QUEEN'S MATHEMATICAL
COMMUNICATOR
FALL 2025
An aperiodical issued by the
Department of Mathematics and Statistics
Queen's University, Kingston, Ontario, Canada K7L 3N6

WELCOME FROM THE HEAD, TROY DAY

Welcome to the latest issue of the *Queen's University Mathematical Communicator*. As always, this issue offers a snapshot of the remarkable range of activity taking place in the Department of Mathematics and Statistics. These activities span both theoretical and applied research, teaching and outreach aimed at students at many different stages of education, and a community that continues to support interest in, and appreciation for, mathematics and statistics.

Several of the stories in this issue highlight mathematics engaging directly with the world beyond the university. For example, **Felicia Magpantay's** work on modeling syphilis transmission, carried out in collaboration with public health partners, is an excellent example of how mathematical ideas can inform societal challenges. At the same time, this issue highlights foundational research in mathematics through **Thomas Barthelmé's** recent NSERC Alliance International grant, which supports an international collaboration with researchers in France on the study of Anosov dynamics. This area of dynamical systems focuses on understanding the long-term behaviour of systems that exhibit strong sensitivity to initial conditions, and addresses deep structural questions about stability and global behaviour. Both research themes, and many others represented in this issue, also provide excellent platforms for the training of our graduate students and postdoctoral fellows.

At the same time this issue provides a nice illustration of the strength of our academic community across career stages. We celebrate faculty milestones such as tenure and professional recognition (**Giusy Mazzone**), welcome new staff whose work is already helping to advance the department (**Jenalee Dymond**, **Christina Salavantis** and **Luisa Escolar**), and hear from postdoctoral fellows whose research and engagement in teaching enrich our departmental life (**Chris Kennedy** and **Neige Paulet**). There are also several student stories involving graduates, award recipients, and those participating in clubs, outreach, and events like Pi Day, which, together, highlight the department's achievements in education, mentorship, and intellectual growth.

I am also very pleased to highlight the continued vitality of our outreach efforts. Initiatives such as Math Quest and Rabbit Math demonstrate a long-standing commitment to sharing mathematics beyond our classrooms and to fostering interest of mathematics in younger students. These programs depend on sustained dedication from faculty, staff, and volunteers, and they are an important part of how the department connects with the broader community. We have also been very fortunate to receive a generous gift from an alumnus that will allow us to further strengthen these outreach efforts through a professorship named after one of our longest-serving faculty members, **Peter Taylor**. We are currently in the process of recruiting for this position, so stay tuned to learn more in the next issue!

Finally, this will be my last message as Head of the Department of Mathematics and Statistics. Despite the challenges of the past five years, there have been many truly rewarding aspects to this role. Chief among them has been the opportunity to work with such a collegial, committed, and thoughtful group of faculty, staff, and students. The department has navigated retirements, new appointments, program renewal, and broader institutional challenges thanks to the dedication, good will, and sense of humour shared across our community. I hope you enjoy this issue of the *Mathematical Communicator*, and I look forward to returning to my role as a regular faculty member within the department.

FACULTY NEWS

FELICIA MAGPANTAY

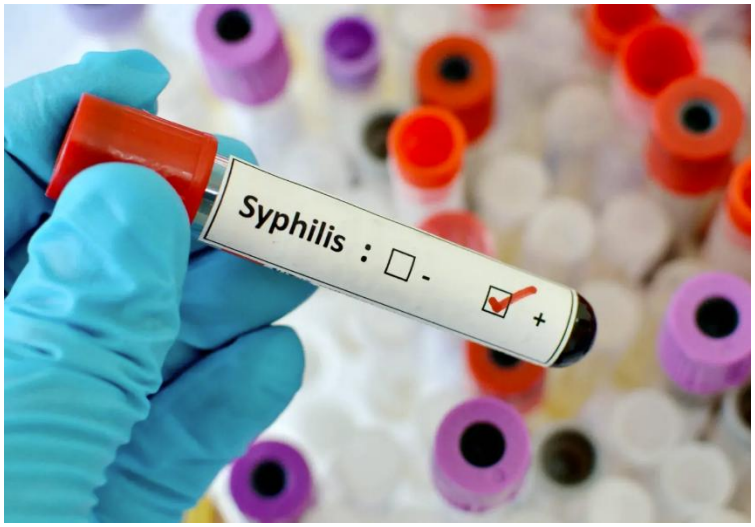
MATHEMATICAL MODELS ARE HELPING FIGHT SYPHILIS OUTBREAKS

Reprinted from the Queen's Gazette May 2, 2025.

In 2022, the Kingston, Frontenac, Lennox & Addington Public Health (KFL&A PH) region saw a sharp increase in syphilis cases. Local infection rates had more than doubled the provincial average, and reports of congenital syphilis, where the infection is passed from parent to baby, were on the rise.

Syphilis is a sexually transmitted infection caused by the bacterium *Treponema pallidum*. It can cause serious health complications if left untreated, but it is easily cured with antibiotics, usually a single dose of penicillin. Many people who are infected do not experience obvious symptoms, and without testing, infections can go undetected and continue to spread.

In response to the outbreak, a regional steering committee was formed, bringing together clinicians, academics, public health practitioners, and front-line health care workers. To support this effort, Queen's University researcher Dr. Sahar Saeed (Public Health Sciences) and Dr. Megan Carter (KFL&A PH) co-led a multidisciplinary Canadian Institutes of Health Research funded study called **SPRITE** (Syphilis Point-of-care Rapid testing and Immediate Treatment Evaluation). The team also included Dr. Felicia Magpantay (Mathematics and Statistics) and former PhD student Sicheng Zhao (Mathematics and Statistics). Their work, alongside that of other team members, contributed to the study's findings, which were published in **Royal Society Open Science**.



One of the first tasks for the team was to understand how the outbreak was spreading and how extensively it might affect the region. However, traditional mathematical models could not accurately capture the local epidemic, leading the team to explore new methods.

Dr. Magpantay and Zhao developed a mathematical framework aimed at better reflecting how syphilis spreads through local networks. Traditional models, based on the Susceptible-Infectious-Recovered (SIR) framework, assume everyone has the same chance of infecting each other, but that doesn't reflect the reality of how syphilis is typically transmitted. Read more.

