

CHASE ANNUAL REPORT | 2022



**DEPARTMENT OF
MATHEMATICS AND STATISTICS**



**DALHOUSIE
UNIVERSITY**

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HONOURS & AWARDS

Congratulations to all our graduates from the fall of 2021 and spring of 2022!

We look forward to hearing from you. Please feel welcome to either drop us a line when you have a chance or stop in to say hello next time you are on campus.

GRADUATES & NEWEST ALUMNI

We are pleased to present the names of each person who convocated this academic year, a total of 87 Graduates, who are now members of our alumni family. Graduates are listed alphabetically by surname(s) for fall 2021 and spring 2022.

FALL 2021

First Name	Surname(s)	Program
Ashraf	Ahmed	Bachelor of Science Major in Statistics and Neuroscience
Fahimeh	Bayeh	Master of Science, Mathematics
Iain	Beaton	Doctor of Philosophy, Mathematics
Xiaoyan	Chang	Bachelor of Science Honours in Actuarial Science and Economics
Hao	Fang	Bachelor of Science Major in Statistics and Economics
Chunyi	Gai	Doctor of Philosophy, Mathematics
Mahamad	Kanoute	Bachelor of Science Major in Actuarial Science
Vasso	Karmas	Bachelor of Science Major in Mathematics
Pengcheng	Liang	Bachelor of Science Major in Economics and Statistics
Yutong	Liu	Bachelor of Science Major in Statistics and Economics
Kyle	MacKeigan	Doctor of Philosophy, Mathematics
Isaac	McMullin	Master of Science, Mathematics
Raja	Milad	Doctor of Philosophy, Mathematics
Tiara	Mulder	Bachelor of Science Major in Biology and Mathematics
Meien	Pan	Bachelor of Science Major in Economics and Statistics
Francisco	Rios	Doctor of Philosophy, Mathematics
Jiufeng	Zhang	Bachelor of Science Major in Ocean Sciences and Statistics
Boyang	Zhang	Bachelor of Science Major in Statistics and Economics
Jing	Zhang	Doctor of Philosophy, Statistics
Owen	Zhang	Master of Science, Mathematics

SPRING 2022

First Name	Surname(s)	Program
Abe	Adeeb	Master of Science, Statistics
Sara	Atbaei	Bachelor of Science Major in Mathematics
Shea	Boersma	Bachelor of Science Major Co-operative in Mathematics
Jacqueline	Bone	Bachelor of Science Major in Actuarial Science
Jia Qi	Bu	Bachelor of Science Major in Economics and Statistics
Monica	Chen	Bachelor of Science Major in Statistics and Economics
Yuqing	Chen	Bachelor of Science Honours in Actuarial Science and Computer Science
Claire	Cui	Bachelor of Science Honours in Statistics
Taylor	Davies	Bachelor of Science Honours in Ocean Sciences and Math

