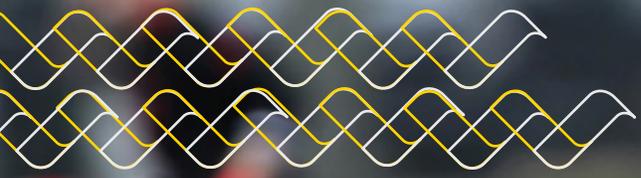


CHASE ANNUAL REPORT 2024



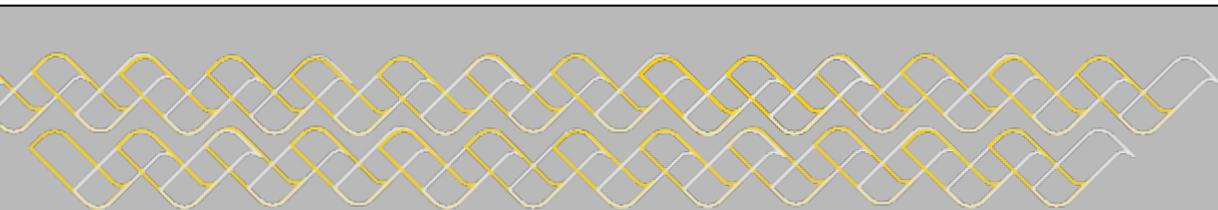
DALHOUSIE
UNIVERSITY

DEPARTMENT OF
MATHEMATICS
AND STATISTICS



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DALHOUSIE
UNIVERSITY

**MATHEMATICS
AND STATISTICS**

DEPARTMENT AWARDS

Congratulations to our award earners! The names of this year's recipients are presented below along with a description about each of the nineteen (19) awards.

SIR WILLIAM YOUNG GOLD MEDAL IN MATHEMATICS

This medal is awarded at convocation to the student who stands first among those taking First class honours in Mathematics. It is also known as the University Medal in Mathematics.

Recipient: Jack Jia

UNIVERSITY MEDAL IN STATISTICS

This medal is awarded at convocation to the student who stands first among those taking First class honours in Statistics.

Recipient: Weifan Yan

UNIVERSITY MEDAL IN ACTUARIAL SCIENCE

This medal is awarded at convocation to the student who stands first among those taking First class honours in Actuarial Science.

Recipient: No recipient Spring 2024

ARNOLD AND BEATRICE TINGLEY MEMORIAL SCHOLARSHIP

The Tingley Scholarship commemorates the lives of Arnold and Beatrice Tingley. The scholarship was established by their son Daryl and his family Maureen, Peter, and Martin. Arnold joined the faculty at Dalhousie University in 1953. With the support of his wife Bea, Arnold served Dalhousie, in turn, as mathematics professor, Chair of the Department of Mathematics, Registrar, Secretary of Senate, Secretary of the Board of Governors and Assistant to the President, until his retirement in 1986. He was appointed Professor Emeritus in 1988. This scholarship is awarded to an undergraduate student from Atlantic Canada entering the third year of a four-year BA or BSc program. Candidates will have high academic standing and will have shown enthusiasm and talent for mathematics (by having taken at least five mathematics or statistics courses over their two first years of study and being enrolled in any mathematics program).

Recipient: Awarded by the Registrar's Office; name unavailable for print

BARRY WARD FAWCETT MEMORIAL PRIZE

This monetary award goes to the student who has achieved the highest grade in MATH/CSCI 2113 (Discrete Structures II).

Recipient: Will be announced in the fall of 2024

BERNOULLI PRIZE

This monetary award goes to the student registered in the Co-op Mathematics Program who has the best cumulative academic record, subject to the restrictions that the prize can be awarded only once to a given individual, and that the winner must have performed acceptably in all work term assignments.

Recipient: Will be announced in the fall of 2024

ERMA GEDDES FILLMORE MEMORIAL SCHOLARSHIP

This scholarship is in memory of Erma Geddes Fillmore (BA'24) and was established by her family. This scholarship is awarded in the fall term – to a full-time BSc undergraduate student with the highest grade-point average entering the second year of their degree with a declared major in either Mathematics or Statistics.

Recipient: Will be announced in the fall of 2024

FIELD PRIZE IN STATISTICS

This monetary prize is awarded to the student with the highest academic standing who has completed their third year of studies in Statistics. This award was endowed by Dr. Christopher Field and Mrs. Harriet Field.

Recipient: Will be announced in the fall of 2024

HELLER-SMITH FOUNDATION GRADUATE SCHOLARSHIP

This scholarship is awarded based on academic achievement. The scholarship was established to provide financial support and recognition to a graduate student.

Recipient: Joseph Bars

JONATHAN BORWEIN MEMORIAL SCHOLARSHIP

This scholarship is in the memory of the late Jonathan (Jon) Borwein (1951–2016) who began his academic career as a post-doc in our department, and then spent a substantial part of his career here at Dalhousie: First from 1974 to 1980, and then again from 1982 to 1991 in this department, and later, from 2004 to 2009 as a CRC in the Faculty of Computer Science, but still with close connections to our department. Dr. Borwein completed an Honours Mathematics degree in 1971 at the University of Western Ontario (now Western University). He received his DPhil from Oxford in 1974, as an Ontario Rhodes Scholar. Dr. Borwein held faculty positions at Dalhousie, Carnegie-Mellon, Waterloo and Simon Fraser, including named professorships and Canada Research Chairs. Most recently he was Laureate Professor at the University of Newcastle (NSW, Australia).

Throughout most of his career he founded and directed successful research centers, and he maintained his connection with Dalhousie through an adjunct appointment. Among numerous other honours, Dr. Borwein was elected a Fellow of the Royal Society of Canada in 1994, and he became a fellow of various prestigious mathematical and scientific associations around the world.

This cash prize is awarded to a student who has shown promise, as demonstrated by academic achievement and/or successful involvement, in one or more of the following areas: experimental mathematics, optimization, classical number theory, special functions, scientific computation, or in an area related to these, as determined by the Awards Committee.

Recipient: Will be announced in the fall of 2024

KEN DUNN MEMORIAL PRIZE

This cash prize is awarded to a student who has completed the third year of an Honours program in Mathematics or Statistics, or a combined Honours program in Mathematics and Statistics.

Recipient: Will be announced in the fall of 2024

PROFESSOR MICHAEL EDELSTEIN MEMORIAL GRADUATE PRIZE

This prize is awarded to a graduate student who shows great promise in the mathematical sciences.

Recipient: Linh Dinh

R.P. & KAMLA GUPTA SCHOLARSHIP IN STATISTICS

This scholarship is to recognize excellence in Statistics by providing one or more scholarships to undergraduate students enrolled in Honours Statistics.

Recipient: Will be announced in the fall of 2024

THE DR. EMIL AND MRS. STELLA BLUM PRIZE IN MATHEMATICS

This monetary prize is awarded to an Advanced Major or Honours Mathematics student who achieves the highest grade in second year Calculus.

Recipient: Will be announced in the fall of 2024

THE ELLEN MCCAUGHIN MCFARLANE PRIZE

This award is in the memory of Ellen McCaughin McFarlane (BA or BSc'27) and goes to the student who has achieved the highest standing after completing year one of the honours program. This prize is a monetary award.

Recipient: Will be announced in the fall of 2024

THE KATHERINE M. BUTTENSCHAW PRIZE

This monetary prize is awarded to the student standing highest in the advanced Mathematics courses.

Recipient: Will be announced in the fall of 2024

THE PETER AND ANNE-ELLEN FILLMORE SCHOLARSHIP

This scholarship is awarded to a graduating math honours or major student from the Maritimes who plans to become a high school math teacher.