GIUSY MAZZONE
AWARDED TENURE AND RECEIVES LICENSE AS A PROFESSIONAL ENGINEER

“Receiving promotion to Associate Professor is a tremendous honor for me, and I am very grateful to my colleagues and students for supporting me during my tenure period. I joined Queen’s in July 2019 as Assistant Professor. I received a Ph.D. in Mathematics from Università del Salento (Italy, 2012), and a Ph.D. in Mechanical Engineering from University of Pittsburgh (USA, 2016). Before joining Queen’s, I held a postdoctoral position at Vanderbilt University (USA, 2016-2019).

“I feel blessed to be living in an inclusive and supporting community like Queen’s University, and Kingston. I interact with wonderful students in our undergraduate and graduate programs. A special mention goes to the junior collaborators whom I had the pleasure to supervise. I am forever indebted to all of them for teaching me to be a better mathematician.

“My research interests are in applied mathematics for problems involving the interactions of fluids and solids. Think about a wind turbine turning on Wolfe Island, the blood flowing within your own veins and arteries, or the Earth beautifully rotating around the Sun. How and why these systems work is the result of delicate physical phenomena that I am exploring from the mathematical point of view.

A commemorative photo of the Canadian Symposium on Fluid Dynamics 50th Anniversary Dinner (June 2024, Queen’s University Club)

“Through my work, I made some progress in understanding how a fluid is able to “stabilize” certain motions of solids, it works somehow like the shock absorber that makes your car rides more enjoyable! Studying these problems needs few differential equations and proofs, but it is rewarding to see how math is ultimately able to explain phenomena that are part of our every-day life. All of this could not have happened without my interactions with students and colleagues scattered all around the world.

“I am currently serving as a Chair of the “Equity, Diversity, Inclusiveness and Membership Committee” of the Canadian Applied and Industrial Mathematics Society (CAIMS). I am working to support underrepresented groups toward a more diverse and inclusive mathematical community.

“Besides work, I enjoy spending time outside with my family, cooking (Italian cuisine is my specialty), and reading books.”

THOMAS BARTHELMÉ EARNS AN NSERC ALLIANCE INTERNATIONAL GRANT

Adapted from the Queen's Gazette March 14, 2025.

The **Alliance International** program provides support for researchers in Canada to work with leading international researchers from the academic sector, and to establish and grow international research collaborations and projects that have a high potential for impact in natural sciences and engineering disciplines.

Thomas is the principal investigator for the Canadian portion of the grant, titled Anosov Dynamics, working in collaboration with a team of French mathematicians funded by the Agence Nationale de la Recherche.

"It's important to celebrate and acknowledge the significant contribution Dr. Barthelmé is making to the university and our community," says Sharon Regan, Acting Associate Dean (Research). "I congratulate him on this significant professional and personal honour and look forward to seeing where his academic career takes him in the future."

The project studies dynamical systems, which is the qualitative study of systems that evolve over time.

"*Qualitative* here is important: we are interested in what kind of long-term behavior a system has. For instance, the kind of questions we ask include: Are there periodic orbits? Are there a lot of them? Are there orbits that go "everywhere"? The *quantitative* side of this story is the field of differential equations, where they want to find specific solutions – in other words to describe specific orbits."

Thomas joined the Mathematics and Statistics Department in 2016 after earning his Master's and PhD from the Université de Strasbourg. He has high praise for the department, his colleagues, and his students, one of the main reasons he decided to apply to Queen's and why he has chosen to stay.

"The Mathematics and Statistics Department is recognized nationally and internationally as a strong research department, with many colleagues doing excellent research. Moreover, it is a friendly department, with a good atmosphere between colleagues and we all work very well together. This kind of working atmosphere is not a given in academia (or anywhere), so I really appreciate that."

In addition to his cutting-edge research, Thomas enjoys teaching and supporting the student experience at Queen's.

"We are lucky to have exceptional students at Queen's, and many students are really interested in math, either in our math majors, or in the MathEng program. Teaching and discussing my work and the work of my colleagues with these students is always a pleasure… This grant will help me create a long-lasting relationship between researchers here (postdocs and PhD students) here and my colleagues in France."

NEW STAFF APPOINTMENTS, WE WELCOME:

JENALEE DYMOND: OFFICE COORDINATOR

“I am a proud alumna of the Concurrent Education program at Queen’s University, where I earned a Bachelor of Arts (Honours) in Psychology and a Bachelor of Education. Queen’s University has been my home for over 15 years – as an alumna, researcher, and staff member of the Department of Psychology. For the past 5 years, I was the Program Associate for PSYC 100 – the largest course on campus – supporting over 2,000 students annually. In this role I also administered the Participant Pool, generating over 13,000 hours of research participation for the Department of Psychology each year. Additionally, I have served the department in research roles, including managing the Attitudes and Persuasion Lab. My work in this lab spanned over a decade and included support for experiments, supervising research assistants, programming studies, analyzing data, and preparing manuscripts.

I am looking forward to my next adventure in the Department of Mathematics and Statistics!

In my spare time, I love to travel. In June, I visited the *other* Queen’s University in Belfast, Northern Ireland.”

CHRISTINA SALAVANTIS: GRADUATE PROGRAM ASSISTANT

“I came to Queen’s as a Sociology student in 1989. (1989-1993 Bachelor of Arts Honours Degree, 1994-1996 Master of Arts Degree). The position of TA Coordinator was created in the Sociology department (1999-2005). This position became one of the first Program Associate positions at Queen’s and was dissolved in July of 2025.

“I am a dual citizen of the U.S. and Canada. I came to Hamilton Ontario in 1985 under my father’s work visa for the Hamilton Tiger Cats Football Club and proudly became a Canadian citizen in 1996.

“My background experience is in teaching and learning at the first-year undergraduate level including developing Sociology curriculum, library research labs, training and supervising TA teams and managing accommodations and considerations. Other areas of the University I have worked in include teaching Enrichment Studies: SEEDS and E=MC2 programs for public school students, proctoring for the Queen’s exams office and facilitating workshops for the Centre for Teaching and Learning. I am an active union member of USW Local 2010.

“Aside from teaching sociological theory to young people what I value the most is living a quiet rural life near Charleston Lake Provincial Park, gardening and working on my 1850 farmhouse.”

LUISA REYES ESCOLAR:
UNDERGRADUATE PROGRAM ASSISTANT– MTHE

“I joined the Department in July 2025, and although it’s my first time working at Queen’s, I have already felt warmly welcomed and supported by a kind and collaborative team. Their spirit truly embodies some of the finest Canadian values: teamwork and a strong sense of community.

