Thank you for your generosity.
Sustainability is one of the pressing concerns challenging today’s communities at all levels, from the very local – right here at McGill, in Montreal – to the national and the global levels. We need to find ways to understand the complex relationships between natural systems – the atmosphere, for instance, and ecosystems – and the human-derived systems, such as agriculture and urban regions, that interact with them. This is no easy task. The Faculty of Science is a lead player in the recently launched McGill Sustainability Systems Initiative, which brings together research which resides at the intersection of environmental, economic, and social concerns. Research here brings not only a greater understanding of these intricate relationships, but can also guide decisions and policies that aim to ensure that we do not squander the well-being of the planet and of the generations that follow us.

We have an exceptionally strong cadre of researchers working in this field. I accompanied two of them, Biology professor Andrew Gonzalez and Geography professor Graham MacDonald, to the World Economic Forum’s “Summer Davos” in Tianjin, China in 2016 where they met with receptive and enthusiastic audiences for their research findings. These two researchers subsequently presented their work, accompanied by Principal Suzanne Fortier, at the famed WEF Davos meeting in 2017.

A different sort of sustainability can be challenging at the university administrative level, where it is sometimes easy to start projects but difficult to keep them going. At the Faculty of Science, we have an excellent record of sustaining important initiatives. The Reasoning and Learning Lab in the School of Computer Science is an example. Established 15 years ago, it has grown to be a world leader in reinforcement learning, a branch of machine learning that is critical to the astonishing development of artificial intelligence (AI) research and enterprises in Montreal and around the globe. With over 60 graduate students driving the research at any given time, our teams are pushing forward the capacities of AI, leading to applications ranging from health care to transportation to autonomous vehicles.

We also are charged with sustaining and supporting our students, who are at the heart of our research enterprise. There is no doubt that they are a great component in our research excellence. Graduate and even undergraduate students help drive research across all our departments and programs. The engagement between our students and internationally acclaimed research professors will ultimately inform how our societies operate – and how we live. We are committed to the success of our students.

In this report you will learn about some of the initiatives that bring scientific knowledge to bear upon policies, governance, and, indeed, daily life. You will also learn about some of the ways we are helping our students succeed. Your support is critical in all these efforts. Your visionary commitment to, and engagement with, McGill and the Faculty of Science has enabled us to develop and strengthen the support for our students and our research, which in turn strengthens their eventual impact on our world.

From all of us, thank you,

R. Bruce Lennox
Dean, Faculty of Science
Tomlinson Professor of Chemistry
Building a Sustainable Society

The intersection of human and natural systems leads to the very complex interactions that provide the focus of sustainability sciences research, which applies a holistic analysis to environmental, social and economic problems. The goal of sustainability sciences is to find solutions that meet the needs of the present without compromising the health of future generations. “Investment in our sustainability research and resources is yielding a profound social impact,” says Dean of Science Bruce Lennox. “Sustainability Sciences at McGill are gateways to both new technologies and informing public policy.”
Andrew Gonzalez: Biodiversity Corridors and Evolutionary Pressures

Montreal’s 375th anniversary festivities involved a lot more than fireworks. Among the numerous celebratory initiatives was a project to plant 375,000 trees. The city used greenbelt models generated by Biology professor Andrew Gonzalez to select planting sites that will enhance green corridors and maintain biodiversity.

Gonzalez, the Liber Ero Chair in Conservation Biology and Director of the 90-member Quebec Centre for Biodiversity Science, develops models of how a region will alter in the coming century, considering such factors as projected climate and land use change. “I promote a holistic view of a landscape, an ecological system, that considers how humans interact with that system,” he says. “These models also allow us to prioritize habitat and ecosystems – green belts – that will allow urban areas to maintain the connectivity of the whole system.”

The Liber Ero Chair, created through the generosity of Richard Bradshaw, BCom’61, and Valerie Bradshaw, BA’61, supports his research and its transfer into knowledge that can be used to guide policy-makers. Gonzalez’s research offers a powerful conservation message. “Many people feel that in the short term there is little we can do about the environment, and I want to dispel that idea,” he says. “If we work with the landscape by integrating ecological and social points of view, we can protect natural environments as well as the benefits we get from them.”