Recipient: Will be announced in the fall of 2024

THE RALPH AND FRANCES LEWIS JEFFERY SCHOLARSHIP

This scholarship is awarded to two students who have each completed an honours degree in Mathematics, and who have maintained at least second class standing during the first three years.

Recipient: Jack Jia and Julius Frizzell

WAVERLEY PRIZE

This award goes to the student with the highest standing in MATH 1010 (Differential and Integral Calculus II).

Recipient: Will be announced in the fall of 2024

REPORTS & NOTES

MESSAGE FROM THE DEPARTMENT CHAIR

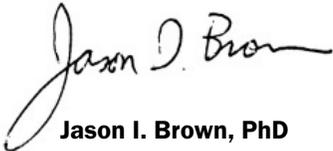
JASON BROWN

“And in the end, the math you take is equal to the math you make” – paraphrased from *The End*
(Lennon and McCartney)

Here you are, at the end of your university degree. You have spent years at this one task, all culminating in this one day. Congratulations! And not just to you, but also to your family and your friends as well. You couldn't have done it alone. Achieving a degree in Mathematics, Statistics or Actuarial Sciences at Dalhousie University is something to be proud of, not just now, but for the rest of your life. But take a minute, breathe in and savour the moment. You are here!

There is much that goes on behind the scene in the Mathematics and Statistics department to ensure that all goes seamlessly. We are finally fully staffed, with Mark Monk, Nora Amaro and Jeanne Clyburne behind the desks in the main office, working their magic. We also rely on Balagopal Pillai in IT and Angela Myers for maintaining the Chase building. I deeply appreciate all of their hard work and dedication. And most of all, I thank Anna Marie Davis, the department's Administrator, who has guided and mentored the staff through this learning period. Her dedication to faculty and especially to students has made my role as Chair easier.

I extend my deepest congratulations to all who have graduated this term, and further to our award winners. I'm not sure of what life has in store for you, whether it is graduate school, an interesting career or some other life goal, but this final day at Dalhousie is just the first day of the rest of your life. So please take with you all that the university and the department has offered, and make the most of what lies ahead.



Jason I. Brown, PhD
Professor of Mathematics
Department Chair

UNDERGRADUATE PROGRAM

HONOURS PROGRAM

DORETTE PRONK, JULIEN ROSS (MATHEMATICS)
ED SUSKO, BRUCE SMITH (STATISTICS)

This year we had five honours students in our Mathematics program and fourteen in our Statistics program. Each student, their project, and their supervisor, are noted below:

Mathematics

- **Anamieka Aerts**, Thesis title: *Two models of computability and their equivalence*, **Supervisor: Neil J. Ross**
- **Julius Frizzell**, Thesis title: The zeros of polynomials whose coefficients are generalized stern numbers, **Supervisor: Karl Dilcher**
- **Xiaoyu (Jack) Jia**, Thesis title: *Modular forms and the divisor sum function*, **Supervisor: Karl Dilcher**
- **Timothy Power**, Thesis title: *An extension of the Solow-Swan model*, **Supervisor: Roman Smirnov**
- **Yizhe Zhong**, Thesis title: Evaluating anomaly detection efficacy in diverse graph structures, **Supervisor: Jeannette Janssen**

Statistics

- **Zirui Dong**, Thesis title: Arsenic Contamination in Nova Scotia's Private Well Water: A Spatial-Temporal Statistical Analysis, **Supervisors: Cindy Feng and Edward Susko**
- **Yuzhu Han**, Thesis title: Analysis of genetic traits and chromosomes' effects on potato tuber Sprouting, **Supervisor: Hong Gu**
- **Jiayang He**, Thesis title: Survival Analysis of Breast Cancer Mortality Based on the SEER Database, **Supervisors: Cindy Feng and Edward Susko**
- **Zesheng Jia**, Thesis title: Study of genes interaction relationships using regression convolutional neural networks with hypothesis testing on large-scale self-simulated gene profiles with embedded phylogenetic tree structures **Supervisors: Hong Gu, Toby Kenney**
- **Lucas Keetch**, Thesis title: VARIABLE selection using gaussian copula regression, **Supervisor: Orla Murphy**
- **Xiyu Lin**, Thesis title: analysis of factors affecting potato gene expression levels under multivariate conditions, **Supervisor: Hong Gu**
- **Qianzhu Liu**, Thesis title: Evaluating the impact of measurement error in microbial time series analysis: A SIMEX and PACF Approach, **Supervisor: Toby Kenney**
- **Kyle McDermott**, Thesis title: Bottom trawl surveys and MPA's: A design-based inference for haddock stock assessment, **Supervisor: Joanna Mills Flemming**
- **Mark McTaggart**, Thesis title: Exploring model selection in animal movement hidden markov models, **Supervisor: Théo Michelot**
- **Ziye Tian**, Thesis title: Nonparametric estimation of microbial temporal dynamics —eliminate the impact of missing data, **Supervisor: Toby Kenney**
- **Jingyi Wang**, Thesis title: Universal Inference Procedures. **Supervisor: Edward Susko**
- **Jinlei Xu**, Thesis title: Extensions of the Mann-Whitney Test **Supervisor: Edward Susko**
- **Weifan Yan**, Thesis title: Using superlearner to predict remission from childhood epilepsy **Supervisor: Bruce Smith**
- **Quan Yuan**, Thesis title: Genetic analysis of potato scab disease **Supervisor: Hong Gu**

MATHEMATICS DIVISION

PETER SELINGER, DIRECTOR

A few weeks ago, I received a letter from the Dean's office, thanking me for agreeing to serve another three-year term as Director. I hadn't realized that it's already been three years, let alone that I had agreed to another term! How time flies when you are doing glamorous work. But sadly, I'm just kidding about being glamorous. Unlike the chair, the director's job is behind the scenes. It's mostly spreadsheets and some data entry, punctuated by the occasional request for a transfer credit. In the best case, the result is that we have courses, someone is assigned to teach them, and most people are not too upset about their schedules.

The mathematics division has had another good year. Courses are taught, homework and exams are graded, office hours are held, the Learning Centre is learned in, theorems are proved, publications are written, workshops and conferences are organized and travelled to, talks are given and listened to, students are supervised, and once a year we all meet each other when there is a fire drill. In addition, as every year, we have many exciting outreach events, including the Math Circles program and our summer camps.

We have a wonderful cohort of graduating students this year. Congratulations on earning your degrees! It has been said that the Honours seminar is our most fun seminar, and I certainly enjoyed all the amazing thesis research that was presented by our Honours students. Similarly, our master's and PhD students did a great job defending their theses! Today is a day to celebrate your accomplishments.

As every year, the division could not run without all the faculty and staff that contribute to our success. Julien Ross continued to guide our undergraduate students in his roles as the mathematics advisor and honours coordinator. Karl Dilcher and Dorette Pronk kindly filled in for Julien while he was on sabbatical. Sarah Chisholm kept the learning centre thriving, David Iron looked after the graduate program, and Rob Milson was the coop advisor. Theo Kolokolnikov kept watch over our curriculum, and Suresh Eswarathan continued to organize our successful colloquium. Tom Potter supervised another successful year for Math Circles. Finally, our amazing staff, Anna Marie, Mark, Jeanne, Nora, Balagopal, and Angela, keep everything running.

Most of all, we are so proud of our graduates! So let me congratulate them once again, and may the future be exciting!

STATISTICS DIVISION

ANDREW IRWIN, DIRECTOR

Jonathan Babyn completed his PhD. Joy Liu completed her MSc. Former student Jonathan Bradet-Legrís is working at Nova Scotia Health. Claire Boteler started a position at the National Oceanographic Center in Southampton, UK.

The *Journal of Marine Science and Engineering* will publish a special issue on “Marine Modeling and Environmental Statistics” in honour of Keith Thompson, who passed away in July 2022.