I was born in Barranquilla, Colombia — a vibrant, multicultural coastal city that has shaped me into someone who embraces new experiences and connections with warmth and openness.

I am a trained lawyer with experience working in large companies alongside multidisciplinary teams, before transitioning to a role with the Colombian government focused on supporting indigenous communities.

Outside of work, I’m a bit of a series binge-watcher and an aspiring full-time reader (you’ve got to check out *One Hundred Years of Solitude*). I also love cooking and making great memories with my family.”

CHRIS KENNEDY
POST DOCTORAL FELLOW

“I pursued my tertiary education in the physical sciences at the University of Toronto. It was a circuitous journey, initially gravitating from an interest in physics to pure mathematics during my undergraduate studies and then from geometric analysis to partial differential equations in my graduate work. A decade and three degrees later, I moved to Queen’s University to study fluid-solid interactions with Prof. Giusy Mazzone. Born and raised in Ottawa, it was also a great opportunity to move closer to family.

“I have worked on various research projects, applying probabilistic methods in geometric settings, studying nonlinear dispersive equations to model water waves, and exploring current problems in coupled systems. My work has led to conference invitations to Banff, Saskatoon, and Toulouse in southern France, all great opportunities to visit locales new and old as well as meet a wide gamut of people in and outside of mathematics.

“Kingston has been a great place to lay anchor. The liveability of a city is naturally a function of its proximity – both in time and distance – to the mountains and the sea. Located on Lake Ontario and a half-day’s drive away from the Laurentides, the city and its environs check off roughly one and a half boxes out of two. Whether sailing on Lake Ontario, cycling to Big Sandy Bay Beach on Wolfe Island, or travelling further afield to kayak among the Thousand Islands in Gananoque, the options for things to do have been manifold.

“This is to say nothing of our Math and Stats Department here at Queen’s University, with whom I have universally had an immensely enriching experience. Weekly seminars on partial differential equations and applications, dinners with invited speakers, and informal gatherings for beer on Fridays have kept me engaged alongside my research and teaching duties. I even managed a short schlep with Federico, another postdoc, to brave unploughed roads the morning after an overnight blizzard to get a much-needed day on the ski slopes.”

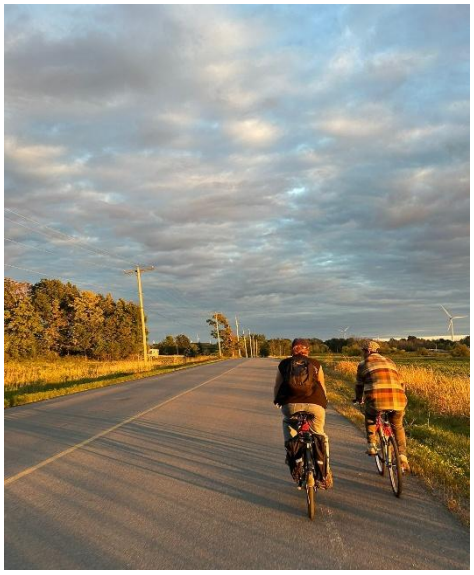
NEIGE PAULET
POST DOCTORAL FELLOW

“I joined the Department of Mathematics and Statistics at Queen’s in August 2024 to start a postdoc with Thomas Barthelmé. I came from France, my home country, where I completed my PhD specializing in Anosov flows and 3-manifolds, a topic at the intersection of dynamical systems, topology, and geometry. Although I hesitated to move so far from home, working with Thomas on these very topics where he has made major contributions and that are currently developing in new directions was an incredible opportunity.

“We started a working group last year in the department together with Katie Mann, Federico Salmoiraghi, and Lingfeng Lu to study certain topological pieces of Anosov flows. We quickly discovered an interesting generalization of the initial project, and it turned out to be very productive, stimulating, and friendly: a great first experience of collaborative research for me.

“And this year, Abdul Zalloum (former post-doc) arrived with exciting ideas for connecting geometric group theory with 3-dimensional Anosov flows, via bifoliated plane actions introduced by Thomas and Katie. This has become another very promising project for the year. I also traveled for talks and conferences: back to Europe, as well as in Japan last year, then Montréal, Banff, and Berkeley this summer. Overall, the work environment here keeps me highly motivated and excited!

“I also took part in the Women+ in Geometry, Groups and Dynamics research network last year. We worked online throughout the year and met in person for a week in Banff in July. The landscape was beautiful, but even more important was the feeling of belonging and the energy that came from working in such a supportive group. For me, it was a realization of what collaborative mathematics can be when you feel at ease. Successful mathematicians thrive not only because of their research but also because they feel comfortable in the community, with good friends and strong networks. Initiatives like WiGGD are essential to give that same sense of belonging to more people.



“This new year, we made more effort to connect math postdocs socially within the department, with regular outings in Kingston. With Christopher Kennedy, we had been searching for Coinche partners (a typical French card game) for over a year, and he finally managed to train some colleagues to play with us during lunch time in the department! It’s not always easy to build connections when everyone comes from different places, knows they’ll leave in a couple of years, and only shares work in common. I also felt the need to diversify more what brings me community, personal joy and self-worth, as I used to have in France outside mathematics. I usually like to play pool and sing karaoke, go to the farmer market on Sunday morning, and to Wolfe Island for the sunset. I joined the Kingston Queer Volleyball teams that meet weekly on campus, volunteered for the annual film festival Reel-Out in Kingston, and finally got a good road bike to explore the region.”

PI DAY CELEBRATES WITH PIE!

The Arts and Science Pie People

Olivia Saur
Krystina Radkevich (DSC cochair)
and her dog Ophelia
Robyn Broersma
Elizabeth White
Nicholle Fernandes
Faith Hoang

Photo by Zoe Dicker (DSC Co-Chair)

What's the sum of the reciprocals of the integers?

$$\sum_{n=1}^{\infty} \frac{1}{n^2} = \frac{1}{1} + \frac{1}{4} + \frac{1}{9} + \frac{1}{16} + \frac{1}{25} + \cdots = 1.6449 \ldots \ ?$$

It's easy to show that it's bounded, and since it's increasing, we know it must converge, but to what?

Known as the Basel Problem, it was posed by Pietro Mengoli in 1644. Calculations easily give us a bunch of decimal places of the answer, but what is the exact actual sum? Surely it must be some beautiful number.

