



# Goodsell Gazette

Carleton College  
Northfield, MN 55057

The newsletter for the Carleton mathematics and statistics community.

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## Congratulations, Seniors!

A lot has happened in the department this past year: we welcomed Alex, Kate, Mike, and Caroline to the faculty, and wished Sam Patterson and Steve Kennedy well on their retirement; Carleton students shone at four separate contests and problemfests; and "Math at the Cow" became "Math at Imminent"! But for many of us here, the biggest change will be when our beloved seniors graduate and move on to the next chapter of their lives. We've asked each of them to share some of their plans for the future, favorite math/stats memories, and advice for navigating life at Carleton, please enjoy what they have to say, and join me in congratulating them on a job well done!

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## Plans Post-Graduation

"I will be working as a junior data analyst at Snowflake Computing in San Mateo, CA." (Yuta Baba)

"I'm going to grad school for Human-Computer Interaction at the University of Michigan, Ann Arbor." (Nupur Bindal)

"Next year I will be working as an RA at the Fed in DC where I will be doing a mix of economic research and policy work. I hope to eventually go to grad school." (Sara Canilang)

"I will be heading to the University of Minnesota in the fall to pursue a PhD in Math." (Patty Commins)

"I'm working as an economics research assistant at the University of Chicago." (Fabio da Silva Soares)

"I'm going to be working at the Federal Reserve Board of Governors as a Research Assistant. I will

"I will be pursuing a PhD in evolutionary biology at Harvard starting this fall. I am planning to do a combination of both wet-lab (experimental evolution) and dry-lab work (theory, computational, stats method development) during my PhD. In the long-term, I hope to move out of the US to some place where I can have a good work-life balance as a research scientist." (Alief Moulana)

"I will be working for Optum as a Business Analyst in their Advisory Services group. Optum is a branch of UnitedHealth Group; the role will be primarily healthcare consulting and I will be based in Eden Prairie." (David Pearl)

"I will be working with AmeriCorps in the cities next year with plans of going to graduate school in Biostatistics within the next couple of years." (Saahithi Rao)

be building models of financial markets in foreign countries and their influence on the American economy." (Noah Feldman)

"I will be in LA this summer working for the US Air Force Office of Scientific Research on Application of Convergent Cross Mapping to Chemical Reactions with RIPS-LA. After that, I plan to be in France teaching English to elementary students." (Brianna Fitzpatrick)

"I'm moving back to the Philadelphia area to look for a software oriented job. I might apply to grad school in math or theoretical computer science in the future." (Josh Gerstein)

"I will join the Boston Consulting Group in its Minneapolis office!" (Pedro Girardi)

"I am in the Carleton teacher licensure program. This fall, I will student-teach at a high school in St. Paul for about 10 weeks under the supervision of an experienced teacher. After that, I will receive a license to teach mathematics to grades 5-12." (Noah Goldman)

"I have not decided yet, but will most likely be following my psychology comps topic and researching the effect of mindfulness in a large university." (Marshall Ma)

"Next year I will be working in Littleton, CO for Johns Manville, a Berkshire Hathaway company, as an account specialist." (Dylan Rye)

"I will be going to University of Wisconsin-Madison for a Math PhD track." (Ian Seong)

"I'm going to grad school for computer science." (Kiran Tomlinson)

"Next year I'll be going to graduate school to get my PhD in chemistry at the University of Washington Seattle." (Nick Vetterli)

"This fall, I will start my PhD in psychology at UC San Diego, mainly studying attention, perception, and memory. Long-term plans are subject to change, but at the moment I would be psyched (pun-intended) to end up teaching at a place like Carleton." (Janna Wennberg)

"I am going to be a PhD student in Computer Science (specifically computer vision, AI, and machine learning) at the University of Minnesota Twin Cities." (James Yang)

"Next year I'll be working in Minneapolis as a transfer pricing consultant at BDO." (Christian Zaytoun)

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## **Favorite Memories!**

"One of my favorite Carleton stats memories was comps. My comps members were great to work with, and we met four times a week (wow that's a lot!), learning about spatial statistics and more importantly having a lot of fun." (Yuta Baba)