Mike Dowd started a three-year project using artificial intelligence to detect and classify both Arctic whales and ships from underwater acoustic data streams obtained from hydrophones. Mike is working on this project with post-doc Farid Jedari-Eyvazi and PhD student Fabio Frazao at Dalhousie, as well as other team members across Canada. The project is funded by Fisheries & Oceans Canada under the Canada Nature Fund for Aquatic Species at Risk program.

Joe Bielawski was awarded the Dr. Anne Marie Ryan Community Growth Award and two Dalhousie CTL grants to support summer undergraduate students who will work on science outreach projects. The project is based on a data analysis platform developed by Paul Bjorndahl (PhD candidate in Statistics). The goal is to make statistical analysis of microbiome data accessible to first year undergraduates and high school students. Ultimately, we will use the platform to improve science outreach in marginalized communities.

Andrew Irwin was awarded a Faculty of Science Killam Professorship for 2024-2029 and was appointed Director of the Atlantic Association for Research in the Mathematical Sciences (AARMS) effective July 1, 2024.

2+2 PROGRAM

HONG GU

The 2+2 program in statistics with the Shandong University of Finance and Economics (SDUFE) admitted the first students in 2020. In 2022, four students of this cohort joined our statistics program. This year all these four students have graduated successfully with high GPAs and all four students have been admitted to master programs in North America. In 2023, five students in the second cohort came to Dalhousie University. Currently there are six students in SDUFE planning to come to Dalhousie this year. These enrollment numbers are similar to that of 2+2 program in Economics from SDUFE.

The number of students who come to Dalhousie from SDUFE to finish their undergraduate study is still not as high as we expected. There are multiple reasons for the low enrollment in Dalhousie for the 2+2 program. One main reason is still the influence from COVID and the lack of information from students and parents about the safety situation overseas. Barry Lesser, Shannon Peng and Hong Gu from Dalhousie have been working on this to get the students and parents better informed. Another main reason is that there is a strong competition between different universities for these students, these include some American universities, other Canadian universities and some UK universities. Students and parents tend to select the universities with higher ranks, this is mainly because employers in China select people according to the ranks of the universities where the degrees were obtained. The new course-based master program in statistics provides good motivation for students in the 2+2 STAT program to come to Dalhousie University.

In addition to the 2+2 STAT with SDUFE, we have also initiated the discussion of possibility of 3+1+1 in STAT and 2+2 in MATH with SDUFE and a 2+2 in STAT with University of Finance and Economics (UFE) in Mongolia. The administrations in both SDUFE and UFE are very positive and eager for these possibilities. Certain details in the logistics of these programs are still to be worked out.

ACTUARIAL SCIENCE

TOBY KENNEY & CATIE FOLEY

There were seven major graduates from the Actuarial Science program this year. Several of our students successfully passed professional exams offered by the Society of Actuaries.

Outside of the classroom, several students attended the ASNA (Actuarial Students National Association) Conference in Montreal. This was a great opportunity to network with employers as well as students from other universities.

At the ASNA conference, some students were offered interviews for contract or full-time employment. Locally, demand for actuarial science graduates is also strong. We hosted local employers from two companies, Manulife and TELUS Health (formerly Lifeworks), as they provided actuarial information sessions for Dalhousie students this year.

BOOKS WANTED FOR SALE

KARL DILCHER

As I mention every year in the Chase Report, I'm taking care of a large number of surplus books that have been donated over the years by current and retired faculty members, alumni and departing students. Over the last few years, a few thousand volumes were sold to mathematicians all across Canada and hundreds more around the world. Once a year I can donate the sizeable income from these sales in equal part to scholarship funds in our department and to the CMS.

More than 1,500 volumes still remain; they are catalogued at: mathstat.dal.ca/~dilcher/oldbooks.html.

As always, I welcome further donations of mathematics, statistics and related books, including textbooks of any kind. Anything that is deemed suitable for the library will be placed there. In my experience, eventually most of the books find a good home and as an extra bonus, two good causes will be supported. I thank all those who have donated their books.

A related initiative is what I informally call the Calculus Textbook Preservation Project. I'm keeping one copy of each edition of each calculus textbook that I can get my hands on; they are hidden in the basement. Quite surprisingly, without much effort on my part, this collection has grown to about 500 volumes. For this initiative too, I welcome further books. Duplicates are given away to students, along with other elementary mathematics and statistics textbooks.

ALUMNI NEWS

CAROLINE COCHRAN RECEIVES THE 2024 ACADIA ALUMNI AWARD FOR EXCELLENCE AWARD

ROMAN SMIRNOV

I am pleased to inform you that our former student Dr. Caroline Cochran (née Adlam) has received this year's prestigious Acadia Alumni Award for Excellence in Teaching.

Caroline joined the Department in 2003 as a qualifying-year student following her graduation from Mount Allison University in New Brunswick with a BSc degree in Mathematics (major) and Physics (minor).

In 2004 she was accepted into our MSc program. Caroline received her MSc degree in 2005 (Thesis: "A Lie Group Theory Approach to the Problem of Classification of Superintegrable Potentials in the Euclidean Plane").

In 2006 she began her PhD program at Dalhousie. Interestingly, two years later, in 2008 (i.e., well into her PhD program!), Caroline was awarded both the Killam Predoctoral Memorial Scholarship and the NSERC Postgraduate Scholarship. In addition, she was also awarded that year the Professor Michael Edelstein Memorial Graduate Prize (and bought a kayak using the prize money!).



PHOTO PROVIDED BY ROMAN SMIRNOV

She successfully defended her PhD thesis entitled: ‘The Equivalence Problem for Orthogonal Separable Webs on Spaces of Constant Curvature’ in 2011 (the external examiner was a world-renowned expert in the area of orthogonal separation of variables, Professor Willard Miller Jr. of the University of Minnesota (1937-2023)). In her thesis, in particular, Dr. Cochran solved the classical problem concerning the orthogonal separable coordinates defined in the hyperbolic 3-space by employing the method of moving frames. To be precise, she completed the solution of the canonical forms problem in the hyperbolic 3-space published by a famous Russian mathematician Olevsky in his classical 1950 paper by solving the corresponding equivalence problem. She also solved the equivalence problem for the 3-sphere.

Even though since then we have heard various claims by other scholars around the world working in the area that the problem can be (better) solved “using spinors” ^[5] or “representation theory” ^[6] I do not think anybody has been able to solve this problem for the hyperbolic 3-space using a different method (it is just too hard, solving the problem would require too many calculations, there are too many cases to account for, etc.). Please correct me if I am wrong – I have been working in a different area of mathematics in recent years.

Caroline’s MSc and PhD theses were jointly co-supervised by Professor Ray G. McLenaghan and me, and of the University of Waterloo, a familiar figure in our department.

Ray has been an Adjunct Professor with us for many years, actively engaged in supervising students, examining MSc and PhD theses, and delivering talks.

Dr. McLenaghan played a pivotal role in introducing the Carminati-McLanaghan invariants in General Relativity ^[7], a topic further developed by Professor Alan Coley and his research group.

Moreover, Professor Ray McLenaghan supervised the PhD thesis of Professor Niky Kamran, FRSC, of McGill University, who, in turn, supervised the PhD thesis of Professor Robert Milson – a faculty member in our department. Notably, in the 1960s, Ray McLenaghan pursued his PhD degree under the mentorship of Professor Fred Hoyle, FRC, at Cambridge, famously known for coining the term “Big Bang” -- initially intended as sarcasm yet enduring in scientific discourse.

Caroline published several papers based on the results presented in her MSc and PhD theses ^[1-4].