First Name	Surname(s)	Program
Salimata	Diakite	Bachelor of Science Major in Statistics
Yueqi	Fan	Bachelor of Science Major in Economics and Statistics
Chris	Freund	Bachelor of Science Major in Mathematics
Hayley	Fulton	Bachelor of Science in Mathematics
Mingzhao	Gong	Bachelor of Science Major in Statistics
Alexandra	Gouthro	Bachelor of Science Major in Actuarial Science
Lauren	Grace	Bachelor of Science Major in Actuarial Science
Madison	Gray	Bachelor of Arts Major in Mathematics and Music
Jacob	Hare	Bachelor of Science Major in Mathematics and Computer Science
Yichuan	Hu	Bachelor of Science Honours in Actuarial Science
Chengjing	Jiang	Bachelor of Science Major in Statistics
Chengyan	Jiang	Bachelor of Science Major in Mathematics and Computer Science
Alex	Karavos	Bachelor of Science Honours in Mathematics and Physics
Liyanze	Liu	Bachelor of Science Major in Statistics
Jade	Lotter	Bachelor of Science Major in Statistics
Meng	Lyu	Bachelor of Science Major in Statistics
Joseph	Mingrone	Doctor of Philosophy, Statistics
Raymond	Mulrooney	Bachelor of Science Major in Mathematics
James	Munday	Bachelor of Science Honours in Mathematics and Physics
My	Nguyen	Bachelor of Science Major in Mathematics
Georgia	Palov	Bachelor of Science Major in Actuarial Science
Cali	Park	Bachelor of Science Honours in Statistics
Daniel	Perry	Bachelor of Science Major in Actuarial Science
York	Qie	Bachelor of Science in Statistics
Ravi	Rai	Master of Science, Mathematics
Luojia	Sang	Bachelor of Science Major in Economics and Statistics
Alice	Shen	Bachelor of Science Major in Statistics
Michael	Smith	Bachelor of Science in Statistics
Jamie	Stark	Bachelor of Science Honours Co-operative in Chemistry and Mathematics
Nick	Stead	Bachelor of Science Major in Mathematics
HaoTeng	Sun	Bachelor of Science Major in Economics and Statistics
Wanting	Sun	Bachelor of Science Major in Statistics and Economics
Xiaoting	Sun	Bachelor of Science Major in Economics and Statistics
Yifan	Sun	Bachelor of Science Major in Mathematics and Statistics
Zhe	Sun	Bachelor of Science Major in Economics and Statistics
Langxuan	Tan	Bachelor of Science Major in Mathematics
Jiachen	Tao	Bachelor of Science Major in Mathematics
Arvin	Vaziry	Master of Science, Mathematics
Moxuan	Wang	Bachelor of Science Honours in Biochemistry and Molecular Biology and Statistics
Xing	Wang	Bachelor of Science Honours in Statistics and Economics
Yasong	Wang	Bachelor of Science Major in Economics and Statistics
Xinyi	Xie	Bachelor of Science Honours in Statistics
Yifan	Xie	Bachelor of Science Major in Statistics
Chen	Xu	Bachelor of Science Major in Mathematics and Computer Science
Kaiwen	Xue	Bachelor of Science Major in Statistics and Computer Science
He	Yang	Bachelor of Science Honours in Psychology and Statistics
Shutong	Yang	Bachelor of Science Major in Economics and Statistics

First Name	Surname(s)	Program
Wenxiu	Yang	Bachelor of Science Major in Statistics and Economics
Jonah	Yapp	Bachelor of Science Major in Statistics
Haotong	Yu	Bachelor of Science Major in Economics and Statistics
Jie	Yu	Bachelor of Science Honours in Statistics and Actuarial Science
Bijun	Zhang	Bachelor of Science Major in Economics and Statistics
Xinyuan	Zhang	Bachelor of Science Major in Economics and Statistics
Yandi	Zhang	Bachelor of Science Major in Statistics
Yifan	Zhang	Bachelor of Science Major in Economics and Statistics
Peiyu	Zhao	Bachelor of Science Honours in Statistics
Lei	Zhou	Bachelor of Science in Statistics
Yulan	Zhou	Bachelor of Science Major in Mathematics

DEPARTMENT AWARDS

The names of this year's recipients are presented below along with a description about each of the 17 awards. Congratulations to our 2021 – 2022 award earners!

SIR WILLIAM YOUNG GOLD MEDAL IN MATHEMATICS

This medal is awarded at convocation to the student who stands first among those taking 1st class honours in Mathematics. It is also known as the University Medal in Mathematics.

Recipient: James Munday

UNIVERSITY MEDAL IN STATISTICS

This medal is awarded at convocation to the student who stands first among those taking 1st class honours in Statistics.

Recipient: Claire Cui

UNIVERSITY MEDAL IN ACTUARIAL SCIENCE

This medal is awarded at convocation to the student who stands first among those taking 1st class honours in Actuarial Science.

Recipient: Yuqing Chen

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: Linh Dinh

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: Linh Dinh

THE ELLEN MCCAUGHIN MCFARLANE PRIZE

This award is in the memory of Ellen McCaughin McFarlane, class of 1927 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: Andrew Allen

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: Georgakopoulos Tolis

ERMA GEDDES FILMORE MEMORIAL SCHOLARSHIP

This scholarship is in memory of Erma Geddes Fillmore (Dalhousie BA, 1924), 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: Weifan Yan (Fall 2021)

FIELD PRIZE IN STATISTICS

This monetary prize is awarded to the student with the highest academic standing who has completed their 3rd year of studies in Statistics. This award was endowed by Dr. Christopher Field and Mrs. Harriet Field.

