Goodsell Gazette

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Meet Your New Professors!

Mike Cohen

Mike, originally from Dallas, Texas went to Pomona College before going on to recieve his masters and PhD from the University of North Texas. Mike is interested in many aspects of math including topological goups, which act on one dimensional manifolds like the circle and real line. He is especially interested in the actions which are required to satisfy a smoothness condition like differentiating. During his free time, Mike likes to cook including barbequeing and making fried food! He also plays the basoon and is an avid rock climber. Mike is excited about teaching at Carleton and working with students who have already shown a great energy level and enthusiuasm to learn. He is teaching Calc I and III and will be teaching Calc II, Differential Equations, and supervising a comps group this winter and spring.

NUMS 2018

Date: Tuesday, October 2
Location: CMC 206

The Northfield Undergraduate Mathematics Symposium (NUMS) is an annual event sponsored jointly by Carleton and St. Olaf. This year the event will be held on October 2 at Carleton College in CMC 206 from 3:40-7:40pm, with a break for dinner (provided!) at 5:20pm. There are five Carleton speakers (Clara Buck, Aniruddha Nadiga, Keenan Ronayne, Nathaniel Sauerberg, and Ian Seong) and three St. Olaf speakers (Jakob Hofstad, Kyla Pohl, and Julie Yuldasheva). We hope to see you there!

Schedule of Talks

3:40 - 4:00 pm Drawing three trees at once - Edge-disjoint Tree Representation of Three Tree Degree Sequences
Ian Seong, Carleton College

4:05 - 4:25 pm On Solvable Leibniz Algebras with Abelian Nilradical
Kyla Pohl, St. Olaf College

4:30 - 4:50 pm Spectral Analysis of a Neural Field Model
Keenan Ronaye, Carleton College

4:55 - 5:15 pm Linear Factorization of Hypercylic Functions for Differential Operators
Jakob Hofstad, St. Olaf College

5:20 - 5:55 pm Dinner (will be provided)

6:00 - 6:20 pm Special Sets of Vertices in Paley Graphs
Clara Buck Carleton College

6:25 - 6:45 pm Lattice Based Cryptography and Fully Holomorphic Encryption
Aniruddha Nadiga, Carleton College

6:50 - 7:10 pm Constructing Generalized Gelfand-Graev Representations
Julie Yuldasheva, St. Olaf College

7:15 €“ 7:35 pm Exploring Upper Bounds of Graph Proper Diameters
Nathaniel Sauerberg, Carleton College

Summer Activities Lunch

Are you wondering how you might spend next summer? Do you get hungry at lunchtime? Come to CMC 209 on Tuesday, October 9 at noon to satisfy both these needs! A few math and statistics majors will be available to answer your questions and discuss their experiences with internships or research this past summer. Free lunch will be served.

Problem Solving Group

If you have always really enjoyed the problem-solving aspect to your classes, then the problem-solving group is just for you. Come join us in CMC 328 from 4:30-5:30 on Wednesdays, where we will work on solving some fun and challenging math problems together, and learn some strategies for solving them. Students at all stages of their Carleton careers are welcome.

Rafe Jones will be hosting the session. You can contact him for more information at (rfjones@carleton.edu).

Putnam Signup Time is Here!

Fall term is just getting underway, but it's already time to register for this year's William Lowell Putnam Mathematical Competition. As many of you know, the €œPutnamâ€ is the granddaddy of all college math problem-solving contests - a challenging exam focusing on mathematical insight and ingenuity. Typically, several thousand undergraduates across the United States and Canada participate, and the median score is usually less than 10 out of a possible 120. Whether you've taken the exam before or are considering taking it for the first time, you'll probably enjoy getting experience with past Putnam problems (and learning some new problem-solving strategies) at our weekly problem-solving group, which meets every week on Wednesday, from 4:30 to 5:30 in CMC 328.

This year the Putnam will be held on Saturday, December 1. That's during our winter break, but we'll gladly make arrangements for you to take the Putnam at another college or university. If you'd like to sign

up, or just have questions about the contest, contact Rafe Jones in person (CMC 226) or via email (rfjones). Act soon! Although the Putnam is still more than two months away, we have to submit a participant list soon, so your deadline for signing up is today, September 28, by the end of the day.