Last but not least, Dr. Caroline Cochran was defending her PhD thesis just one month before delivering her first baby – a wonderful boy called William.

In 2014, Caroline joined the Department of Mathematics and Statistics at Acadia University, where she serves as an Instructor II. Additionally, she holds an adjunct position in our department, contributing to the training and mentorship of our graduate students. She has also played a key role in organizing the summer math camp for high school students, hosted at Dalhousie in 2014, 2015, and 2017. Throughout the years, this initiative has been jointly sponsored by AARMS, CMS, Dalhousie, and Acadia universities.

Please join me in congratulating Dr. Caroline Cochran on this well-deserved honor and wishing her continued success in her academic endeavors.

^[1] (with R. G. McLenaghan and R. G. Smirnov) Equivalence problem for the orthogonal separable webs in hyperbolic 3-dimensional hyperbolic space. *J. Math. Phys.* 58 (2017), no. 6, 063513, 43 pp.

^[2] (with R. G. McLenaghan and R. G. Smirnov) Equivalence problem for the orthogonal webs on the 3-sphere. *J. Math. Phys.* 52 (2011), no. 5, 053509, 22 pp.

^[3] (with R. G. McLenaghan and R. G. Smirnov) On geometric properties of joint invariants of Killing tensors. *IMA Vol. Math. Appl.*, 144 Springer, New York, 2008, 205-221.

^[4] (with R. G. McLenaghan and R. G. Smirnov) An orbit analysis approach to the study of superintegrable systems in the Euclidean plane. *Phys. Atom. Nuclei* 70 (2006), 486-490.

^[5] [SLS 2011 - 08 - Konrad Schöbel](#)

^[6] K. Schoebel, *An algebraic geometric approach to separation of variables*, Springer Spektrum, Wiesbaden, 2015.

^[7] [The Carminati-McLanaghan invariants.](#)

REFLECTION & REMEMBRANCE

FROM THE CHASE REPORT OF TEN YEARS AGO

AS DUG UP BY KARL DILCHER

3.14... AND ALL THAT

While Pi as a number remains, the annual Pi Day event keeps growing. In fact, this year the Graduate Student Society, who hold the department's right to Pi, moved this year's March 14 event to the Colloquium Room (from the usual 2nd floor lobby and lounge), and still managed to pack this larger venue. Once again someone tipped off the CBC, and a reporter and camera person chased at least one hapless faculty member around the building who had been falsely accused of being a specialist on facts about Pi. While this person escaped, others didn't, and Lucas Mol has been immortalized on <http://www.cbc.ca/news/canada/nova-scotia/math-lovers-celebrate-pi-day-at-dalhousie-university-1.2573099?autoplay=true>, reciting an embarrassingly large number of digits of Pi. Danielle Cox is also quoted on this link.

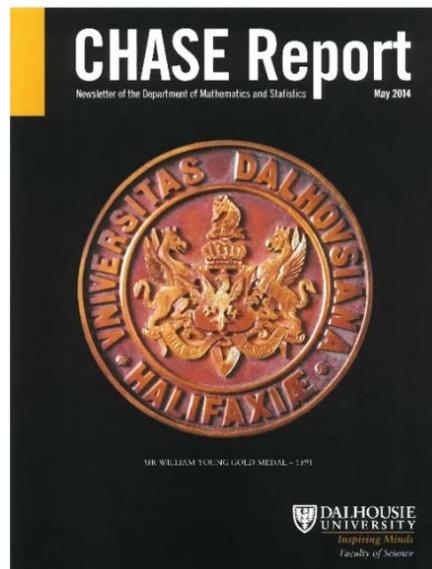
Some purists, meanwhile, complained about the fact that the official cutting of the pie took place at 12 noon, rather than at the correct 1:59 p.m. and 26 seconds.

THE END OF AN ERA

For 23 years after our department moved into the Chase Building in 1985, the departmental library – consisting of the collection of all Mathematics and about half of all Statistics journals at Dalhousie – was the proud centerpiece of our department. In fact, the department leadership at the time fought very hard to have our library move together with the department from the Killam Library (where the department was located for a number of years, until 1985) to the Chase Building. The older members of the department will still remember the hard-fought battle with the Library Administration, which ended in a compromise imposed by the VP Academic, according to which the journals would move with us, while all books remained in the Killam Library.

Until 2008 we had one of the most pleasant departmental libraries in the country, but then things changed rapidly, and keep changing, in parallel to a fundamental shift in recent years to a near-universal use of electronic journals. First, in recognition of the importance of pleasant and ample spaces for students, the library and learning centre switched spaces in the Summer of 2008. Then, in July of 2010 the basement of the Chase Building, and in particular the library, was struck by a disastrous flood which destroyed hundreds of volumes of mathematics and statistics journals.

The next change to our library has recently begun: By the end of this Summer all journals will be moved to the Killam Library, to make room for extra student space. This shortage of space is “a good problem to have” as it reflects the growing numbers of graduate and honours students we have seen in recent years. Still, some of us will sorely miss what used to be the centre of our department.



DEPARTMENT OF MATHEMATICS AND STATISTICS

FROM THE CHASE REPORT OF FIFTEEN YEARS AGO

AS DUG UP BY KARL DILCHER

THE CHASE TURNED 78

Not rounds per minute, of course, although there are some days in the “Oval Office” when it feels that way. No, but on January 14, 2009, our good old Chase Building had its 15 seconds of fame when on CBC TV’s “Nova Scotia at Six” it was reported that on that day in 1931 the building was opened as the N.S. Public Archives. A very nice archival picture was shown, and it was duly mentioned that the building is now the home of the Dalhousie Department of Mathematics and Statistics.

HIGHFLYERS

Right at the beginning of the Winter term it was noticed that an unidentified frying object had found its way to the very high ceiling of our 2nd floor lounge, where it had landed in the middle of a greasy circle.

A contest was then launched to guess the most likely nature of the object, and how it got there. While the grand prize, the object itself, was never claimed, it now seems likely that it was a piece of a hotdog, with mustard as adhesive. It appears that some people can’t keep their food down.



WE REMEMBER

Double Milestone for Dalhousie Alumna

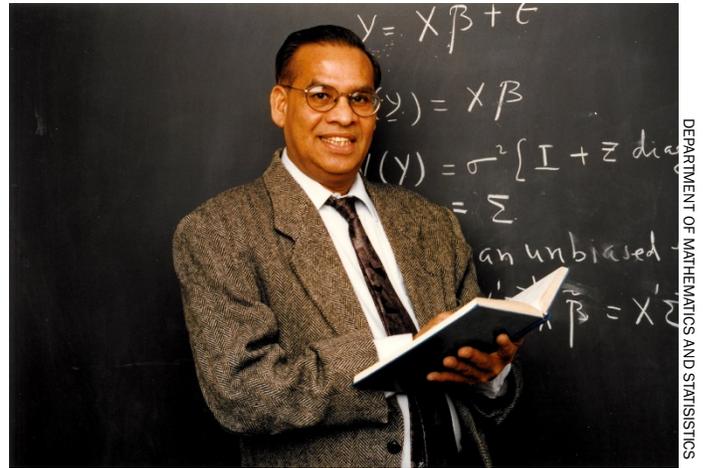


This year marks the centenary of Mrs. Erma Geddes Fillmore’s (BA’24) graduation, one of our named awards, established by her family. Above is a photo of Erma Geddes Fillmore at her fiftieth anniversary class reunion in 1974.

DR. RAJENDRA PRASAD (R.P.) GUPTA (1942-2023)

The Department of Mathematics and Statistics is saddened by the passing of former faculty member and chair Dr. Rajendra Prasad (R.P.) Gupta in December 2023.