"One of my favorite Carleton math department memories is of when Professor Steve Abbott came to Carleton for a day and lectured about the exponential function and other interesting analysis topics. He was very engaging and he posed a lot of interesting questions that made me second-guess lots of things that I thought I knew. It was also just cool to meet the author of the textbook for my first

"When I found that the technique in my stat comps (factor analysis) could actually be applied to a real world dataset (an ongoing study in the social psych lab where I work) and generated very clean results, I was really amazed." (Marshall Ma)

"Whenever Eric started writing on the walls. In combinatorics, he wrote on the wall of Boliou after running out of space on the chalkboard during an outdoor class. In combinatorial games, he continued writing with red and blue chalks on the 206's wall to emphasize the infinite sequence of some game--the drawing only disappeared a week

upper-level math class; he seemed like a celebrity."  
(Andrew Biehl)

"I have loved every math class that I have taken here and I have really enjoyed learning from every professor that I have had the opportunity to learn from." (Andrew Biehl)

"My fondest (and weirdest) Math/Stats memory: Summer research with Strawberries (aka Fares). Ever been to a Math conference with your research partner dressed in a strawberry suit? I have."  
(Nupur Bindal)

"One certain Albanian monk from combinatorics... blockus in the CMC... proving that  $2+2=4$  in two different classes" (Robert Browning)

"Playing banagrams and blokus in the skills center." (Sara Canilang)

"One of my favorite math/stats memories is road tripping to the Nebraska women in math conference with Milena, Marcella, and Kate - it was a ton of fun!" (Patty Commins)

"Classes are usually fun and thought-provoking, and the faculty is incredible. However, I must say that the memories of working on problem sets with other people are the ones that will stay with me for sure." (Fabio da Silva Soares)

"Math at Imminent is always so fun to talk math, play banana-grams or even the classic set."  
(Brianna Fitzpatrick)

"Another highlight is getting to know all of the professors better in office hours. Also, getting to do homework with friends and making new friends in the department has been such a pleasure."  
(Brianna Fitzpatrick)

"Working with Caroline and my awesome comps mates will go down as such a rewarding experience." (Brianna Fitzpatrick)

"I really enjoyed learning Galois theory (in MATH 352, 2018)." (Josh Gerstein)

"Learning about infinite series at my Calculus II class with Steve Kennedy, back in Fall term

later. I propose that the department should have an installation to demonstrate Eric's mural artistry."  
(Alief Moulana)

"My favorite math/stats memory was presenting my group comps in February. I was proud to have completed a project that represented the culmination of many math classes and lots of hard work paid off. It was especially meaningful for me to have my parents and friends there to support my group and me!" (David Pearl)

"Comps! Bouncing ideas off my group-mates and getting to work on project that we could call our own using "real" data was really fulfilling!" (Saahithi Rao)

"Working on problem sets with other students, studying in the skill center and talking with Russ, and meeting other women and non-binary students through SWiMS has been awesome." (Saahithi Rao)

"Rob Thompson invited his Fourier Series Class to his house for pizza as a final celebration of finishing the class. The pizza was delicious and it was the highlight of my term!" (Keenan Ronayne)

"So there used to be this room right at the top of the staircase on the third floor. What made it so cool was that the room had a table made out of whiteboard material so you could draw on it. Super cool. It was usually unofficially reserved for senior comps groups to meet and work in. But sometimes there was no one there and you could sneak an hour or two of work in there as a non-senior. Those moments were the best. Anyway, it's now an office. Bummer." (Tim Schoch)

"The best memory I had was the Konhauser Problemfest in 2019. It was held in St. Olaf, but we had more teams from Carleton participating than St. Olaf, and we were victorious in the end and claimed the Pizza Trophy!" (Ian Seong)

"Finding CeeLo Green quotes to put on an abstract algebra final paper on the Sylow theorems." (Kiran Tomlinson)

"The most interesting staircase to climb on -- Devil's

freshman year. After that day I probably knew I'd end up majoring in something Math related." (Pedro Girardi)