Recipient: Jia Qi Bu

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: Deni Salja

THE KATHERINE M. BUTTENSCHAW PRIZE

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

Recipient: Peilin Li

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: Linh Dinh

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: Sara Atbaei

PROFESSOR MICHAEL EDELSTEIN MEMORIAL GRADUATE PRIZE

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

Recipient: Wensha Zhang

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: Weifan Yan

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 2nd class standing during the first three years.

Recipients: James Munday & Alex Karavos

WAVERLEY PRIZE

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

Recipient: Cassie Norman

REPORTS & NOTES

FROM THE CHAIR

// Jeannette Janssen

Congratulations to our graduates and prize winners! Completing a degree in Mathematics, Statistics or Actuarial Science is a major achievement in the best of times. This cohort of graduates faced extra challenges; they completed the most intense part of their studies in a university environment deeply changed by the pandemic. I am glad that they will be able to celebrate the completion of their studies with an in-person ceremony. Graduates, I hope you celebrate your success in style!

If there is one word that characterizes the past year, it would be “hybrid.” The academic year started with the re-opening of the Chase building and a return to our offices. Judging from the paper bin, many of my colleagues cleaned their office to mark a new beginning. I did the same. Most instructors were excited about the return to in-person teaching. The return introduced new routines: masking, distancing, and hybrid delivery. Then, Omicron hit in December. We moved online again in the middle of the exam period. Winter term started online and ended in-person – in practice most classes were held in a hybrid form throughout the term.

All of us have learned to adapt to high levels of uncertainty and rapid change. I am impressed by the flexibility shown by students and instructors alike: the innovative adaptations and rapid adjustments that enabled us to continue to deliver a first-rate education to our students. Thank you!

The year also saw great changes in the office. In December, Ellen Lynch left her position at the front desk, which she held for 12 years. Danielle Hill, who joined us in 2020 as financial assistant moved to another position at Dalhousie. Thus, in January we were left with only Maria and Ann in the office. Together they kept the office running smoothly. Ann worked incredibly hard taking care of every detail, and on top of that, leading the hiring of new staff.

The silver lining is that we were allowed to replace Ellen and Danielle with full time positions. Going forward, we have the administrative support we need for our growing department. A warm welcome to new staff members Mark Monk and Susan Enta, and thanks to Maria, Ellen, Mark, Danielle, and Susan for keeping the office functioning during the pandemic and transition. Thanks to Angela Myers for keeping our building clean and safe, and to Balagopal Pillai for maintaining our computer equipment and finding clever solutions for our videoconferencing needs. Finally, a very special thanks to Ann Bannon. Her expert help, her extra effort and her eye for detail were instrumental in navigating all the changes.

Orla Murphy joined us as a new faculty member last summer. Orla completed a first-class honours degree at St. FX; her honours thesis, under supervision of Ping Wang and Xu (Sunny) Wang, led to a publication. She did her graduate studies at McGill, taught at UNB, and held a post-doctoral position at McMaster. Orla's job interview was one of the last in-person events held in the Chase building; Orla wisely spent the pandemic year completing her postdoc and joined us when we were finally back in our offices.

Another new faculty member, Théo Michelot, will join us in July. In addition, Asmita Sodhi and Philippe Fullsack helped us out this year in limited term positions. Welcome to Orla and Théo, and thanks to Asmita and Philippe.

Suresh Eswarathasan, Lam Ho and Julien Ross were all granted tenure this year and will start the new academic year as Associate professors. In all three cases, their promotion and tenure were supported by enthusiastic letters of reference, very strong dossiers, and unanimous support from the department. In addition, it was just announced that Lam Ho was renewed for a second term as Canada Research Chair. Congratulations to Suresh, Lam, and Julien.

Congratulations also to Theo Johnson-Freyd, who started with us in 2021. With his first NSERC Discovery grant, Theo received an Accelerator supplement, which is meant to "maximize the impact of established, superior research programs". In addition, Theo is part of a team of mathematicians and scientists that was funded by the Simons institute. Theo thus joins Peter Selinger and Andrew Irwin as department members with large external grants. Such grants also benefit the department: they generate overhead funds which provide extra funds for our graduate program and postdoctoral fellowships.