Indeed it is. And Euler provided that number 90 years later in 1735-- it's $\pi^2/6$. That's crazy. Where on earth did the π come from? And even more, how did it get squared?

Grant Sanderson of 3 Blue 1 Brown fame says "Whenever you see π show up, there will be some connection to circles," and in a remarkable 17-minute video, he takes us on a geometrical journey that constructs that connection.

Apple Math DSC successfully returned to the tradition of pie for Pi Day!

They gave away free apple pie for Apple Pie Day and sold Apple Math jacket patches.

L to R: Sam Shaw, Nyah Slusarenko, Matei Nitu, Serdar Yuksel and 2 incoming second-year students

OUR GRADUATES: SPRING 2025

Arts & Science

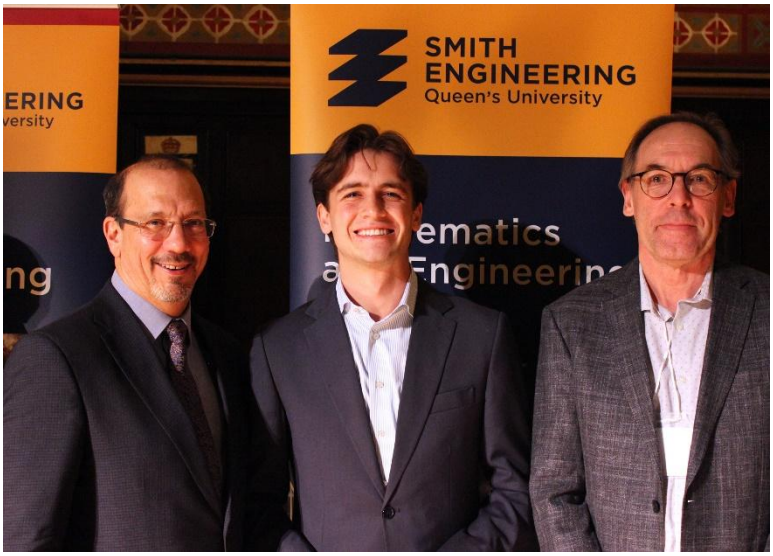
Mathematics & Engineering

STUDENT AWARDS

JORDAN MATUS
THE UNIVERSITY MEDAL IN MATHEMATICS AND ENGINEERING

“I spent the summer of 2013 at one of my favourite places on earth, Camp Northland in Haliburton, Ontario. That summer I was lucky enough to have a Queen’s EngPhys student, Jared Westreich (Sci’16) as one of my counsellors, who I looked up to greatly. He saw my intellectual curiosity and asked me riddles and math problems that I still remember to this day.

“That summer, I made a shaky promise that one day I’d follow in his footsteps and become a Queen’s engineer. Years passed, my love for math and the sciences grew, and year over year that shaky promise solidified itself into the obvious best path for me. Possibly the only good decision I made at age 10.



Jordan with Smith Engineering Dean Kevin Deluzio (L) and Head of Math&Stat Troy Day (R).

Jordan with Jules Samson, Mech ’25 at the annual Cure Cancer Classic hockey game.

“My time at Queen’s has felt like nothing more than an opportunity. From the friends I’ve made to the lessons I’ve learned about the world and myself, these past 4 years have challenged me to grow in new ways, and I could not be more grateful for the doors it has opened. I wouldn’t be where I am today without the incredible support system I found surrounding me from week 1 of first year. A special thanks goes out to my engineering gang; the reason I had any sort of fun through all the hard work, as well as the entire Apple cohort of Sci 25’ for the culture of teamwork and generosity I’ve been lucky to be a part of.

“After graduating I had the privilege to travel to Israel, Greece, Portugal, Spain and Italy. A break from screens and numbers was much needed, and I’m grateful for the experiences and perspectives I gained through these travels. Plus, the food was spectacular.

“In September I was back working on the trading floor at TD Securities as part of their rotational associate program. My first rotation was on an e-trading desk, where I developed quantitative models to trade and make markets on government bonds. I see it as a great opportunity to learn a lot quickly and develop a diverse set of valuable skills, much of what drew me to choosing Apple in the first place. The floor is constantly iterating, and demands the fast-paced, creative problem solving that so many of Apple’s courses develop.

“Taking a Test 1 in any of Yuksel’s courses makes the stress of the trading desk feel like a breeze. I’d like to thank Dr. Yuksel, Dr. Alajaji and the rest of the faculty for their contributions to this wonderful program and the valuable ideas they taught me in and out of the classroom.”

BERND ZWANZIGER
MEDAL IN MATHEMATICS AND STATISTICS

The medal is awarded annually by the University to the graduating candidate who has demonstrated academic excellence in an honours degree who is deemed by a Department to have achieved the highest standing in a Plan offered by that Department. Departments within the Faculty of Arts and Science will consider students in a major, joint honours or specialization Plan offered by that Department.

“I am extremely fortunate to have attended the Queen’s University Mathematics program. I have spent the last four years surrounded by smart, kind, and extremely passionate mathematicians, who are always willing to discuss and teach mathematics not only at a high level, but in a way that focuses on the students. It is due to this that I find myself as in love with Mathematics as I am. Professors like Dr. Mike Roth, Dr. Gregory G. Smith, and Dr. Francesco Cellarosi have taught me not only mathematics, but also how to enjoy it; how to see the incredible beauty in the topics we learn, and the unparalleled excitement of discovering them for yourself.

“My future aspirations were solidified when I worked with Dr. Roth and Dr. Smith over the past two summers on an undergraduate research project, cementing my hope to become a research mathematician. The crowning moment of my undergraduate degree was giving a talk to the math department at Queen’s along with my colleague Tony Luo. That was when I knew that I wanted to continue mathematics, and Queen’s has given me the skills I need to succeed in this field. I hope to return to Queen’s often for conferences, and to see the people who taught me these things.

“More than anything in mathematics I am continually amazed by the intersections of differing fields to solve problems. The research project I worked on focused heavily on the intersections of combinatorics and algebraic geometry; that is, polynomials and their solutions using counting techniques and geometry. It stuns me always how related these two seemingly disparate topics are, and how useful one can be when tackling problems in the other. It is this relationship, along with other intersections, that I hope to study more at graduate school at Cornell, and in my career.

“Of course, my life at Queen’s would not have been complete without some time away from the classroom. I spent many enjoyable hours at the ARC, engaging mainly with sports like volleyball and squash, not to forget the various intramural leagues. I never lost my competitive drive and am proud to have played with the teammates I did.