These benefits are numerous. For example, a recent project in Montreal used Gonzalez’s models to plant trees, shrubs and other greenery to mitigate pockets of extreme heat known as urban heat islands. Gonzalez is also working with the Island of Montreal and the David Suzuki Foundation to research urban waterways, or “blue belts,” to find ways to mitigate floods such as those that inundated entire Montreal-area neighbourhoods in Spring 2017.

“We’ve created an infrastructure to manage our waterways, but it is outmoded and inappropriate for the extremes we’re expecting under climate change. But natural ecosystems can absorb these extremes, so we’re adapting our ecosystem connectivity models to identify areas that need investment in restoration projects,” states Professor Gonzalez.

In another current major project, LEAP (Large Experimental Array of Ponds), Gonzalez explores evolution in ecosystems. We usually think of evolution as happening very slowly, but it can in fact occur rapidly in ecosystems when stressed by contaminants. LEAP, based at McGill’s Gault Nature Reserve, takes pristine water from nearby Lake Hertel and fills 96 small pools or ponds. Each pond becomes a unique experimental microsystem that replicates the lake’s eco-community. The research team then imposes gradients of stress upon them. In 2016–17, the research focused on glyphosate (also known by its tradename, RoundUp), the world’s most widely used pesticide. “We have no idea of the ecological and evolutionary consequences of glyphosate use, but by adding it to the ponds in an experimentally controlled way, we can see how they responded to it,” he says.

While many of pools the responded negatively, some had a positive adaptation, developing a resistance to the pesticide. “We want to know why, so we can advise government ministries that are regulating glyphosate, as well as farmers who wonder about the fate of that chemical in their fields.” Negative responses resulted in many species going extinct, while one or two resistant species prospered. Cyanobacterial or blue-green algae blooms are an all-too-common example of a negative response arising from polluting a lake with phosphorous from domestic, agricultural and industrial sources.

Gonzalez’s LEAP and greenbelt research projects are connected. “You have to take an experimental approach to figure out how ecosystems will respond in the long term, and too often large-scale conservation planning processes use old criteria to make decisions,” he says. “We should be designing our landscapes so we can maintain biodiversity while being more evolutionarily resilient.”
Graham MacDonald: Understanding Food Systems

As of 2017, more than half the world’s population lives in cities. This is a demographic phenomenon that has a huge impact on diets, regionally and globally, and in the routes that food must travel from farming systems to our dinner plates. Graham MacDonald, an Assistant Professor of Geography, aims to understand the impact of changing food systems, including agricultural production but also food distribution and consumer demand. One long-term project involves exploring the consequences of the use of fertilizer nutrients like nitrogen and phosphorus, which are critical for high-yield agriculture but also have an impact on water quality. Another involves building spatial models of food sources.

“We trade 20 to 25 per cent of our calorie intake across international borders,” MacDonald explains. “And the bulk of food consumed in most cities is imported from other regions or countries, which creates a relationship between cities and distant agricultural landscapes. So where is our food [used in] cities coming from? A long-term project involves modelling that relationship to investigate the sustainability implications of different food trade systems and their impact on food security.”

Urban agriculture is another area of interest for MacDonald. “North America has seen increasing emphasis on local food production, such as vertical farming or container systems that have super-efficient production models. But we don’t fully understand the relative benefits of the global and hyper-local models,” he says. “We know that one consequence of not producing and consuming foods locally has been that we have become separated from that food-producing culture. The resurgence of urban agriculture allows urbanites to be more connected to food systems. The social and cultural dimensions of that production model may be more significant than the actual food.”

Professor MacDonald is a 2017 recipient of a Trottier Fellowship from the Trottier Institute for Science and Public Policy, with which he aims to develop a nitrogen footprint calculation for the Island of Montreal, assessing all the region’s nitrogen-producing activities, from producing or importing food production to air travel and transportation. The nitrogen footprint is a key sustainability marker that communicates how everyday choices (fuel and food in particular) contribute to nitrogen pollution.

“We will be exploring how to mitigate Montreal’s nitrogen footprint, and identifying the actors who could be involved in that – from large institutions like McGill and the other local universities, as well as the city of Montreal and the island’s other municipalities, the private sector, and farm producers,” MacDonald says. “From there we can develop a model for understanding dimensions of sustainability in other cities, as they have the potential to be the locus of sustainability efforts.”