This year saw the launch of CANSSI Atlantic, the regional centre of the Canadian Statistical Sciences Institute. Joanna Mills-Flemming is its first director. She organized a successful event, held in-person in Halifax and attended by participants from across the Atlantic region, to celebrate the launch.

Hong Gu and Toby Kenney were recognized for their idea of an automated diagnosis software tool for Emergency departments. They participated in a competition that included a "pitch" of their idea to a panel of business leaders and were awarded funds by Innovacorp to develop and commercialize their idea

Finally, kudos to Deni Salja, a graduate student supervised by Dorette Pronk, one of two recipients of the first AARMS graduate prize ever awarded. Kudos also to Jason Brown, this year's recipient of the Dalhousie Award for Excellence in Graduate Supervision.

My term as Chair ends on June 30. Leading the department through the pandemic has been an interesting challenge. I leave the department in good shape: we have a large crop of new faculty members, our programs are growing, and there are new initiatives and ideas. I wish the new Chair, Jason Brown, all the best, and will happily return to teaching and research.

GRADUATE PROGRAM

GRADUATE STUDENTS' ASSOCIATION

This year, the Mathematics and Statistics Graduate Student Society was mainly focused on restoring society's activities after being inactive for a considerable period due to the pandemic. The elected executive members of the Grad society faced several issues in transitioning process as most of the former executive members are no longer students at Dalhousie University and do not reside in Nova Scotia. After constant efforts to reach out to the former executive members, the Grad society finally completed a successful transition in March. We would like to thank Tom Potter- former VP internal in 2018-2019- for his kind help to the Grad society with the transition process.

Although the Grad society could not resume the regular social activities from the pre-pandemic era for the aforementioned reasons, it organized a new event- Women in Mathematics Day- to celebrate women's contributions to Mathematics and inspire female graduate students in our community. Women in Mathematics Day is celebrated annually on 12 May, the birthday of Maryam Mirzakhani, the only woman ever to win the top award in mathematics, the Fields Medal. Our event was held in a hybrid format for three days, May 11-13, with the collaboration of Dr. Asmita Sodhi. At this event, three films were screened:

- Women in science in Africa, A SILENT REVOLUTION
- Secrets of the Surface: The Mathematical Vision of Maryam Mirazkhani
- Words of Women in Mathematics in the Time of Corona

Also, we enjoyed several great talks by some of women mathematicians from our department, Dr. Sarah Chisholm, Dr. Sara Faridi, Dr. Orla Murphy, Dr. Dorette Pronk, and Dr. Asmita Sohdi. The event was a great success. Below, there are some pictures from this event.



We look forward to planning more events during the summer, and we wish everyone a wonderful summer.

2021/2022 Executive:

President: Leila Mohammadi | **Vice President External:** Fahimeh Bayeh | **Vice President Internal:** Arvin Vaziry | **MSc Mathematics:** *vacant* | **PhD Mathematics:** Scott Wesley | **MSc Statistics:** *vacant* | **PhD Statistics:** Fatemeh Tofighi

UNDERGRADUATE PROGRAM

DALHOUSIE UNDERGRADUATE MATHEMATICS AND STATISTICS SOCIETY (DUMASS)

2021/2022 Executive Council Members:

President: Seoyeon (Cali) Park | **Vice President:** Rachel Beck | **Treasurer:** Lawrence Matsuoka | **Secretary:** Louis Bu | **Communications:** Hailey Wigmore | **DSS Rep:** Aliya Grant

The Dalhousie Undergraduate Mathematics and Statistics Society is a part of the Dalhousie Student Union. We assist with organization of student involvement in mathematics and statistics conferences, seminars, and departmental events, as well as organize social events for mathematics and statistics students.

This year, we had our general meetings (once per each term), where we helped introduce students to each other and the executive committee. We held monthly meetings on the first Wednesday of every month, and planned fun events to socialize, while following COVID-19 guidelines. These events were very well attended, and some events were planned with other DSU societies, such as the undergraduate physics and chemistry societies. Due to the unexpected closure of campus at the end of fall term, our monthly meetings were moved to an online format. Despite this, our monthly meetings were still lively, and there were lots of interactions between the students.