"Prof. Rafe Jones talked about his "ring of things" in Abstract Algebra I. The underlying set consists of physical objects: chairs, fruits, etc. The addition operation is to put the things near each other and call their union a "thing". The multiplication is to put two things in a blender and mix them together. Unfortunately, he forgot to make sure every thing had an additive inverse! But I hear Shady Ralph is selling some antimatter for \$1,000,000...." (Noah Goldman)

"In Differential Geometry with Rob Thompson, a student tried to claim that Hilbert was the most unfortunate name for a mathematician. This claim was quickly proven false by a counterexample attributed to Lipschitz." (Noah Goldman)

Staircase." (Haoyi Wang)

"I loved TAing Math 101 with Patty this year and struggling through related rates shadow problems together! Another gem is floating down the Cannon last spring with Alice Antia and Maria Briseño-Martinez (both 2018 majors). We ate Otter Pops and shared our favorite math memories of each other." (Janna Wennberg)

"Every time I see Mark Krusemeyer running down the stairs!" (James Yang)

"I think the memory that will stick with me the longest will be the late nights working with Dylan and Aaron in the CMC on Bayesian or Inference problem sets. No better feeling than watching that markdown document knit after a long day of work." (Christian Zaytoun)

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## **Advice for current or future math & statistics majors**

"My advice for current/future math/stats majors is to take a variety of courses offered at Carleton. You can even take courses outside of math/stats courses. I found it really cool to see when I was able to connect ideas from different disciplines to stats. Also getting to know your classmates is always great. You will learn so much from them!" (Yuta Baba)

"If I had to give one piece of advice to a younger math major version of myself, I would say try to reach out to both faculty and peers in the math department more often. It took me a while to get to know the math department community, but I am very glad that I did eventually. I wish I had more time being a part of this community." (Andrew Biehl)

"Take fun classes." (Robert Browning)

"Take advantage of all the resources available at Carleton. This includes PE classes, culture events, IM/club sports, dance/music classes, your

"A "major" or "minor" title may not mean too much as long as you are taking classes that are important to you and getting meaningful/useful experience out of them." (Marshall Ma)

"Do homework with your classmates--can be your friends or a random person sitting next to you. Even when you don't need help, sharing your ideas and figuring out problem with others will benefit the way you think about other problems and the way you write down your answers. Talking with my classmates when doing homework has definitely improved my proof-writing skills." (Alief Moulana)

"It is possible to be a successful math or stats major starting at Calc I -- I did it! Also, people at Carleton are really smart and so are you - don't forget that!" (Saahithi Rao)

"Go to office hours. It will help clarify any questions you might have with course material. Plus Carleton

professors, SHAC, etc. College is more than just academics. Also, hang out in the skills center and make friends with other math majors." (Sara Canilang)

"It is easy to be intimidated by students that come in with more experience or upperclassmen majors, but stick with it - they were once in your shoes, and with more time and practice you will be in theirs." (Patty Commins)

"Start problem sets early, no matter the course!" (Fabio da Silva Soares)

"If you're interested in a job in statistical consulting or research, then most employers will be interested in the concrete projects that you've done. This can include projects that you've worked on under professors, internships, end of term assignments, and extracurricular research. Try to build up a large, diverse portfolio of projects where you take various roles (part of a team, leadership, etc.) and that you can be proud of. They will pay off later in job interviews and on resumes." (Noah Feldman)

"My biggest piece of advice is to ask questions in class, trust me every question that is actually a question not a comment is always regarded highly to everyone in the class. Also, go to office hours even when you do not need help because this department has the most kind and amazing professors I have ever met. Lastly, if you want people to do homework with, then do it in the CMC because there are such amazing people who do work there!" (Brianna Fitzpatrick)

"If taking three to five math classes in one term with a reduced workload sounds fun, apply for BSM!" (Josh Gerstein)

"Get to know your profs, check/discuss your homework answers with friends, and be sure you're having lots of fun all the time." (Pedro Giardi)

"Underclassmen, it's OK if other people in your class seem to know much more about math/have a better foundation than you. Just be sure that you are enjoying your studies and learning. Not everyone gets to Carleton with the same

profs are all very nice and approachable." (Johnny Reichman)