“I was similarly blessed with two amazing roommates through which I met the Queen’s and Kingston Juggling Club. I recall watching a performance at the juggling festival the club put on and was astounded by the mastery and the beauty on display. I began attending the club as a total beginner, and the members of the club were nothing if not supportive. Many of them took the time to teach me the ropes (and the clubs!) of juggling. I made some fantastic friends, and I hope to continue that friendship for years to come. Plus, I aim to keep coming back for the juggling festival as often as I can, both to juggle and to visit the university and my friends!”

EMILY PERSICO
THE IRENE MACRAE MATH & STATS SCHOLARSHIP

Established in April 1986 by Margaret Crain in memory of Irene MacAllister MacRae, Arts 1914, who was vice-president of the Mathematical Club while at Queen's. Awarded on the basis of academic excellence to a student graduating with a BA (Hons) or a BSc (Hons) degree with an academic plan in Mathematics or Statistics.

“Whether it was giving myself second-grade math homework in kindergarten or being unable to sleep from excitement the night before a math contest, I have loved mathematics for as long as I can remember. With deep appreciation for its near cosmic functionality and elegance, I’ve always perceived math’s security, beauty, and symmetry as a calming refuge from the illogicality, unfairness, and unpredictability of the world around me.

“Even as the content of our mathematics and statistics courses became increasingly difficult, I remained steadfast in my enjoyment of the unfathomable diversity and ingenuity of mathematics—two qualities repeatedly demonstrated in the many math club colloquia friends and I attended over the past four years. Although not many people understood my choice to major in mathematics, to me, there was no decision truer to who I am. Currently in my final year of the Concurrent Education program, I hope to one day spread my love of mathematics to as many of my future students as possible.

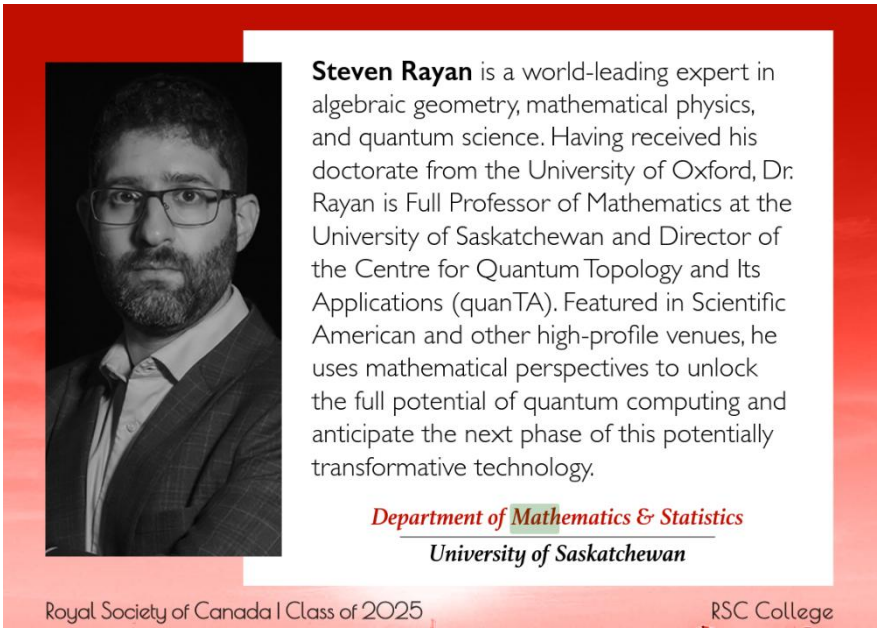
“That said, in my third year at Queen’s University, I took a series of geography courses that fundamentally changed my outlook on my academics and future. Long dedicated to issues of social injustice, the critical analysis of human geography has offered me a lifeline of an outlet to learn about, examine, and propose solutions for contemporary issues. I would like to thank Dr. Mark Stoller, Dr. Carolyn Prouse, and Dr. Laura Jean Cameron for fostering and encouraging me to pursue these interests. I hope to one day research the role of financialisation and neoliberalism in the racialisation and incarceration of immigrants as a Master's project at Queen’s University. As such, spreading a passion for social justice to my future students has also become a core pillar of my career aspirations.

“In my spare time, I enjoy baking, reading, cooking, painting, and being in nature. My biggest goal is to be a lifelong learner who brings peace and joy to the people and more-than-human world around me.

“It was such an honour to be my class’ recipient of the Irene MacRae scholarship this past June. I would like to acknowledge and give a deep thanks to Dr. Mike Roth, my math major friends, Sara, and my family for giving me their invaluable support over the past four years. I truly would not be here—let alone receiving this award—without them.”

ALUMNI NEWS

STEVE RAYAN INDUCTED INTO THE ROYAL SOCIETY OF CANADA.



Some Memories, Mathematical and Otherwise, of Queen's to Now

"My journey started at Queen's 2002, hailing from northern Ontario and with a strong conviction that I would focus in some way on mathematics (thanks to excellent mathematical experiences in my high school). I arrived at Queen's on a Chancellor's Scholarship, and set myself to taking all of the possible courses in Math, Physics and Computer Science that one could.

"Gems from the Math Department include 110, taught by Morris Orzech, 120 by Ole Nielsen, 211 by David Pollack, 237 by Dan Offin, and 280 by Jamie Mingo. I also tried my hand in year 2 at BIOM 300 by Troy Day, in what I believe was the first year it was offered. Canada had only just emerged from the SARS crisis, and I saw for the first time how mathematics could be used to benefit society immediately, as opposed to a delayed influence over decades if not centuries.

"These two first years were truly explosive for me in terms of my inculturation into mathematics, and the opportunities for extracurricular engagement were off the charts. I remember fondly losing the entire Reading Week of my first year due to a challenge problem posed by Ole, which was to find a closed form expression for the volume of the sphere Sn, leading us to discover Euler's gamma function for ourselves.

"By the end of my second year, I decided to aim for an Honours degree in Mathematics. There were a variety of experiences in the lead up to this, including spending two summers working in experimental physics at the Sudbury Neutrino Observatory, where I had some scientific contact with Art McDonald, who went on to win the Nobel Prize in 2015. I remember that one could, or had to, choose a focus within the Honours degree. I recall getting permission from Peter Taylor, Department Head at the time, to do two foci: Algebra/Number Theory on the one hand and Dynamical Systems on the other. This reflected the quality and range of the mathematical experiences on offer in my third and fourth years.