McGill at Davos

In 2016 Dean of Science Bruce Lennox accompanied three sustainability researchers – Andrew Gonzalez and Graham MacDonald, and Elena Bennett of the McGill School of the Environment and the Faculty of Agricultural and Environmental Sciences – to the World Economic Forum’s “Summer Davos” meeting in Tianjin, China. “Representing McGill was a phenomenal experience,” says Graham MacDonald. “The World Economic Forum brings together people from different sectors and countries to talk about some of the world’s greatest challenges. As an academic researcher, I found it fascinating to engage in that process with policy-makers and industry leaders.” Gonzalez found a very receptive audience for his research into greenbelt connectivity and biodiversity, and stresses the importance of communicating research to a broader audience. “We have the science to address problems, but we need more support at the decision-making levels to go beyond the ‘good idea’,” he says.
Potvin impacts policy

Biology Professor Catherine Potvin created and chaired the pan-Canadian Sustainable Dialogues panel involving over 80 researchers from across disciplines. In May 2017 the panel issued an independent report, Re-Energizing Canada: Pathways to Low-Carbon Future, which had been commissioned by Natural Resources Canada and Minister of Natural Resources James Carr to help inform federal policy. Professor Potvin launched Sustainable Dialogues with the support of a 2013-15 Trottier Fellowship from the Trottier Institute for Science and Public Policy based in the Faculty of Science. She also holds the UNESCO Chair for Dialogues on Sustainability and a prestigious Canada Research Chair (Tier I).
Pioneering Directions in Artificial Intelligence
Research into Artificial Intelligence (AI) has experienced dramatic advances in recent years, leading to significant applications ranging from computer vision to machine translation and speech recognition. “These successes have been fueled by advances in Machine Learning, and something special is happening at McGill and in Montreal,” says Joëlle Pineau, a professor in the School of Computer Science and, with fellow Computer Science professor Doina Precup, Co-Director of its Reasoning and Learning Lab.

Machine Learning involves training the computer with data, and its two most important subfields are reinforcement learning and deep learning. “The Reasoning and Learning Lab has been building expertise in reinforcement learning for 15 years, becoming one of the world’s biggest and best labs in that subfield,” says Pineau. McGill’s team regularly collaborates with researchers in the Université de Montréal’s Deep Learning Lab, giving Montreal unparalleled machine learning expertise – indeed, some industry insiders have designated the city “Silicon Valley of the North.” The Reasoning and Learning Lab has more than 60 graduate and five post-doctoral fellows, making up the largest cohort of trainees in AI-hot Montreal.

“We’re probably the only place in the world with that concentration of students in these really important subfields of Machine Learning,” says Pineau. “Not only does McGill have a leadership position for training students and developing research, but there is the possibility of really expanding that.” In Spring 2017 the federal government announced the creation of new AI Research Chairs that are expected to double the number of professors in Montreal in the next five years, in effect doubling the number of graduate students. Profs. Pineau, Precup and their collaborators are also in the process of creating the Montreal Institute for Learning Algorithms (MILA), which will bring together McGill and Université de Montréal researchers in a shared physical site. “With close to 300 people, it would be the world’s largest institute in this research area,” Pineau says.

Montreal’s AI environment has lured many large companies to open labs in the city; the last 12 months have seen Google, Microsoft, IBM, Facebook, DeepMind, Samsung, and Telus announce new research groups in Montreal. “And it’s not just these big companies – there is a healthy AI start-up community,” says Pineau. “For many years students graduating with masters and doctorates had to leave Montreal to find work, but increasingly they stay, because there are so many opportunities in industry and academia.”

The proliferation of industry labs has led to new models of collaboration. In September Pineau accepted a new position as director of a new Montreal lab being opened by Facebook, and now holds a joint position with McGill and Facebook. In October, Precup became head of Google’s DeepMind-Montreal AI research lab, arranging a similar joint position with McGill. “Montreal is already a world centre for outstanding AI research and we are excited about further nurturing local talent and attracting more gifted researchers to the city”, said DeepMind co-founder Demis Hassabis.

Says Precup of her work with DeepMind, “My portfolio within DeepMind will be fundamental research. I work on algorithms that take inspiration from natural intelligence, so that automated programs can learn not just under supervision, but by doing experiments and receiving feedback on them.” The ultimate goal, she notes, is to develop insights that could be applied in areas as diverse as superconductor material design and drug discovery.