Student Research Symposium

The Student Research Symposium will take place on October 19 in the Weitz Commons. All students who have done summer research are encouraged to participate. Students must register by 5pm Friday, October 5.Registration can be found at
https://apps.carleton.edu/campus/ltc/calendar/student_research/.

Minnesota Undergradute Data Analytics Competition

Consider participating in this year's Midwest Undergraduate Data Analytics Competition (MinneMUDAC)! Two years ago first place went to a group from Carleton. There are cash prizes and you will learn new statistical techniques and get experience giving an interesting presentation about your analysis. If you're interested in registering, or have questions, please contact Adam Loy. This year, the challenge will focus on predicting voter turnout. Student teams will have several weeks to analyze data before the main event on Nov. 3 in Eden Prairie. This competition will provide real world experience with a real world problem, as well as real career and internship opportunities: there will be active recruitment both at the event and afterward, and of course the chance to win prize money and bragging rights. Registration is now through mid-October with data release coming in early October. More than one team from the same college or university may participate. Individual students may only join one team. There is a limit to three teams from the same college department. For more information, visit: http://minneanalytics.org/minnemudac/.

Winter Break Research Funding Opportunity

The Kolenkow-Reitz fellowship provides research support for Carleton students working with non-Carleton science and math faculty at another institution during the summer or over winter break. These research opportunities are intended to encourage Carleton students' development as scientists and their exploration of mathematics and the sciences as a possible career. Awards fund student stipends ($440/week for full-time work) for up to 3 weeks during winter break and can include expenses for travel, lodging, and meals. No award will exceed $1500. Note that students must work full-time in order to qualify. Carleton students are eligible to apply for this funding. Before applying, students should have already contacted and discussed the nature and timing of their project with the person they are planning to work as well as a faculty member at Carleton who can vouch for the project. Because the intent of the fellowship is exploration in STEM fields, priority is given to students who have completed coursework related to the proposed research, but who have not yet had a significant funded research experience (7 or more weeks). Please note that previously funded students through the Kolenkow-Reitz Fund (winter break or summer) are less likely to get funded, but are still eligible to apply. The application deadline is Thursday, October 4, 2018 at 5:00 p.m. More details can be found in the application form, which you can find here: https://apps.carleton.edu/mathscience/faculty/studentresearchaway/.

Stats Volunteering Opportunity

The CCCE is currently partnered with the Northfield Community College Coalition, who are looking for student volunteers to help tutor some of their adult college students in introductory statistics. Tutors would work with students in the evenings, and there would be a very flexible schedule. Anyone who is interested can email Patrick Wigent (wigentp@carleton.edu) for more information.

NEW Bioscience Programs

University of Colorado - Denver

The Computational Bioscience Program brings a pioneering new approach to computation that advances human health and the molecular understanding of life. Founded and directed by Prof. Lawrence Hunter, the PhD program is globally recognized for its research and teaching of computational biology and bioinformatics at the University of Colorado's Anschutz Medical Campus. The program is designed to produce graduates with depth in computational methods and molecular biomedicine, an intimate familiarity with the science and technology that synthesizes the two, and the skills necessary to pioneer novel computational approaches to significant biomedical questions. CU Denver also offers a Biomedical Informatics Summer Training Fellowship. Applications for both programs are open right now. For more information, visit: compbio.ucdenver.edu.

Georgia Tech

The Ph.D. in Quantitative Biosciences is an interdisciplinary program at Georgia Tech, founded in 2015, that includes more than 50 program faculty from six home schools in the College of Sciences. The program has three classes of doctoral students, as noted in our Director's Highlights for fall 2018. Quantitative Biosciences integrates the physical, mathematical and biological sciences, enabling the discovery of scientific principles underlying the dynamics, structure, and function of living systems. For more information, visit: http://qbios.gatech.edu/.

Upcoming Events

Week 4, Tuesday October 2, 3:40 - 7:40pm
NUMS - CMC 206

Week 5, Tuesday, October 9, 12:00pm
Summer Activities Lunch - CMC 209

Job & Internship Opportunities

University of Chicago, Research
Professors Sendhil Mullainathan at the University of Chicago Booth School of Business and Ziad Obermeyer at UC Berkeley's School of Public Health are hiring full-time research assistants to start around July 1, 2019. These full-time RAs will be working on projects in health data science. The ideal candidate is someone who wants to do research for a year or two before applying to graduate school. This position is excellent preparation for Economics PhD programs and medical school. For more information and to apply, visit: http://www.nber.org/jobs/Mullainathan_ad.pdf.