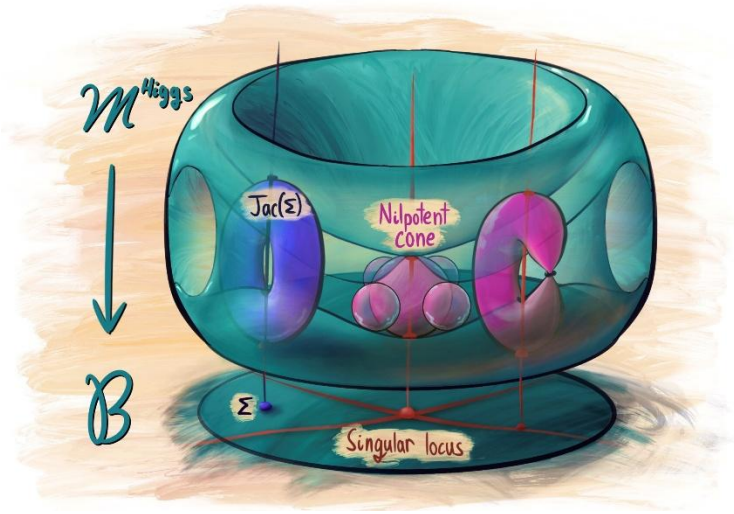
[Right: Steve giving a 2023 TEDx talk at U. Sask.]

“I was awestruck by a sequence of courses taught by Ram Murty in number theory, including transcendental number theory, as well as combinatorics. I also cannot forget the spirited course in Galois theory offered by Noriko Yui (and my project on the ring of periods to which I willingly lost three days of sleep) and Ernst Kani’s course in the mathematics of cryptography, in which we were somehow able to coax MAPLE into a semi-sophisticated cryptographic engine by the end of the course.

“At the same time, Tony Geramita convened a bi-weekly algebraic curves working seminar on Wednesdays, inviting all of the undergraduate, graduates, and postdocs involved to his house for a pasta dinner each time. Glorious.

“On the dynamics side, I learned a lot from Dan Offin’s MATH 427 courses on dynamical systems and variational methods, as well as from two project courses he offered me, one in my second year and again in my fourth year, where we took a deep dive into various configurations of the n-body problem. The amount of personal attention here was just fantastic.

“In addition to Tony’s seminar and Dan’s project courses, I recall that a group of us were offered a special real analysis course by Leo Jonker, the goal of which was to write our own text that could offer more insight and coherence for fellow undergraduates than the standard textbook options. I don’t know if we succeeded. Honestly, I don’t think we did. But it was fun.



“And, finally, there was the Math Club run by Mike Roth, Ivan Dimitrov and Greg Smith, featuring enthusiastically-delivered topics well outside the curriculum as well as semi-regular Putnam prep sessions. One aspect of mathematical life for an undergraduate at Queen’s that should not be overlooked was the nontrivial contact with grad students. There was a continuity and camaraderie between undergraduates and graduates: we took courses together and spent countless hours in Jeffery Hall working with one another.

“All of this helped to fuel a hunger for further studies. It was hard not to feel part of a special community, whether it was the pasta dinners at Tony’s, or big groups of students gathering for long chats on music and philosophy at Peter’s newly-built house on Sydenham, or my summer cat sitting for Morris and Grace Orzech during their trips to New York or elsewhere, the Department had an especially human character to it that showed us the best of what a career as a mathematical academician could be.”

AMAURY HAYAT (ECOLE DES PONTS PARISTECH, CERMICS)

THE 2024 LORNE CAMPBELL LECTURE

October 25, 2024

Amaury Hayat is a Full Professor of Mathematics at Ecole des Ponts Paristech, CERMICS, in Paris, France. He earned his B.Sc. from ´Ecole Polytechnique (2014), followed by an M.Eng. from the University of Cambridge (2015), and a Ph.D. from Sorbonne Universite, LJLL (2019). Before assuming his current role, he completed a postdoctoral fellowship at Rutgers University (2019–2020).

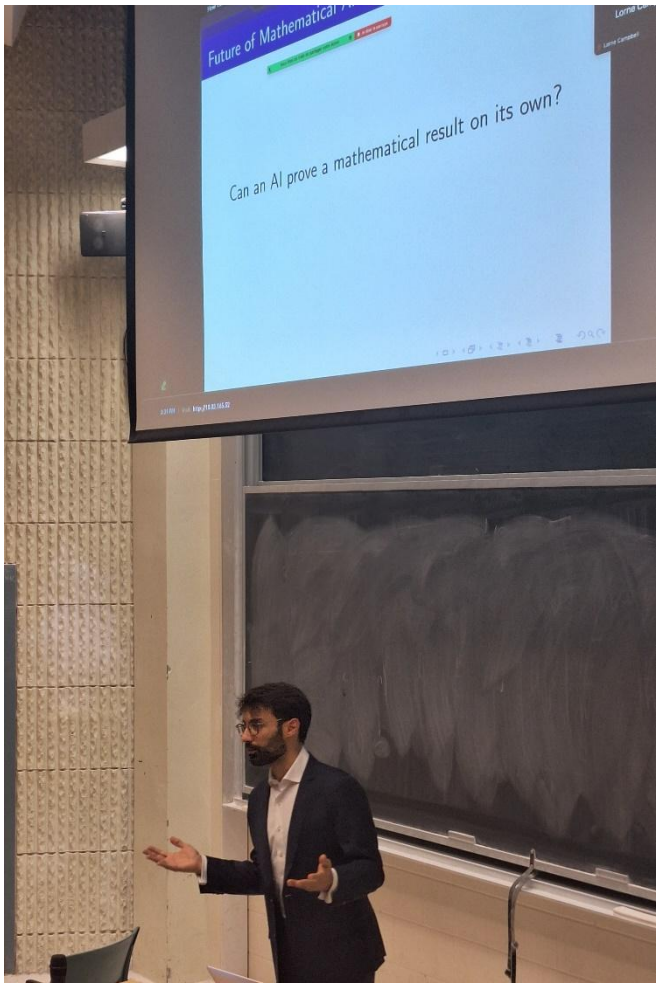
Dr. Hayat's research focuses on the stabilization of partial differential equations (PDEs) and systems of PDEs, with applications in traffic, biology, and fluid dynamics. Additionally, he is advancing the use of AI models to address complex mathematical challenges, aiming to help mathematicians find solutions to unresolved problems in the field.