Born in 1942 in a remote part of northern India, Dr. Gupta overcame humble beginnings to make his mark on academia and in the Indo-Canadian community. After earning his PhD from the University of Delhi in 1966, he soon began a distinguished tenure at Dalhousie University, becoming the youngest full professor in the university's history and chairing the Math department from 1991 to 1998.



In 2017, Dr. Gupta and his wife, Kamla Kumari, established an eponymous scholarship that is awarded annually to a deserving undergraduate Honours Statistics student. To date, five students have received the R.P. & Kamla Gupta Scholarship in Statistics, and while we look forward to announcing this year's recipient, we will do so with heavy hearts.

Beyond this award, Dr. Gupta's legacy will live on through the fond memories many of us in the department have of his contributions as a teacher, leader, researcher, mentor, and friend.

Dr. Gupta's Obituary is included below:

Dr. Rajendra Prasad Gupta, fondly known as RP, passed away on December 10, 2023 in Halifax, Canada. Born in 1942 in a remote village in northern India to parents Murari Lal Gupta and Asharfi Devi Gupta, he overcame humble beginnings to leave an indelible mark on academia, community service, and family life.

Dr. Gupta's early years were marked by simplicity in a small village in Uttar Pradesh, India. He received his B.Sc. at NREC College Khurja and master's degree at Jat College Baraut. His academic journey continued with a PhD from the University of Delhi, setting the stage for an illustrious career.

In 1966, he began his career as an assistant professor at the University of Florida, followed by a distinguished tenure at Dalhousie University. He served as Chair of the Math Dept for several terms. His contributions to mathematics and statistics were recognized with the honour of being the youngest full professor at Dalhousie. He has mentored and helped establish the careers of countless number of students, locally and abroad. He also published over 90 research papers, 3 authored textbooks, organized international conferences and was a founding member of an international statistics journal.

Dr. Gupta played a vital role in the Indo-Canadian community. He hosted radio and TV programs and organized multicultural conferences, showcasing his dedication to fostering diversity and inclusivity. His impactful contributions earned him the prestigious Lifetime Achievement Award from the Indo-Canadian Association.

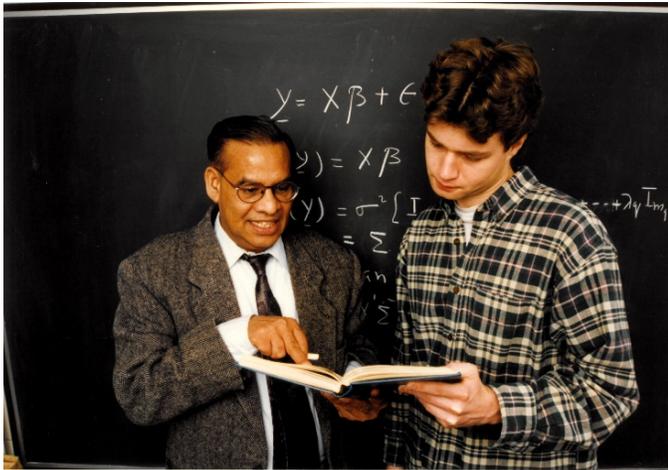
In addition to his professional accomplishments, Dr. Gupta cherished his family life. His achievements were possible only with the support of his dedicated wife, Kamla Kumari of 59 years.



FIRST DALHOUSIE/BEA MATH CAMP
July 1991

DEPARTMENT OF MATHEMATICS AND STATISTICS

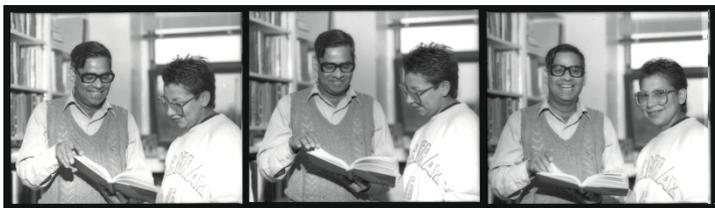
DEPARTMENT OF MATHEMATICS AND STATISTICS



They were blessed with four children: Anita (children Adiya and Sarayu), Sanjay (wife Sita and children Vishna, Varesh, and Vania), Anil (wife Geeta and children Shyla, Aarya, Samaaya), and Sunita (husband Marc and children Ariana and Maya).

Dr. Rajendra Prasad Gupta's life was a testament to his community service, resilience, family values and the pursuit of academic excellence. He has been an inspirational leader in the community and an epitome of gentleness, integrity, and social consciousness. His impact on academia, community service, and family will be remembered as a source of inspiration for future generations. His vibrant and permanent smile will be dearly missed by all.

<https://www.dignitymemorial.com/en-ca/obituaries/halifax-ns/rajendra-gupta-11578094>



DEPARTMENT OF MATHEMATICS AND STATISTICS



DEPARTMENT OF MATHEMATICS AND STATISTICS

PROFESSOR WILLARD MILLER, JR. (1937-2023)

ROMAN SMIRNOV

It is with a heavy heart and great sadness that I report the untimely passing last year of our dear colleague [Professor Willard Miller, Jr. \(1937-2023\)](#) from the University of Minnesota.

Willard was one of the most prominent researchers in the world who worked in the overlap of the representation theory of Lie groups, special functions, and the theory of superintegrable systems. He contributed greatly to our programs in the department by serving as the external examiner at the defenses of PhD theses of our former graduate students Caroline Cochran and Jin Yue, coming here as a visitor, colloquium speaker, and a speaker at the AMS Fall Eastern Sectional Meeting held at Dalhousie in 2014.

I would like to share my eulogy delivered during the Memorial service at University of Minnesota on April 9, 2024:

“Dear colleagues, friends, and family,

Today, we gather to remember and celebrate the life of a remarkable scholar, Professor Willard Miller Jr. As we come together to pay our respects, we reflect on the profound impact that Willard had, not only as an esteemed educator and mathematician but also as a cherished colleague, mentor, and friend.

I first met Willard in the summer of 1999 at the Workshop on Integrable Systems held at CRM at the University of Montreal, where he was one of the keynote speakers. After his talk, we engaged in a conversation for more than an hour about the topics of separation of variables and superintegrable systems, which I was beginning to explore at the time. This discussion was incredibly enlightening and insightful for me. Later that year, he visited the University of Waterloo, where I was a postdoc under the supervision of Ray McLenaghan, to give a colloquium. In the years that followed, we regularly crossed paths at conferences and workshops, including those hosted at the Institute for Mathematics and its Applications at the University of Minnesota. Willard visited Dalhousie University in Nova Scotia, Canada several times to attend conferences, give colloquia, and serve as the external reader of the PhD theses for two of my former students, Caroline Cochran and Jin Yue, who have since established successful careers in academia. I want to take a moment to acknowledge his support, which speaks volumes about his dedication to nurturing the next generation of scholars.

One of my most cherished memories with Willard occurred in the summer of 2005 during our participation in the conference “Symmetry in Nonlinear Mathematical Physics” at the Institute of Mathematics in Kyiv, Ukraine. Being a native of Ukraine, I was delighted to show Willard and his wife, Jane, around my hometown of Kyiv, an experience they thoroughly enjoyed. Subsequently, we decided to travel to Russia together for our next conference, “The 2nd International Conference on Superintegrable Systems in Classical and Quantum Mechanics,” held at the Bogolyubov Laboratory of Theoretical Physics of the Joint Institute of Nuclear Research in Dubna. Both conferences were held back-to-back.

Reflecting on this journey now is disheartening, given the current events in Ukraine. Russia's invasion has led to a devastating war, resulting in loss of life, and displacing many innocent people. The circumstances are unimaginably different from the time of our joint travel.