In each case, McGill and its industry partners are working on open-research problems. “In previous generations companies would work secretively, but the Facebook lab is dedicated to fundamental research and open science, so I can connect my research in the McGill and Facebook labs in a really productive way,” says Pineau. Indeed, these collaborations should strengthen AI research and industry across Montreal. “A healthy local ecosystem relies on large companies, research startups, incubators and academia coming together,” says Precup. “I think we have an obligation, from the side of the university, to support this ecosystem, partly by training our very talented students.”

The process has already begun, with Facebook and DeepMind labs set to provide internships and eventual employment for McGill graduates, ensuring that McGill, and Montreal, remain at the forefront of Artificial Intelligence.
### FACULTY OF SCIENCE FACTS

#### ADMISSIONS AND ENROLMENT

(August 2017 statistics)

<table>
<thead>
<tr>
<th>Undergraduate (BA&amp;Sc and BSc)</th>
<th>Graduate</th>
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</thead>
<tbody>
<tr>
<td><strong>applicants</strong></td>
<td><strong>registrations</strong></td>
</tr>
<tr>
<td>11,803</td>
<td>1,250</td>
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</tbody>
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#### Admissions and Enrolment

- Quebec CEGEP: 33%
- Ontario high school: 17%
- Other Canadian high school: 16%
- US high school: 10%
- Overseas high school: 22%
- Other Quebec University: 1%
- Other: 1%

#### McGill24 SUCCESS IN THE FACULTY

McGill24 is an annual day of online giving that allows alumni, faculty, and staff, students and friends the chance to directly support their preferred McGill initiatives.

<table>
<thead>
<tr>
<th>2017</th>
<th>Up From 2016</th>
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<tbody>
<tr>
<td>Donors: 203</td>
<td>Donors: 100</td>
</tr>
<tr>
<td>First Time Donors: 70</td>
<td>First Time Donors: 44</td>
</tr>
<tr>
<td>Total Amount Raised: $96,894</td>
<td>Total Amount Raised: $27,969</td>
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Here are some of the institutions Science students attended on exchanges in 2017:

<table>
<thead>
<tr>
<th>University</th>
<th>City</th>
<th>Country</th>
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<tr>
<td>University College London</td>
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<td>U.K.</td>
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<td>University of Amsterdam</td>
<td>Amsterdam</td>
<td>Netherlands</td>
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<td>Université catholique de Louvain</td>
<td>Louvain-la-Neuve</td>
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<td>China</td>
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<td>École polytechnique fédérale de Lausanne</td>
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<td>Switzerland</td>
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<tr>
<td>University of Alaska Fairbanks</td>
<td>Fairbanks</td>
<td>USA</td>
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<td>University College Dublin, National University of Ireland</td>
<td>Dublin</td>
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<td>Universidad de los Andes</td>
<td>Bogotá</td>
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<td>University of Tübingen</td>
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<td>Germany</td>
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<tr>
<td>University of Sydney</td>
<td>Sydney</td>
<td>Australia</td>
</tr>
<tr>
<td>University of the West Indies – Cave Hill Campus</td>
<td>Wanstead</td>
<td>Barbados</td>
</tr>
<tr>
<td>Uppsala University</td>
<td>Uppsala</td>
<td>Sweden</td>
</tr>
</tbody>
</table>

$5,241,667

Program support - $2,166,872
Student support - $1,890,937
Undergraduate experiential learning - $1,011,681
Departmental support - $152,162
Infrastructure and equipment - $20,013

Donor-funded Science Undergraduate Research Awards (number of students)

43 direct funding + 47 endowed (permanent) = 90 grand total
David Harpp has spent the better part of his 50-plus years as a McGill Chemistry professor finding new and effective ways to teach students. Around 10 years ago, he was co-teaching the World of Chemistry with Ariel Fenster and Joe Schwartz, a course with over 500 students but no teaching assistants. “I tapped into a small Office of Science and Society fund, tracked down a few top students from the previous year, and asked if they would be willing to put in 25-30 hours of their time a term for about $300 to coordinate the discussion board, host small tutorials, and organize simple review tests,” Harpp says. That modest beginning grew into a unique venture.