His research has garnered significant attention, with coverage in prominent French and international media, including Le Monde, Science et Avenir, France Info, TechXplore, Popular Science, and Fortune. Among his many accolades, Dr. Hayat has been awarded the L.E. Rivot Medal by the French Academy of Sciences, the 2019 PhD Award from the European Embedded Control Institute, and the Solemn Prize of the Chancellerie des Universities de Paris. In 2020, he was also recognized as one of Forbes "30 Under 30" in Europe in the Science and Healthcare category.

How can Machine Learning Help Mathematicians?

Abstract. Artificial Intelligence (AI) has demonstrated remarkable achievements across diverse fields, from natural language processing to mastering complex games like chess. This naturally raises the question: can AI assist mathematicians in solving open problems in mathematics? This talk aims to address this question.

We will explore how AI models can be trained to provide valuable insights into several mathematical questions from different areas of mathematics and applied mathematics. We will then present examples of AI models specifically trained to prove mathematical theorems on their own.



MATH QUEST
OUR GIRLS' MATH CAMP

By Peter Taylor

This year we had 24 campers, two all the way from Brazil.

Straight edge and compass

My favorite session was the one on straight-edge and compass constructions. Probably that's because the weeks we spent on that in Grade 10 are really my only significant high-school classroom memory. I loved it because it was constructive, artistic, logical, and challenging. Our textbook was called simply, Euclid's Elements, and it was the real thing, even some of the original drawings. Construct a line of length $\sqrt{2}$, Construct an angle of 120 degrees.

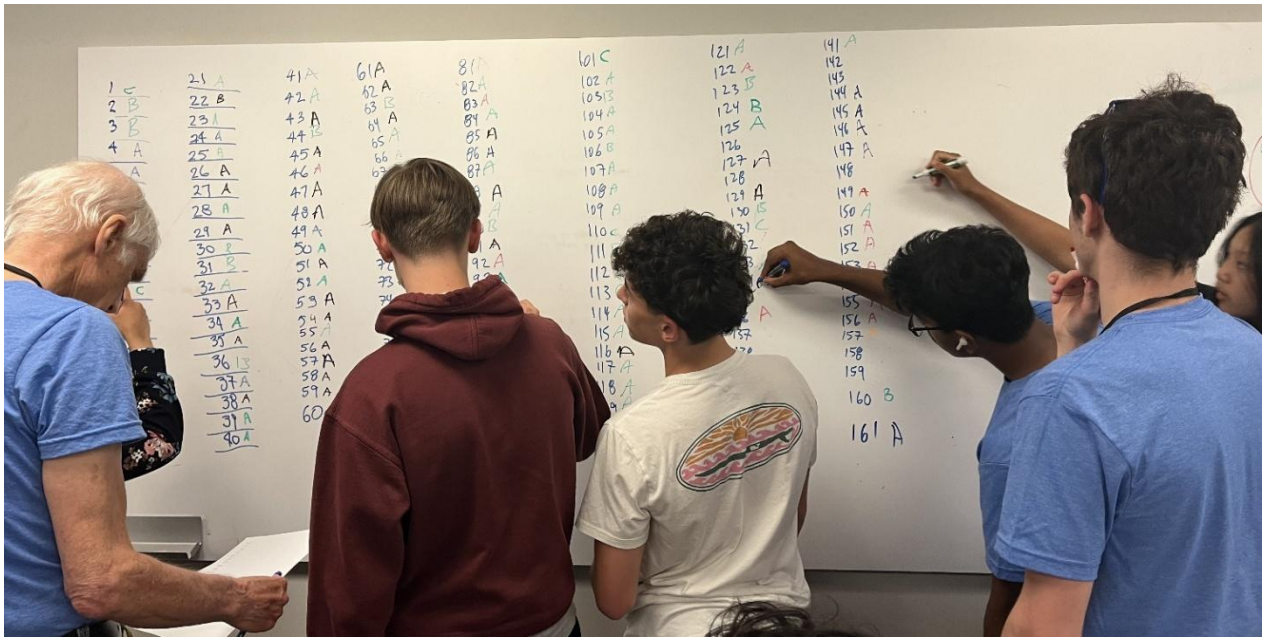
Know what my favorite word is in the comments above?—*construct*. Students actually love making careful precise drawings and that was evident at the camp.

Anyway, most of the girls seem to have never seen these before. These modern times have put most of that old Euclid stuff aside. Pity.

[Top picture taken by Israte Afroze and bottom by Peter.]

RABBITMATH

By Peter Taylor



Take any number *n* (a positive integer), square its digits, and add them up. What you get is a new number which we will call *T*(*n*). *T* is a transformation that changes one number into another. Our objective here is to understand what happens when we iterate *T.* For example, if we start with 2025 and iterate we get

$$2025 \to 33 \to 18 \to 65 \to 61 \to 37 \ldots$$

and we keep right on going. What eventually happens? What happens for other starting numbers?

This is an old problem but not well known. It reminds us of the Collatz conjecture, except this one is solvable, and indeed, even solvable by a group of high-school students. It turns out that there are two possibilities, either it goes to the stable point 1, or it winds up in a stable cycle of size 8. It is part of the rabbitmath.ca collection.

BUT, this is not the problem I gave the kids. I gave them a slight variation, one that I didn't know the answer for.

Suppose that after you add the squares of the digits, you subtract 1. For example we would have:

$$2025 \to 32 \to 12 \to 4 \to 15 \to \cdots$$

In the picture above, the kids are collecting data and classifying the outcomes. This problem has a richer set of stable cycles than the classic problem. Fun. And lots of good thinking.

[Top picture taken by Mike Cabral and bottom by Peter.]

IN MEMORIUM

CHUCK MOLSON

Chuck was a math prof at St Lawrence college for many years and when he retired over twenty years ago we were looking for someone to teach our basic service course in Statistics. Chuck was the perfect person for the job.

In fact, the course prospered under Chuck's hand and in recent years Chuck was teaching the STAT 263 to 1000 students every year organized into four sections of 250 each. The students loved the course and a few would keep in touch with Chuck over many years.

In late August, a few days before the start of term, with the two Fall sections awaiting him, Chuck fell ill and was unable to continue. He died three weeks later.