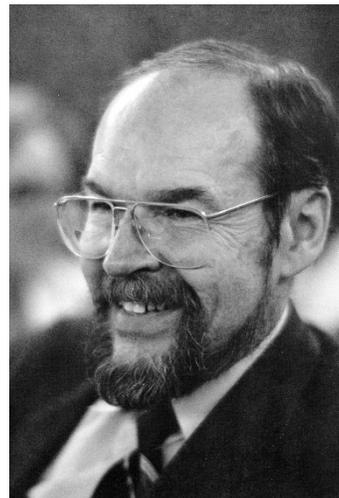
Accompanied by Professor Manuel Ranada from Zaragoza, Spain, we journeyed to Moscow by plane and embarked on a memorable car ride from the Sheremetyevo-2 airport to Dubna. The trip proved to be quite eventful, particularly as three of us (Willard, Jane, and Manuel) were first-time visitors to Russia. Unexpectedly, our car broke down in the middle of nowhere between Moscow and Dubna, prompting a patient wait while our driver adeptly fixed his old GAZ-24 “Volga”, probably manufactured around the time when Mikhail Gorbachev came to power in the USSR. This unplanned delay, however, turned out to be a blessing in disguise. On that very day, Dubna experienced a severe storm which we managed to miss due to the delay caused by the car breakdown.

Upon our arrival in Dubna, we encountered streets filled with debris, and none of the city's hotels had power. Compounding the situation, we discovered that there were two hotels under the same name “Dubna”, and due to the power outage, there was no way to verify our reservations through the computer system. Fortunately, a receptionist at one of the hotels temporarily accommodated us with two rooms, and I ventured out to purchase some food and water for our party of four since I could speak Russian.

Luckily, the power was restored the same day, and we were able to meet with the organizers and check into our hotel where we had reservations. The conference was a great success, enjoyed by all participants. Remembering that travel with Willard, Jane, and Manuel, I still recall that throughout that adventure, Willard managed to hold his composure and remain a mathematician first and foremost. No matter what was going on around us, Willard remained focused on his beloved mathematics, continuing to discuss recent results in the area and problems that were still to be solved. This was truly an inspiration, especially to a young academic like myself just starting his career at the time.

Although I am now working in a different area of mathematics, I feel incredibly blessed to have had Willard in my life when I needed his guidance the most, shaping my understanding of the topic of orthogonal separation of variables and having such a strong influence on my career as a mathematician. Beyond his scholarly achievements, I will always remember Professor Miller for his kindness, humility, and warm sense of humor.

Thank you.



COURTESY OF UNIVERSITY OF MINNESOTA

SUMMARY OF COLLOQUIA & SEMINARS

Everyone who is interested is welcome to attend our discussions and seminars:

- Departmental Colloquium – Mathematics
- Departmental Colloquium – Statistics
- Honours Seminar (Mathematics)
- Number Theory Seminar
- Atlantic Category Theory & Algebra Seminar (ATCAT)
- Dalhousie-AARMS Analysis-Applied Math-Physics Seminar
- Graph Theory Seminar
- Relativity Seminar

Additional information on the colloquia and seminars is available on the Department website: dal.ca/faculty/science/math-stats/news-events/colloquium.html

We would like to highlight the two colloquia series. The Mathematics Colloquia are organized by Suresh Eswarathasan. The 2023-2024 colloquium schedule is online at: mathstat.dal.ca/~sureshe/Colloquium.html.

The Statistics Seminars are organized by Théo Michelot and Orla Murphy. This year the seminar series moved to a hybrid setting, with several in-person presenters with most of the event still being held online. The list of the talks is located here: dal.ca/faculty/science/math-stats/news-events/colloquium/deparmental-colloquia-statistics.html#contentPar_text

AFFILIATED ORGANIZATIONS & SOCIETIES

The Department participates in five organizations related to mathematics and statistics:

- Canadian Mathematical Society (CMS)
- Atlantic Association for Research in the Mathematical Sciences (AARMS)
- Canadian Statistical Sciences Institute (CANSSI) Atlantic
- Statistical Society of Canada (SSC)
- American Mathematical Society (AMS)

We are pleased to share updates from some of these organizations.

ATLANTIC ASSOCIATION FOR RESEARCH IN THE MATHEMATICAL SCIENCES (AARMS)

DAVID LANGSTROTH

There are two large items and a few smaller ones that we would like to bring to your attention.

The first is that we are pleased to announce the appointment of Dr. Andrew Irwin as the next Director of AARMS for a three-year term effective July 1, 2024. Andrew has a PhD in Mathematics from Queen's University (Kingston) and postdoctoral experience at Rutgers University. He developed his applied mathematics teaching and research program at Mount Allison University for more than a decade. He is currently a Professor in the Department of Mathematics and Statistics at Dalhousie

University. His research interests focus on statistical and mathematical models in biological oceanography, spanning temporal scales from days to centuries and spatial scales from the flask to the ocean basin. The Chair of the AARMS Board, Dr. Tim Alderson, and the current AARMS Director, Dr. Sanjeev Seahra, send their best wishes to Dr. Irwin for a successful Directorship.

Our second item is to report that applications are now open for the 2024 Diversity in Mathematical Sciences summer school. This year's program will be held at Dalhousie University and will run from July 29 – August 2. The goals of the summer school are two-fold. First, to introduce students to research level mathematics and second, to encourage more female and female-identifying students to pursue graduate school in the mathematical sciences. The research theme of the 2024 summer school will be Combinatorial Commutative Algebra. By introducing advanced mathematics in a supportive and engaging environment, we aim to give students the tools and the support structure that will enable them to thrive in graduate school. This program includes funding for travel and local expenses. Detailed information can be found at: <http://www.fields.utoronto.ca/activities/24-25/IDMS-2024>

Finally, we would like to remind everyone that there are two fairly new AARMS programs which are still undersubscribed. Our Graduate Scholarship program invites nominations for two \$5,000 scholarships to be awarded each year. These scholarships will recognize the brightest young mathematical scientists in the region and are open to graduate students registered at AARMS member universities in the Fall academic term. In our Doctoral Thesis Award program AARMS invites nominations for two \$2,500 awards to be presented in the Fall each year. These awards will recognize exceptional research achievement of recently graduated doctoral students from Atlantic Canada. Look out for the announcements through the AARMS mailing list, or check our website for more details: www.aarms.math.ca

Diversity in the Mathematical Sciences 2024
Dalhousie University
Halifax, Nova Scotia, Canada
July 29 – August 2, 2024

Synopsis
The main tools to study zero sets of polynomials using algebraic tools come from Commutative Algebra. When the polynomials have only one term (monomials), one can do without heavy commutative algebra, using basic techniques from algebraic geometry. The development of such techniques, going back to the 19th century and with a renewed burst of research activity, is the focus of the field of Combinatorial Commutative Algebra.
Our school will introduce some of these ideas to the participants via concrete local plans and problems. We will cover topics including edge ideals of graphs, Hilbert functions, combinatorial commutative algebra and discrete homotopy theory.
The school will also include panels, discussions of graduate school, academic and non-academic jobs and issues facing women in mathematics at general. We will have morning lectures, afternoon tutorials and real topics.

Application Deadline
March 30, 2024

Let's Start!

Eligibility
We are seeking applications from both male and female-identifying students who have finished at least two years of an undergraduate degree in the mathematical sciences. Applicants having successfully completed an Honours' level proof-based course in linear algebra will be given full consideration. A first year course in algebra covering rings and ideals will be considered an asset.