When Harpp was named the Tomlinson Chair in University Science Teaching in 2013 – the Chair made possible by the generosity of Dr. Richard Tomlinson, PhD’48, DSc’01 – he directed some of the Chair’s budget to formalizing these mentorships. The Tomlinson Engagement Award for Mentoring (TEAM) provided honoraria for outstanding undergraduate students who would act as mentors to other undergraduates – and not just in one or two courses, but across the Faculties of Science and Engineering. The TEAM program’s first year, 2013-14, saw 49 courses, taught by 46 different professors, benefit from 114 TEAM mentors.

Thanks to support from the Dean’s Fund and other sources, the program has grown rapidly: in 2016-17, there were 447 TEAM mentors helping 120 professors in 147 courses across the Faculties of Science, Engineering, and Agricultural and Environmental Sciences. Courses in the Faculty of Arts and even the Schulich School of Music have also recently been added to the mix, and the Faculty of Education and the Desautels Faculty of Management are likely to join as well.

“Very few teaching assistants have taken the course of the instructor they are helping,” says Harpp. “TEAM students are all graduates of that class in one or two previous semesters, and that’s an important difference.” The TEAM mentors are given an orientation workshop by graduate students, as well as by Harpp. “So the mentors understand what the job entails and how many hours they should put in.”

Jimmy Tan, BSc’17, served as TEAM mentor for three courses – General Chemistry and Organic Chemistry, both taught by Dr. Laura Pavelka, and Neuro-Ethics, taught by Professor Jennifer Fishman. “I wanted to be that person I needed as a first-year student taking those courses, someone who had recently been through the experience as a learner and was close to my age,” says Tan, now a medical student at the University of
Toronto. “When I was in first and second year, I felt very intimidated by my professors. I wanted something more accessible and the TEAM program addresses that.”

The main focus is tutoring students, and TEAM mentors have a chance to develop their own approaches; Tan and some fellow mentors created a study activity based on “Jeopardy”, which proved so successful that they are still being used by Pavelka’s TEAM students. They also assist in other tutorial initiatives, such as the Faculty’s FRezCa program (see page 15). “TEAM mentors also play a role in maintaining student wellness, too, because students feel more comfortable speaking to people their own age,” says Tan. “It was really fulfilling to be able to help, and to be a part of their academic journey.”

Another supporter of the TEAM program is Leonard Pinchuk, BSc’76, DSc’05. When David Harpp was asked to make a presentation on TEAM to Science’s Faculty Advisory Board, he brought along Jimmy Tan and Beatrice Yeung, a TEAM mentor and 2016 Rhodes Scholar. “It’s well-known that undergrads are scared of profs, even a bit scared of TAs, who are older graduate students, but not at all scared of their peers,” says Harpp. “So Jimmy asked the Board, ‘How many of you were intimidated by professors when you were in university?’ And every hand went up.” The presentation had an impact, as Board member Pinchuk made a sizable gift to help support and expand the TEAM program.

Pinchuk recognizes a good idea when he sees one: a prolific innovator, with 120 issued U.S. patents and 90 publications, he is the founder or co-founder of 10 biomedical companies, and the 2017 winner of the BioMed SA Award for Innovation in Healthcare and Bioscience.

Very few teaching assistants have taken the course of the instructor they are helping. TEAM students are all graduates of that class in one or two previous semesters, and that’s an important difference.

– David Harpp, Tomlinson Chair in University Science Teaching
The Faculty of Science Dean’s Fund is a discretionary fund that uses donor support to enable the Faculty to support a wide range of initiatives. Examples include the following initiatives in teaching and learning.

The Grace Hopper Celebration

Named for computer programming pioneer Grace Hopper, the Grace Hopper Celebration is the world’s largest conference of women technologists, who are an ever-growing cadre. The School of Computer Science has seen the enrollment of women triple since 2009, with women now making up 35 per cent of its undergraduate population. And for the past two years, the Faculty of Science has sent female students from this program to the Grace Hopper Celebration. Li Xue and Irene Woo are among the four McGill Science students who attended the 2017 conference in San Francisco, thanks to support from the Dean’s Fund and other donors through McGill’s Seeds of Change crowd-funding platform.