Some events we held this past year were:

- Back to campus party, where we hosted fun games for professors and students to interact at the beginning of the term
- Halloween movie night
- Exam season pop-up coffee event
- Combined parties with other departmental societies

Anyone who is taking a mathematics and/or statistics course is part of the society, and we welcome you to attend our events. We have a Microsoft Teams group where students can join via the [Teams link/code](#).

With the end of COVID-19 in sight, the incoming executive members will have more in person events planned for the upcoming year and we look forward to meeting you all next year.

Incoming (2022/2023) Executive Council Members:

President: Louis Bu | **Vice President:** Aliya Grant | **Treasurer:** Jan Schrader | **Secretary:** Liam Bennett | **Communications:** Monica Conohan | **DSS Rep:** Moe Osman

HONOURS PROGRAM

This year we had a total of eleven honours students in our three programs. Each student, their project and their supervisor are noted below.

MATHEMATICS

- **Alex Karavos**, thesis title: SIR Modeling & The Effects of Noise on Infection Spike Motion, **Supervisor: David Iron**
- **James Munday**, thesis title: Exceptional Gegenbauer Polynomials and Confluent Darboux Transformations, **Supervisor: Robert Milson**
- **Beihan Zhou**, thesis title: A Bitcoin Price Model, **Supervisor: Roman Smirnov**

STATISTICS

- **Claire Cui**, Fluorescence Data and Stabilizing Variable Selection for Analysis of Water Treatment, **Supervisor: Hong Gu**
- **Cali Park**, Modelling Coccolithophore data in the North Atlantic Ocean, **Supervisor: Andrew Irwin**
- Xing Wang, COVID-19 Data Analysis Based on the SEIR Model in Nova Scotia, **Supervisor: Lam Ho**
- **Xinyi Xie**, Effect of Trauma Team Activations (TTAs) and Canadian Triage and Acuity Scale 1 Patients (CTAS 1) on Other Patients' Waiting Time in the Emergency Department, **Supervisor: Hong Gu**
- **Jie Yu**, Prediction of Survival Time for Breast Cancer Patients, **Supervisor: Lam Ho**
- **Peiyu Zhao**, Do Trauma Team Activations Affect Pediatric Emergency Department Crowding? **Supervisor: Hong Gu**

ACUARIAL SCIENCE

- **Yuqing Chen**, COVID-19 Severity Modeling in Public Health Using Bayesian Theorem, Supervisor: Toby Kenney
- **Yichuan Hu**, Medical Fraud Detection, Supervisor: Toby Kenney

MATHEMATICS DIVISION

// Roman Smirnov, Acting Director

The 2020-21 academic year challenged everything we knew about our work and our lives. And yet, from the jolting experience of a global pandemic, we have emerged stronger than ever and continued our reinvention in the next academic year of 2021-22, which has been very interesting and eventful for the Mathematics Division. Many exciting things have happened over the last year. Our faculty, postdoctoral fellows, students, and staff have been actively engaged in teaching and learning, scholarly work that included research published in peer-reviewed journals, conference presentations, participation in seminars, administrative and service duties. We are particularly proud of our newest members, Suresh Eswarathan and Theo Johnson-Freyd, who have already established themselves as very competent, enthusiastic, and highly respected colleagues strongly contributing to all aspects of life of the department and university. Kudos to Julien Ross and Suresh Eswarathan who were granted tenure and promoted to the rank of Associate Professor this year. We also congratulate Jason Brown who is this year's recipient of the 2022 Award for Excellence in Graduate Supervision.

Mathematics continues to be a very important subject of study and is now arguably one of the most popular at Dalhousie University, where it is given high priority in curricula across the campus. We have been constantly working on developing our courses, improving syllabi and forms of delivery. In particular, from now on most of our first- and second-year calculus courses will be taught from the OpenStax textbooks available online free of charge. This arrangement will give our students more flexibility and help to lower their educational expenses.

We wish to thank all the faculty, instructors, staff, and graduate students who have done such an excellent job this year to assure that all things run smoothly. We are very proud of our new graduates, who have finished their academic endeavors at Dalhousie. Well done!

Let us look forward to a new academic year!