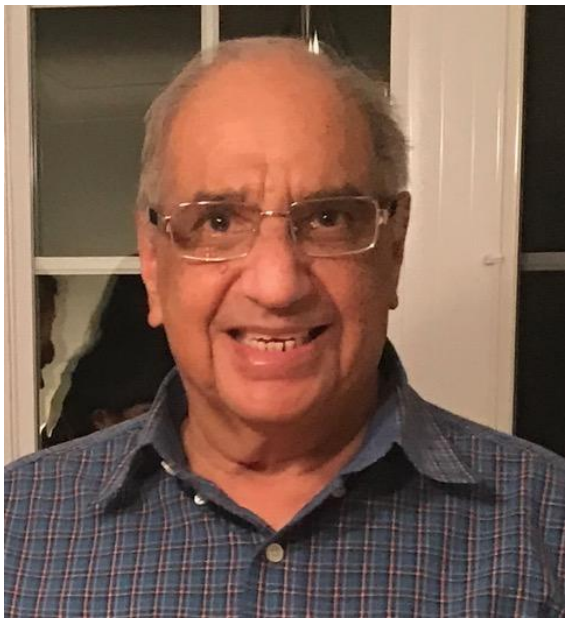
I connected with him often over the two decades he was with us and he was always so excited to meet his new students. He felt privileged to have been given the opportunity to work with them.

His passions included jazz and dance (he referred to it as "baltering" which apparently means dancing in an enjoyable and clumsy way), and he spent many recreational hours doing exactly that at Kingston's downtown RCHA club.

Finally I couldn't resist posting this picture of Chuck long ago (age around 20) with the Fort Henry Guard.

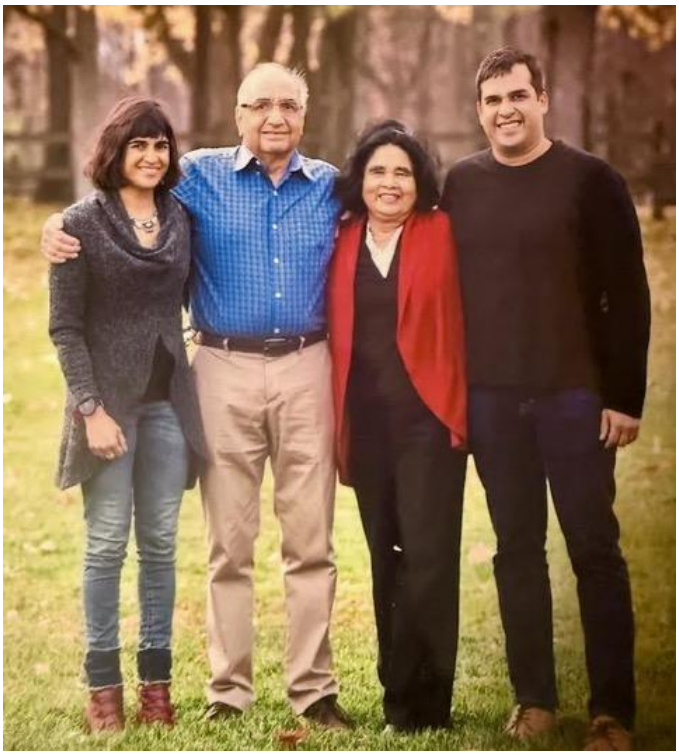
Peter Taylor

KIRTI OBERAI



Kirti was born 1936, in Rawalpindi in pre-partition India, the youngest of thirteen children. Like many of his generation, his early years were shaped by the upheaval of the 1947 partition of India, during which his entire family was displaced from their home in Rawalpindi and eventually resettled in Delhi.

Kirti's academic success took him to the University of Illinois Urbana on a Fulbright Scholarship where he completed his PhD in mathematics working on the Weyl Spectrum. He was a prof at Queen's for 36 years where he continued his work in Functional Analysis. He died peacefully on Dec 17 at age 89.



Kirti had two children Anjali and Sumit as seen in the photo at the left along with his wife Tara,

Sumit was in Applied Math & Engineering, graduating in 1995. He went on to work at startups, as a consultant, and was with Indigo books for about 10 years. He is currently working at RBC in their IT sector leading the team that provides the technology for the "Personal Bank"— the bank that individuals deal with in Canada.

Comments from Mike Roth: "When I was an undergraduate, I had Kirti as a prof in Math 220, a version of Math 280 and Math 281 together. In the class I pestered him that Queen's should have a course in set theory (what reputable university would not have an entire course devoted to set theory?). Instead, he gave me a book off his shelf, on 'Set Theory and Logic', told me that I should read it, and that I could keep it. (Since I have been here as a faculty member, a few students have asked about a course in set theory. I told them I didn't think it was a good idea.) I did keep the book.

Kirti retired in 2002, the year that I started. Following the ancient system for assigning offices, I now have his old office. The book on Logic and Set theory is now back on the shelf it started on many decades ago.

JOHANA NG

Last September we were shocked to learn of the loss of Johana Ng. It had only been three years since her retirement and she and her husband, Howard, were looking forward to many years of recreational travel. Indeed, as her parting gift, we had given her a collection of travel books. The story of her retirement is found in the 2022 Communicator.

Johana and her husband Howard at her 2022 retirement breakfast at Toast and Jam.

In 1987 Johana was appointed secretary of the Apple Math (Applied Mathematics and Engineering) program and she held that position until her retirement in 2022, an extraordinary 36 years of service to the work of the Department. I must point out that during that span, the administrative processes of university life had became much more complex, and the word “secretary” no longer described the sophistication of Johana’s job. When she retired it was as the Undergraduate Program Advisor of the Applied Mathematics and Engineering program. The program flourishes now and Johana’s decades of care are paying off.

OPPORTUNITIES FOR SUPPORTING THE DEPARTMENT

There are lots of quite interesting opportunities for participating in the life of the Department by making a gift. And it's easy. Go to the Office of Advancement's secure website:
www.givetoqueens.ca/mathstats

Queen's UNIVERSITY **Mathematics and Statistics**

Queen's Mathematical Communicator
Department of Mathematics and Statistics
Queen's University
Kingston, Ontario Canada K7L3N6

Queen's Mathematical Communicator
Editor: Peter Taylor
mathstat@queensu.ca
queensu.ca/mathstat/

If you are a Queen's Math & Stats or Math and Engineering graduate and are not receiving notification of this publication, our alumni records might not have your email address. You can update that information by emailing records@queensu.ca.