Meet our Organizers
Susan Cheng (University of Toronto), Sara Park (Dalhousie University)

Meet our Instructors
Nasim Amini (University of Toronto), Sobi Karz (University of Toronto), Sarah Mayson-Tang (University of Toronto), Susan Morry (University of Toronto), Maryam Shafiqi (University of Calgary)

Our Sponsors
AARMS, BIRS, Fields Institute, PIMS, OAC, University of Manitoba

PROVIDED BY MARK MONK

CANSSI ATLANTIC

JOANNA MILLS FLEMMING

The Canadian Statistical Sciences Institute (CANSSI) Atlantic Regional Centre serves the Atlantic Canada statistical sciences community. Its newly formed Advisory Committee consists of Dr. Hugh Chipman (Acadia), Dr. Michael McIsaac (UPEI), Dr. Connie Stewart (UNB SJ) and Dr. Yildiz Yilmaz (MUN). This team is making efforts to increase both recruitment and retainment of highly qualified personnel in our region.

Plans include:

- Hosting a Florence Nightingale Day (May 12) event this spring in New Brunswick,
- Developing a CANSSI Atlantic Recruitment Scholarship for masters-level study in statistical sciences at a university in Atlantic Canada,
- Creating a CANSSI Atlantic Data Fest type event to run in conjunction with Science Atlantic each year,
- Pursuing the establishment of a STAGE node in Atlantic Canada,
- Developing a CANSSI Atlantic Hybrid Seminar Series that will travel around Atlantic Canada and be accessible to upper-level undergraduates and graduate students.

CANSSI will be hosting a National Town Hall on Friday, June 7 beginning at 2pm AT (10am PT) via Zoom. Please contact Joanna Mills Fleming, Regional Director of CANSSI Atlantic if you are interested in getting involved in any of these projects.

COMMUNITY OUTREACH & BEYOND

FUN MATH PROBLEMS

TOM POTTER

This problem is based on the January 31 presentation given by Marissa Assam Andrecyk:

You are at department function, and you notice that the mathematicians shake hands only with the statisticians, but the statisticians shake hands with both the mathematicians and the other statisticians. If there are M mathematicians and S statisticians, how many handshakes occur?

Hint: Split it up: how many statisticians shake hands with other statisticians; and how many mathematicians shake hands with statisticians?

The solution is revealed on page 19!

DALHOUSIE MATH CHALLENGE CLUB

DORETTE PRONK

In September 2023 we restarted the Dalhousie Math Club. Some of our students have been with us a long time and were looking forward to solving problems together and showing their skills in the upcoming competitions. Many were new students who had heard about the math club through the AARMS website through the announcement made during the Math Kangaroo medal ceremony in June 2023.

We started with nine students in the senior club (grades 8-12), five of which are female. Throughout the semester two more male students and two more female students joined us. Some students attended the club online, some from as far away as Romania (this student is a Canadian student living abroad who hopes to represent Canada in the EGMO competition next year). The junior club (for grades 5-7) started with five students and grew to eight, two of which were female. I want to note here that our youngest club member was a girl in grade two, who solved most of the problems we worked on in the club.

During the fall semester the clubs were mostly taught by the students in MATH 3790, a course on mathematical problem solving. For the undergraduate students the enthusiasm and skills of the math club attendees was inspiring. They enjoyed finding topics to teach and seeing the response of the students in the club.

During the winter semester the club was taught primarily by Jack Jia, one of our graduating students, and Dorette Pronk. We want to thank Jack for his dedication and many years of assisting in the math club! We wish him the best for the next stage of his training can career and will miss him here! We also had an occasional guest lecturer, such as James Rickards, the chair of the IMO committee for the Canadian Math Society. (James has accepted a position at Saint Mary's University, so we hope to see more of him in the next years!)

The students participated this year in the Canada Jay Math Competition (for students in grade 8 and below) and the Canadian Open Math Challenge, organized by the Canadian Math Society. They performed extremely well and received a long list of honours. Our youngest student, Paris Tang, received a "Performance with Honours" certificate; and the others received various gold, silver, and bronze awards, whether it be for their grade levels or the provincial awards. For the Canadian Open Math Challenge, we received a gold and silver award for Nova Scotia grade 11, and silver and bronze awards as well as an honourable mention for Nova Scotia grade 9. We congratulate all our students on their results in these contests!



DORETTE PRONK/DALHOUSIE MATH CHALLENGE CLUB



Some of our students participated also in the AMC contests from the Mathematical Association of America, the AMC10 and AMC12, and one of our students, Maria Mihai, qualified to participate in the AIME (the American Invitational Mathematics Examination). Congratulations!

In April 2024 the students participated in their favourite contest of the year: the Purple Comet online team competition. The fun starts with choosing team names. What would you think of “Minuet and Trio”? And they all agree that they enjoy solving problems together is far less stressful and a lot more fun than working on an individual competition. Our two teams came first in Nova Scotia; our high school team came 59th worldwide among mixed teams (from more than one school) and our middle school team came 94th worldwide (among mixed teams).

We ended the year with a celebration of all we had learned, accompanied by math games, snacks, and award certificates.

DALHOUSIE & BEA ANNUAL MATH CAMP

The 2023 BEA Math Camp continued its week-long residential camp from July 3 to 7, 2023. The camp returns this summer starting on July 7 to 12. The Dalhousie & Black Educators’ Association Math Camp began in the summer of 1991, and was founded by the late Dr. R.P. Gupta.

NS MATH CIRCLES

TOM POTTER

It has been another exciting year of outreach activities for NS Math Circles. The activities of NS Math Circles are twofold: travelling to schools around the province to do interactive math workshops—doing mathematics and in way that promotes engagement and builds confidence—and hosting monthly interactive presentations aimed at the junior to senior high level, which are free to attend.

This year Tom Potter continued as program director of Math Circles, and Dr. David Iron continued as faculty advisor. A number of presenters and content developers from last year continued to work with Math Circles this year; these included: Anaam Choudhury, Baorui Jia, Daniel Teixeira, Dario Brooks, Dulguun Norjinbat, Iresha Madduwe Hewalage, Joey Latta, Joyce Jiao, Knowledge Gule, Louis Bu, Neil Kelley, Scott Wesley, and Vivienne Kwan. We also recruited several new presenters in order to keep up with the growing demand for Math Circles presentations, these included Aaron Fairbanks, Christine Fang, Fatema Gholami, Joy Liu, Hasan Mahmood, Hala Hasan, and Timothy Power.

Between October and December, we had a very full schedule of school visits. We attended the Math Teachers Association Conference again this year and made new connections with teachers from around the province. We gave a presentation to promote our program and had an exhibit table for teachers to sample our activities and learn about our work.

Between October and March, we did five special presentations at Dalhousie for students of African descent from Duc d’Anville Elementary and Clayton Park Jr High. These were organized together with Phillip Jackson, an African Nova Scotian Student Support Worker. The presentations, given by Dario Brooks and Knowledge Gule, were very well-received, and Mr. Jackson informs us that the students continue to speak of their experience at Dalhousie. We have plans to continue and expand these presentations.

We continued our afterschool program for Indigenous students this year, which was overseen by Tom Potter and Dr. Dorette Pronk, together with Mandy-Lynne Markie



TOM POTTER/MATH CIRCLES



(support worker with HRCE). We visited Bayview High School in Tantallon on an almost weekly basis, providing fun activities, homework support, enrichment for advanced students, and encouragement for a small but committed group of students. We plan to continue and expand this program next year.

In March we hosted the 2024 [Canadian Math Kangaroo Contest](#) at Dalhousie. Dalhousie was the only Kangaroo contest site in Nova Scotia, with 160 registrants. Tom Potter and Dr. Dorette Pronk were the site coordinators, who also had help from several members of the Math Circles team. We also provided two in-person training sessions for the Kangaroo contest, with the help of the Math Circles team. We will hold an awards ceremony again this year in June.