STATISTICS DIVISION

// Michael Dowd, Director

The Statistics division has been fortunate to welcome a new faculty member this academic year: Dr. Orla Murphy. In addition, we have another new faculty member, Dr. Theo Michelot, who will be arriving soon at Dalhousie. Charith Bhagya Karunaratna and Nhat Linh Vu also joined the department as post-doctoral fellows.

Teaching this academic year was a mix of both in-person and online teaching, due to the ongoing COVID-19 pandemic. Despite these challenges, our undergraduate enrollment numbers have continued to increase for all our courses, at all year levels. For our graduate program, congratulations are extended to Ethan Lawler and Jing Zhang who completed their PhDs this year, and Abe Adeb who completed his MSc.

CANSSI Atlantic is now up and running. This is a regional centre for the Canadian Statistical Sciences Institute. Joanna Mills Flemming is its first director, and the inaugural launch took place in November 2021.

The division members have also been very successful at obtaining new research funding. Granting agencies include: MITACS, AARMS, NSERC, Simon's Foundation, and Environment and Climate Change Canada.

ACTUARIAL SCIENCE

// Toby Kenney

There were nine graduates from the Actuarial Science programme this year. This is a slight reduction from last year, which may be due to disruptions caused by COVID-19. We will continue to monitor numbers of enrolled students to ensure that the programme continues to meet student needs.

A number of changes to the Actuarial Science programme were approved by the senate this year. These changes mirror changes to the Society of Actuaries curriculum and offer greater flexibility for Actuarial Science students. The changes will go into effect for the coming year.

The Dean has approved a 3-year part-time instructor position for a professional actuary to teach some of the Actuarial Science courses for next year. We are hoping that the new instructor will be able to share practical experiences in actuarial work, and that this will inspire our students to successful careers in actuarial science or related fields.

BOOKS WANTED AND 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, over 1,500 volumes were sold to mathematicians all across Canada and dozens more around the world. Once a year I can donate the sizeable income from these sales in equal part to our department and to the CMS.

More than 2,000 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.

REFLECTIONS

FROM THE CHASE REPORT OF 15 YEARS AGO

// Dug up by Karl Dilcher

THE IRON STAPLER AWARD

One fine April day, David Iron asked whether he had the right to his own office stapler. He was informed by the Chair that upon a sufficient amount of committee work, he would indeed receive his own stapler.

On May 9, 2007, David's work on the ad-hoc appointments committee for a mathematics instructor was officially over, and in the afternoon of that day the Chair and the Administrator presented him with a shiny new stapler, plus two bars of matching staples. A truly moving ceremony, almost (but not quite) worth an official photograph. Happy stapling, David!

A PROOF IS A PROOF

A proof is a proof.
What kind of a proof?
It's a proof.
A proof is a proof.
And when you have

A good proof,
It's because it's proven.

■ Jean Chrétien

WE REMEMBER

Department's First PhD Graduate Has Died

Raymond Douglas Holmes, who became the department's first PhD graduate in 1970, passed away in Halifax on March 27, 2022, at age 78. He was also a faculty member of this department from 1972 to 1988.

Ray was born in Sydney, Nova Scotia and grew up in Hantsport. Early on he showed great mathematical talent and enrolled at Acadia in 1961 after completing Grade 11. He received a Master's degree from Princeton and intended to continue for a PhD there, but as a dual citizen he got in trouble with the draft board and returned to Canada. After one year as lecturer at Acadia, he enrolled at Dalhousie and completed his PhD thesis, entitled "*Contributions to the Theory of Contraction Mappings*" under the supervision of Michael Edelstein (1917-2003).

The long-term Department Head and Dalhousie Registrar, Arnold Tingley (1920-1999), wrote in his history of our department, "*[Ray Holmes] then spent two years at the University of Alberta as a post-doctoral fellow. At Dalhousie he continued to show a great deal of ingenuity and was often consulted by his colleagues, in particular with respect to his work in computers, where he was essentially self-taught. He resigned in 1988 and took up a position in the private sector.*"

Emeritus Professor Tony Thompson wrote in a tribute after Ray's death, "*He was exceptionally logical in his thought processes, exceptionally gifted as a mathematician and exceptionally talented in a wide range of hobbies and pursuits, among them owning a farm, a sailboat, car rally driving and, above all, computer games. He died at his desk in the middle of a computer game. I knew him well during the years he was at Dalhousie, first as a graduate student and then as a colleague and co-author. I have very many good memories of our times together over those years.*"