New York Yankees, Associate Positions
The New York Yankees are seeking talented students for a couple of positions within the Baseball Operations Department. They are looking to fill the following positions for the coming year: Associate,

Quantitative Analysis: a hands-on experience with quantitative projects related to player evaluation, player development, and/or in-game strategy and Associate, Baseball Operations: a hands-on experience with various important baseball operations tasks, including advance scouting, data collection and entry, and video charting. For Quantitative Analysis role, they are looking for students with strong quantitative reasoning, familiarity with statistical programming, and a passion for baseball. For the Baseball Operations role, they are looking for candidates who are highly detail-oriented and have solid working knowledge of current baseball players, rules, and strategies. Both positions are a year-long position intended for recent graduates (including those graduating in or before 2019). The main difference between the roles is that the Quantitative Analysis position is almost solely dedicated to statistical analysis to inform baseball operations decisions. The Baseball Operations position involves less of the quantitative side (although statistical projects will come up) and deals more with assisting the advance scouting process, charting games from video, and general baseball operations administration. Applications are rolling and we get a large volume of applications, so we encourage students to apply as soon as possible. Apply via the links above and more information can also be found on the Tunnel.

Southern Teachers Agency, Teacher

Are you interested in a career in education? Well, Southern Teachers has already begun recruiting the brightest and best seniors to teach the next generation! Southern Teachers is the premier placement service for private school teacher jobs in the South. Since 1902, teachers, coaches, and administrators have found more jobs through Southern Teachers than from any other source. Hundreds of schools around the South will list about 3,000 jobs with the agency for the next school year. Private schools are looking for candidates who have a strong background in math and are able to share their passion with students; they usually do NOT need a teaching license or education major. For more information, visit: https://southernteachers.com/Contents/Home/SeekingJobs?utm_source=department%20email

Problems of the Fortnight

To be acknowledged in the next issue of the *Gazette*, please send your solutions to me by noon on Tuesday, October 9!

(1) Let A be a subset of n-dimensional Euclidean space $\mathbb{R}^n$. A set S is sometimes called a *Steinhaus set* for A if it has the following property: for every subset B of $\mathbb{R}^n$ which is congruent to A, B intersects S in exactly one point. Stated otherwise, if $T : \mathbb{R}^n \to \mathbb{R}^n$ is any rigid motion (i.e. composition of translations and rotations), then $|T(A) \cap S| = 1$.

Let me emphasize that we are making absolutely no requirements on the set S other than that it be a subset of $\mathbb{R}^n$: it need not be open, closed, connected, bounded, convex, Borel, measurable, star-shaped, nor any other epithet you may summon to mind.

(a) Suppose A consists of exactly two points in $\mathbb{R}$. Does there exist a Steinhaus set for A in $\mathbb{R}$? Explain your answer.

(b) Suppose A consists of exactly three non-collinear points in $\mathbb{R}^2$. Does there exist a Steinhaus set for A in $\mathbb{R}^2$? Explain your answer. What if the points are collinear?

(2) Lenny and Oggy each have an infinitely differentiable function whose domain is $(0, \infty)$. Lenny's function has the property that for every real positive x, its second derivative at x is twice the value of Oggy's function at x divided by x^2. Curiously, Oggy's function has the property that its second derivative is twice the value of Lenny's function at x divided by x^2. Put otherwise,

$$L''(x) = \frac{2O(x)}{x^2} \text{ and } O''(x) = \frac{2L(x)}{x^2}$$

where L denotes Lenny's function and O Oggy's. Given that $L(1) = O(1) = 1$, $L'(1) = 1707$, and $O'(1) = 1789$, find Lenny's function explicitly.

I would like to extend congratulations to Carleton students Ben Hafner and Hiromichi Ueda, both of whom submitted correct solutions to both Problems of the Fortnight posed September 14! May their names be chiseled into the immortal granite of Thog's wheel, to be solemnly regarded throughout the eons. I also received an elegant solution to both problems from "Auplume." Thanks and good luck with the new problems!

-Mike Cohen

Editors: Saahithi Rao, Owen Biesel
Problems of the Fortnight: Mike Cohen
Web & Subscriptions: Sue Jandro