After the success of last year's breakout sessions at the South Shore Science Fair in Bridgewater, we were invited to

do it again this year. We did a full day of breakout sessions for grades 6-12 for this event. We also participated in the first STEM night at New Minas Elementary School this April, where our table attracted 300 students with their families. We also participated for the first time in the Kings County Academy STEAM day on May 1, where we worked with two groups of students for over 4 hours, after which the students presented their work in the school gymnasium.

NS Math Circles again provided the activities for Dal Discovery Days for the Math Department. Over three days we hosted large groups of students, from grades 5 to 9, in the Learning Centre. We did activities such as cutting Mobius Strips, Fold and Cut Theorem, Eulerian Circuits, Cryptography, and Card Tricks, and included a refreshment break for each group.

As of the first week of May, we have completed **98 school visits**, for a **total of 379 classes**, in addition to the special outreach presentations mentioned above. We visited schools all over the HRM, as well as in Canning, Cornwallis Park, Granville Ferry, Hardwood Lands, Kentville, Lantz, Stellarton, Truro, and Wolfville. We did a couple virtual class presentations as well this year, reaching a class in Fall River and another in Guysborough.

Our evening monthly events have continued to be successful and well-attended. We've continued to host our monthly evening events in a hybrid format, which has allowed to us reach more students. We've also provided recordings to those who wanted to attend but were unable. This year we had presentations from enthusiastic undergraduate and graduate students, a faculty member, and a local high school teacher. We also had two special monthly events which were done in collaboration with [Imhotep's Legacy Academy](#), in which the presentation was created and delivered by Marissa Assam, a tutor from the ILA team. Nearly 200 students joined us so far this year. We had pizza and pop for those who attended in person. Our presenters so far this year were Tom Potter, Bram Ogus, Iresha Hewalage, Marissa Assam Andrecyk, Dr. Roman Smirnov, Dylan Pearson, and Erick Lee. See our website to learn more about these excellent presentations. We are very grateful to our volunteers for giving these workshops.



Thanks to everyone who helped make this year a great success, including presenters, teachers, and math consultants and support workers in the community. We would also like to thank the support in the Math and Stats Department: Nora Amaro, Mark Monk, and Anna Marie Davis, for their work ensuring all the administrative needs were met, including pay queries, room bookings, building access, and cleanup requests. Thank you to Dr. David Iron for overseeing all contracts and expenses and

helping troubleshoot any problems that arose. Thank you to Dr. Dorette Pronk for being heavily involved in the program's continued success as we worked to apply for funding renewal, and for helping oversee the afterschool program at Bayview High.

This year, Math Circles celebrates its tenth year of funding with Eastlink. In April we hosted an event for our sponsors to celebrate this milestone. The folks at Advancement and Alumni Engagement were extremely helpful in organizing this event, including Jocelyn Adams and Christena Copeland, and especially Mila McLean for overseeing all aspects of our sponsor event and helping Tom prepare for it. We are extremely grateful to Eastlink for their generous support, which makes our program possible!

Keep up to date with our events at www.nsmathcircles.ca. We are also on Twitter (@NSMathCircles) and Facebook (NSMathCircles1).

SCIENCE ATLANTIC

ANDREW IRWIN AND DORETTE PRONK



PHOTO PROVIDED BY ANDREW IRWIN

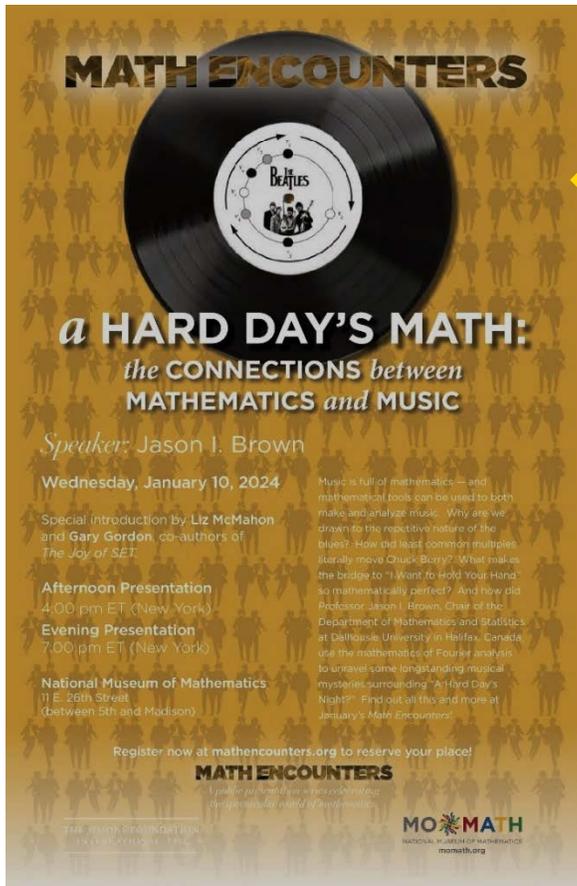
We had a very successful trip to Charlottetown on the weekend of October 14/15 for Science Atlantic. Fifteen undergraduate and eleven graduate students participated in the meeting. A photo of most of the team is featured here. Joanna (Mills Fleming) gave a very nice and well-received plenary talk.

Prizes for graduate research talks were won by: Louis Bu (first place), Dylan Pearson (second), Joy Liu (third). Dalhousie undergraduates also won second (Tim Power) and third prize (Ethan Saunders) for their talks. The Dalhousie team of Owen Winters and Tim Power won third prize in the Math contest. **In all, Dalhousie contributed 14 of 41 talks at the meeting!**

Thank you for your support, mentoring, and encouragement of all participants.

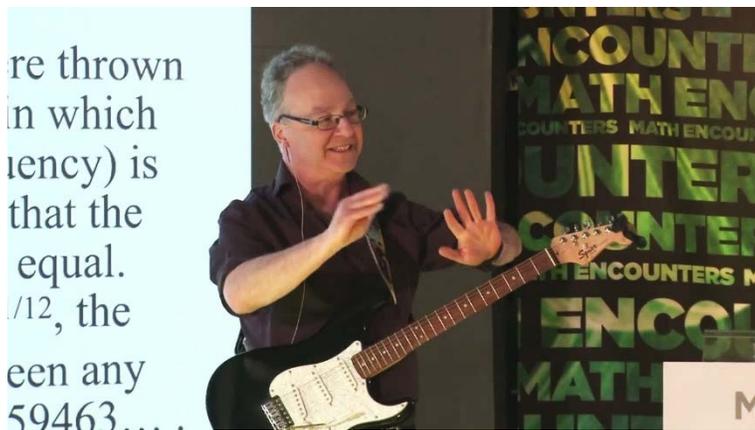
A HARD DAY'S MATH: THE CONNECTIONS BETWEEN MATHEMATICS & MUSIC

ANDREW IRWIN



NATIONAL MUSEUM OF MATHEMATICS

In January, Dr. Jason Brown (Department Chair) gave a talk at the National Mathematics Museum in New York City, as part of their *Math Encounters* series.



NATIONAL MUSEUM OF MATHEMATICS YOUTUBE

At left is the poster for the event and below is a link to a video recording of the talk available on YouTube: <https://youtu.be/WUTribzS2IE>

The run time is 1h 12m.

SOLUTION TO FUN MATH PROBLEMS

Answer: $\binom{S}{2} + SM$, where $\binom{S}{2} = \frac{S*(S-1)}{2}$.



CHASE
ANNUAL
REPORT
2024

The **Chase Annual Report 2024** is published for students, alumni, and friends of the Department of Mathematics and Statistics, Dalhousie University. Your suggestions and comments are welcomed for future issues (email mathstat@dal.ca).

This year's edition of the Chase Annual Report was produced and designed by **Mark Monk**.



**DALHOUSIE
UNIVERSITY**

**DEPARTMENT OF
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