Richard Wood, another Emeritus Professor, wrote, "*I enjoyed Ray's company when we were both in the Mathematics Department at Dalhousie University. In particular we spoke several times on relational and categorical approaches to database theory, long before such topics were mainstream in Computer Science. He was a very deep and adventurous thinker.*"

Baby Chase

Justine Gauthier and Brandon Elford were well-known and active honours students in our department, before they graduated in 2015 and 2016, respectively, and moved out West to Simon Fraser University for graduate studies. A few years ago, Justine and Brandon returned to this region, settled in Fredericton, and got married. Very recently, on May 24 of this year, they became proud parents of a baby boy.

The baby's name is Reginald Chase Elford Gauthier. Now, usually a baby's middle name honours a grandparent or another important person in a family. While I have no official confirmation, is it possible that little Reginald's name reflects the fact that Justine and Brandon met in and around our department? That would certainly be a great honour to our venerable building, and as far as I know, would be a first. All our best wishes to Justine, Brandon, and Reginald.

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 Eswarathan. The 2021 colloquium schedule is online at mathstat.dal.ca/~sureshe/Colloquium.html. The Statistics Seminars are organized by Lam Ho. This year the seminar series moved to being held online. The list of the talks is located here: mathstat.dal.ca/~lho/seminar/

AFFILIATED ORGANIZATIONS & SOCIETIES UPDATES

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

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

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

ATLANTIC ASSOCIATION FOR RESEARCH IN THE MATHEMATICAL SCIENCES (AARMS)

// David Langstroth

The biggest news for AARMS this year has been an award from the NSERC Discovery Institutes Support Program (DIS) which will provide stable federal funding for a period of 5 years. And, as public health restrictions have been gradually lifted we have begun to see a return to more normal programming. Applications are being received again for support for workshops, conferences and outreach activities, we are making plans for the visit of at least one AARMS Distinguished Lecturer in the year ahead, and new postdocs are able to travel to the Atlantic region and work among us in person.

One program which has not yet re-started is the annual summer school. Due to the length of advance planning that is required we were not able to make a commitment at the necessary time. However, the summer school will be back in 2023, hosted at UNB. In place of the 2022 summer school, we are continuing with our Advanced Courses Series offered entirely through online instruction, as long as it remains popular.

Other programs are up and running and we look forward to seeing applications from researchers at our member universities for support in the following areas:

- Postdoctoral fellowships
- Collaborative Research Groups
- Workshops and Conferences
- Outreach
- Graduate Scholarships
- Doctoral Thesis Award
- Junior Researcher Travel Support
- Industrial Problem-Solving Workshop
- MSRI Summer Schools
- Distinguished Lecturer

Watch your email for announcements, or check out our programs on our website: aarms.math.ca

COMMUNITY OUTREACH AND BEYOND

BEA ANNUAL MATH CAMP (SUMMER 2022)

The 2022 BEA Math Camp is scheduled from July 4 to 8, 2022.

CMS MATH CAMP (SUMMER 2022)

The 2022 CMS Math Camp is scheduled from July 25 to 29, 2022.

NS MATH CIRCLES

//Tom Potter

As another school year winds down, it has been another year of successful 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, introducing students to mathematics in a fun and engaging way; and hosting monthly interactive presentations at Dalhousie and online, aimed at the junior to senior high level, which are free to attend.

The fall began with a shift back to normal operations for the program, with the return of in-person visits to school. This was a pleasant change from the fully online format of the previous year. We shifted back to online-online class visits when the Omicron variant surged, but we made the best of the situation by arranging a number of virtual class visits. Our hard work from the previous year on adapting the presentations to go virtual paid off, and we've done 24 virtual class visits since January. Near the end of March, we were able to resume in-person visits again.