"Go to office hours!!! The professors are what makes the math department so great. They are even more quirky than you and want to help you succeed!". (Keenan Ronaye)

"College will be stressful, but don't let the source of your stress be grades; i.e. your focus should be on improving your knowledge, not improving your grades. The latter comes from the former, but the former does not necessarily come from the latter. Only if I knew this before I became a senior..." (Ian Seong)

"Take advantage of the great math community! Talk to new people in the skills center, go to math events/talks, etc." (Kiran Tomlinson)

"My advice is to find a group to work through homework problems with. Other people will have different ideas and perspectives that will make working through problems more fun and interesting." (Nick Vetterli)

"Planning the course schedule is very important, especially for the courses that are offered only once in two years." (Haoyi Wang)

"Expect to be challenged or stuck and being organized can help overcome that. Being challenged or puzzled is a natural part of the math experience; in some ways its what makes it so fun. Of course, the fun part is actually finding out a solution to a really hard problem not being stuck. That's where being organized can help play a roll. Having scrap work that looks very neat and readable helps you realize what strategies you've tried, why have they failed, and what other ones you can employ next. Also, having a strategy and outlining what you need to do for a problem, can help you look at the question from a variety of different angles, thus opening more doors to explore in case a few of them get closed. In addition, this can also ensure that you make less mistakes that can totally derail you and cause several hours of severe hardship. Thus, the faster and sooner one can consistently be organized in

background, and that doesn't mean you cannot succeed if you work hard!" (Pedro Girardi)

"Embrace mathematics without letting it cloud out your vision of the rest of the world. There is math in every field, from English to philosophy to fire protection. You can also bring your experiences from other fields into how you perform, explain, or understand mathematics. Everything is connected, and you are more than just a "math person"! Even within mathematics, where we like to split up, say, measure theory and combinatorics, you can transcend boundaries if you only keep an open mind. (And how hard is it to ensure every neuron is contained in a sub-ball?)" (Noah Goldman)

"Create a space that you can call home at Carleton. Adriana Castillo (class of 2018) and I started an IM Basketball team (CLOBz) that has grown to a very large, loving family. We used our love for basketball as a way to create a family. CLOBz is 5 years old and looks to be in a great place to continue for more years! Finding and/or creating a family at Carleton will definitely help you in your strive for success." (Jeremy Hills)

their scrap work, the sooner they can get to enjoy the wonder of the problem and avoid the sense of utter frustration of wondering what to do next. In fact, it can help you solve even harder problems that may at first look completely overwhelming but are doable with a clear and organized mindset, and of course dogged determination." (Ned Wang)

"It can be tempting to internalize thoughts like, "I don't have a math brain." If you struggle with this, know that you are not alone and that tricky problems or classes are part of the process. Oh, and there is no such thing as a math brain." (Janna Wennberg)

"Definitely take a variety of courses from the Math/Stats/CS departments! Even though you feel like it is not pertinent to your long term goal, it will be fun and helpful one way or another." (James Yang)

## **Goodbye to the Seniors!**

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### **Comps Distinction!**

Many students do notable work in comps, but students earn Distinction in Comps for work exhibiting outstanding initiative and effort resulting in an exceptional level of some or all of the following: depth of understanding, creativity, synthesis, and effective communication. Congratulations to the following students, who have earned Distinction in Mathematics and Statistics Comps this year: Yuta Baba, Andrew Biehl, Matthew Carter, Patty Commins, Charlie Kapsiak, Saahithi Rao, Keenan Ronayne, Ian Seong, Kiran Tomlinson, and Nick Vetterli.

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### **Congratulations to Steven P. Galovich Prize Winners**

Each year the Mathematics Department awards the Steven P. Galovich Prize to the graduating senior or seniors who best embody the personal qualities of the former faculty member for whom the award is named. Steve Galovich taught in this department from 1974 to 1991, and he brought to his work

enthusiasm for and love of mathematics, a zestful joy of life, a great sense of humor, and compassion for others. The Galovich Prize was endowed by an alumnus, William Lang '74, who was affected by Steve's teaching and mentorship. This year the department is pleased to name Janna Wennberg and Ian Seong the co-winners of the Galovich Prize. Congratulations Janna and Ian!

