" that can be the center of a ring of criminal activity-- a criminal's home, workplace, or a frequent stop on a commute, for example. For each address on a map, the probability that the given criminal activity arose from that site is computed and the most likely suspects are named.

So who did the analysis point to? A man named Robin Gunningham living in Bristol. And while we can't be certain if Mr. Gunningham truly is Banksy, he was also fingered as a suspect in 2008. This analysis suggests that those fingers may have been pointing in the right direction.
Are you looking for a job to fill your work-study hours next year? The Mathematics and Statistics Department is looking for course graders, lab assistants, someone to edit the Gazette, and an office assistant. Applications are due by April 22 and can be found at https://apps.carleton.edu/curricular/math/resources/.

**Summer Research Opportunity in Applied Math**

Would you like to spend your summer immersed in cool applied math problems and get paid to do it? Join Rob Thompson's research group! Several project topics are possible, including the mathematics of shape recognition, automated jigsaw puzzle assembly, processing of 3d scan data, and symmetry-based methods for smoothing curves and surfaces. As part of the research experience, we will coordinate events with a larger student research group in St. Paul. Please contact Rob (rthompson) for more details or if you are interested. People of all backgrounds and experience levels are invited to participate and learn more!

**Job & Internship Opportunities**

**Penn State University: SCRI M Summer Scholars 2016 REU**

The Network for Sustainable Climate Risk Management (SCRI M) links a transdisciplinary team of climate scientists, economists, philosophers, statisticians, engineers, and policy analysts to answer the question "what are sustainable, scientifically sound, technologically feasible, economically efficient, and ethically defensible strategies for managing the risks associated with climate change?" Starting May 25, 2016, The SCRI M Summer Scholars program will run for 9 weeks. Students interested in SCRI M themes will be able to pursue self-directed research projects (e.g., modeling experiments using a simple Earth system or analyzing geophysical datasets).

Housing, travel support, and a stipend of $4500 are provided for all participants. Applicants must be undergraduate students or recent college graduates with background in a SCRI M-relevant discipline (including applied mathematics!); international students are welcome to apply. But hurry up-- the deadline for applications (accepted at scrimhub.org/summer-scholars) is April 10th!

**World Architects & Engineers: Accountant**

World Architects and Engineers, an architectural and engineering firm with headquarters in downtown St. Paul, is seeking a highly motivated, professional, and dependable individual to join their staff as an accountant. The position requires knowledge of spreadsheet software: duties include processing accounts payable and accounts receivable, reconciling ledger accounts, and assisting in the preparation of monthly financial statements.

World Architects and Engineers offers a competitive wage and benefits including health and dental insurance, life insurance, disability, flexible spending accounts, and a 401(k) plan. Interested candidates should send a cover letter and resume to the recruitment email: opportunity@worldae.com. Applications are also accepted via the Tunnel; both are due no later than June 3.
Problems of the Fortnight

Solutions to these problems are due by Tuesday, April 12 at noon.

1. As this Gazette goes to press, the fourth-grade teacher at Wohascum Elementary School is bracing herself for what might happen this April Fool’s Day. Last year on April 1, she came into the classroom at the scheduled time for math class, and found the following equations on the blackboard: \(1 \times 2 = 7, 6 - 6 = 3, 5 + 5 = 1, 4 - 8 = 9, 1 \times 3 = 4, 9 + 4 = 9\). When she asked for an explanation, the students assured her that all the equations were correct; they just happened to be in code. In the code, each of the digits from 1 to 9 is consistently replaced by a new digit (with different “code” digits corresponding to different original digits); similarly, each of the operation symbols \(+, -, \times\) is consistently replaced by a new operation symbol.
   
   a) What were the (correct) equations originally, and how do you know?
   
   b) Suppose the students had encoded the new equations (on the blackboard) again using the same code, and then encoded the resulting equations using the same code for the third time, and so forth. After how many encodings in all would they have arrived back at the original equations?

2. Suppose you have an unlimited supply of each of two kinds of rectangular blocks, one with dimensions \(2 \times 5 \times 11\) and one with dimensions \(3 \times 7 \times 13\). Can you assemble such blocks to form a single large block of size \(150 \times 200 \times 5000\)? If so, explain how you know it can be done; if not, explain why not. (Of course, you are allowed to put the blocks in any orientation.)

   Will Hardt solved the second problem from February 19 and the first problem from March 4; he is certainly entitled to a B.B.O.P. item (and should stop by CMC 217 to claim one). Partial solutions to both problems from March 4 arrived from John Snyder (off campus in Oconomowoc). Alas, there was an error in the phrasing of the second problem from March 4, which destroyed the intent of the second part of that problem. I just discovered this, and intend to run a corrected version of the problem in the next Gazette. Apologies!

   - Mark Krusemeyer
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