This year Tom Potter continued as program director of Math Circles. Tom is currently pursuing a Ph.D. in mathematics at Dalhousie. Dr. David Iron was our faculty advisor this year and helped by giving Tom feedback and support throughout the year. In the fall semester our core team of presenters and content developers consisted of Scott Wesley, Mozghan Saiedi, Heesung Yang, and Jonathan Tot, who are all PhD students at Dalhousie, in math or computer science. In the winter and spring, we recruited a number of presenters on a casual basis to round out our availability. These included Cali Park, Bian Xiaoning, Arvin Vaziry, Louis Bu, Joey Latta, Dr. Asmita Sodhi, and Carmen Graves, all students in our department, except for Dr. Sodhi who graduated a couple years ago and has been a long-time contributor to Math Circles.

As of the first week of May, we have reached 613 students through 24 virtual class visits, and 2281 students through 24 in-person school visits, with no sign of slowing down through May and June. While most of our visits have been within the greater HRM, we did one visit to Wolfville School in the fall, and have visits planned for Newcombville and Valley in June.

Our Monthly events this year have attracted a mix of participants from students, parents, and teachers. We decided to host a number of these events in a blended format, meaning that students could attend in person, or online. These events were given by presenters from our team, enthusiastic graduate students, department alumni, and post-doctoral researchers in our department. A total of 147 students joined us. Our presenters so far this year were Dr. Asmita Sodhi, Jonathan Tot, Tom Potter, Scott Wesley, Dr. Frank Fu, Dr. Danielle Cox, and Dr. Karyn McLellan, with presentations in May and June to be given by Fred Gluck and Dr. Hector Baños Cervantes. See our website to learn more about these excellent presentations. We are very grateful to our volunteers for giving these fun workshops.

In addition to continuing our usual activities in May and June, we are also helping with a Summer Camp this July, organized by Dr. Nauzer Kalyaniwalla and the Black Educators Association.

We are in the process of creating some new presentations on a couple more advanced topics, namely topology and probability. Future goals include resuming longer trips, hopefully to Cape Breton, Yarmouth, and other counties. We are also seeking more French-speaking presenters and have so far tentatively secured one part-time bilingual presenter for next year.

This year, Math circles celebrates its eighth year of funding with Eastlink. We are very grateful to Eastlink for their generous support, and to everyone who helped make our program a success again this year!

Thanks again to everyone who helped make this year a great success! Keep up to date with our events at www.nsmathcircles.ca and via our Twitter account [@NSMathCircles](https://twitter.com/NSMathCircles).

FUN MATH PROBLEMS

How many ways can the 14 pieces on the right be arranged into a square, as shown? (Note that rotations and reflections of pieces are allowed.) This ancient tangram-type problem, known as the *Ostomachion of Archimedes*, puzzled mathematicians for centuries.



Answer on page 17!

PROFESSOR PRESENTS AT CIMPA 2022

Sara Faridi Travelled to Pakistan to lecture in the CIMPA School on Algebraic and Combinatorial Methods in Geometry.

The Centre International de Mathématiques Pures et Appliquées (CIMPA), founded in France in 1978, is a nonprofit organisation that promotes research in Mathematics in developing countries.

This research school revolved around the interaction of Algebra, Combinatorics and Geometry. The main goal of the school was to build bridges between various disciplines of mathematics which have in common to apply algebraic and combinatorial methods in geometry. The lectures ranged from the foundations to recent results and applications of the relevant theory.



Sara Faridi gave course: The Combinatorics of Syzygies



Abstract of the course: Over the past few decades many combinatorial and topological methods have been developed to study minimal free resolutions of monomial ideals. These lectures will review the background material, and highlight some of the achievements of this perspective. We will also discuss open problems in this area.

The lectures took place at the Lahore University of Management Sciences, and the participants came from all over Pakistan and several neighboring countries.

Answer

(from page 15)

17,152, as determined by Fan Chung, Persi Diaconis, Susan P. Holmes, and Ronald Graham, and confirmed by a computer search by William H. Cutler in 2003.

CHASE ANNUAL REPORT | 2022

The **Chase Annual Report** 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.

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

The front cover photo is from an aerial photo of the Studley Campus circa 1950 to 1965 (as neither the Killam nor Life Sciences Centre are present). The 'Table of Contents' is taken from a snapshot hanging in the reception area above the service kiosk. The back cover photo is from *The Richard McCully Aerial Photograph Collection, 1931* (Nova Scotia Archives). In the centre of the photo stands the Chase Building. You will notice that most of the existing Studley Campus, and University of King's College campus hasn't been constructed yet.



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