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## **SWiMS+ Reception**

Next Tuesday, June 4, 2019, from 5-6pm SWiMS+ (Society for Women in Mathematics and Statistics) will host an end of year reception at the Alumni Guest House Library to celebrate our graduating seniors. Please RSVP at <https://forms.gle/4FJx6UvJyNkibPFB8> if you plan to attend. We hope to see you there!

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## **Upcoming Events**

**Week 10**, Tuesday, June 4, 12:00 - 1:00pm  
Math and Stats Department Picnic - CMC/Boliou Patio

**Week 10**, Tuesday, June 4, 5:00 - 6:00pm  
SWiMS+ Reception - Alumni Guest House Library

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## **Jobs and Internships**

### **Federal Reserve Bank - Kansas City, Research Associate**

The Research Associate position is great for someone considering a Ph.D. in economics or finance. Research Associates develop technical skills and are exposed to a broad range of economic research topics. Most Research Associates stay with the department for two to three years, at which point many return to graduate school. This opportunity is brought to you by Emily Pollard '16, so if you have any questions, you can reach out to Emily at [Emily.Pollard@kc.frb.org](mailto:Emily.Pollard@kc.frb.org). For more information and to apply, visit: <https://frb.taleo.net/careersection/jobdetail.ftl?job=259967&lang=en>

### **Schlumberger Doll Research, Data Science Intern**

The Applied Math and Data Analytics Department at Schlumberger Doll Research (SDR) is investigating the development and application of state of the art data science methods to measurement data pertaining to complex problems in the development of oilfields. The data are acquired inside wells using multi-physics measurements ranging from electromagnetic (optical, NMR, low-frequency EM, resistivity) to acoustical (ultrasonic, sonic, seismic). The intern will work with a senior scientist or within a team of scientists and domain experts to develop and implement new applications of machine/deep learning and/or interpretation frameworks such as probabilistic graphical modeling, leveraging extensive databases and cloud computing infrastructure available locally and throughout Schlumberger. Applicants should send a brief letter of intent and resume via E-mail to [LVenkataramanan@slb.com](mailto:LVenkataramanan@slb.com) with the reference MM-DA.

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## Problems of the Fortnight

Because this is the last *Gazette* of the academic year, solutions to these problems won't be acknowledged until fall term (and they can be submitted any time over the summer). However, if you are a graduating senior who would like to try to collect another B.B.O.P. item (or maybe a first-ever such item), you are encouraged to submit solutions more promptly; any solutions from seniors that reach me by noon on Tuesday, June 11 will be looked at during Senior Week, and maybe you'll then acquire something more to pack up as you leave Carleton.

1. It is a standard result that the set of lattice points (points with integer coordinates) in the plane is denumerable; that is, the set is obviously infinite, and it is possible to assign distinct natural numbers to all the points, for example by starting at the origin and "spiraling" outward. Note that if this particular method is used, the distance from each lattice point to the "next" one is always the same, namely 1. Can the "denumeration" also be done in such a way that the straight-line distance from each lattice point to the next is always the same *irrational* number? Show why your answer is correct.

2. Early in the baseball season, players' batting averages fluctuate considerably. For example, if your average after four official at-bats is .250 (because you got one hit), your next official at-bat will change this average by 150 points for the better or by 50 points for the worse, depending on whether or not you get a second hit. Suppose that as the result of an at-bat, a player's average (rounded, as usual, to three decimal places) went down by exactly 10 points. What are (theoretically) the smallest and the largest number of official at-bats that the player could have had after that particular at-bat?

To my delight, the problems posed May 17 drew a fair number of responses. Both problems were solved by Charlie Kapsiak and by "Auplume". The first problem was also solved by Pei Zhuan '06, and the second problem was also solved by Ben Hafner and by John Snyder in Oconomowoc. Charlie and Ben should each collect a B.B.O.P. item by the usual method, which is to stop by CMC 217 and consult with Sue Jandro.

Good luck with your end-of-term activities, have a great summer, and if you're graduating, keep in touch and best of luck!

- Mark Krusemeyer



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