“There is still a significant minority of women in computing, so it’s reaffirming to see these women who were students like me and have made it and are really doing well,” says Xue. “It made a huge impact on my interest in staying in computing and forming a network of women that I can reach out to for support.” Xue is completing a degree in Economics with a minor in Software Engineering, and has served as president of the Computer Science Undergraduate Society. Following graduation, she is taking up an e-commerce position in Chicago.

In addition to speakers and workshops, the conference is accompanied by a large career fair. Woo interviewed with four companies, landing an internship with Google. “The conference introduced me to different careers and helped me determine that I would rather go into industry instead of research after I graduate,” she says.
Laura Brennan is in her second year of Microbiology Majors, and is also pursuing a Minor in Computer Science. She is one example of a student for whom a Faculty of Science Student Scholarship made a big difference. Brennan came to McGill from Calgary with dreams of continuing to medical school after completing her undergraduate work. She is a 2017-18 recipient of the Scholarship, created by the Dean’s Fund to support outstanding students.

“This is the most exciting scholarship I’ve ever received,” she says. “I worked very hard last year and it’s so nice to get the recognition. The amount was $500, which helped me a lot in affording textbooks and other resources. The time I can save worrying less about money is time I can spend studying instead.” And while medical school remains her ambition, her undergraduate experiences have also stimulated her interest in research: in Summer 2017 she worked in Calgary with a professor researching knee-joint osteoarthritis.

Dean’s Fund: FRezCa, the first-year residence café tutorial

In 2015 Jim Ghoshdastidar was one of two teaching assistants for Laura Pavelka’s Chem 110 General Chemistry course. “It’s a very large class, with 1,100 students, all having different backgrounds in chemistry,” he says. “I wanted to create a mix of different supports for students.” Recalls Pavelka, who received the 2017 McGill Principal’s Prize for Excellence in Teaching, “The TAs had two lecture-based tutorials a week, with low attendance and engagement, but there were lots of students who needed help that wasn’t reaching them. So we started brainstorming ideas.”

Ghoshdastidar had toured the university’s 10 residences before mid-terms, offering two-hour sessions in each to prep students, which seemed like a promising approach—but where to base sessions? A place accessible to students living on and off campus was needed. Cafeterias, where there’s a two hour downtime in the

“Science is so difficult to go at alone, and this is a good place for students to feel comfortable to ask questions and even address personal concerns.”

– Jim Ghoshdastidar, PhD’00, co-founder of the FRezCa tutorial system
afternoon, as well as long tables and a lot of capacity, were the answer. "We decided to bring together the TAs for introductory science courses, and instead of having office hours no one comes to, meet in a place that is accessible to students."

So Ghoshdastidar organized course TAs and launched sessions running Monday to Thursday afternoons in the Royal Victoria College cafeteria. TAs in Physics were also looking for ways to reach students in their large introductory courses, so the two joined forces.

"A lot of undergraduate students are taking chemistry and physics courses, so by bringing the TAs from these courses together we can help them more easily," says Pierre-François Duc, a Physics TA. And so was born the first-year residence café program, better known as FRezCa.

Chemistry 110 student Anita Chang experienced that initial FRezCa session. "The environment had a very comfortable vibe, so people were more willing to ask questions, rather than in a classroom or tutorial setting where you feel worried asking the wrong question," she says.

The FRezCa team has secured funding to ensure the program’s sustainability, with support from the departments and the Faculty of Science’s Dean’s Fund enabling the creation of a coordinator position, now held by Duc.

The program, also supported by Tomlinson Engagement Award for Mentoring (TEAM) undergraduate mentors, has exploded since its 2015 launch, drawing around 60-80 students per session, and over 100 before mid-terms and finals. Even in its first year, 70 per cent of Chem 110’s 1,100 students reported using FRezCa at least once.

"Science is so difficult to go at alone, and this is a good place for students to feel comfortable to ask questions and even address personal concerns. I met with a lot of students who were struggling, who knew I was someone they could go to for support because they had seen me in that capacity in FrezCa," says Ghoshdastidar.

"It’s our duty as educators to provide students with the resources they need to be successful. FRezCa is part of the culture now."
Science Undergraduate Research Awards

The Science Undergraduate Research Awards, supported by gifts from donors, enable students to take part in comprehensive research projects – giving them an unparalleled experience of what it means to be a scientific researcher.

Virtual Galapagos

Brytan Mendes, the 2017 recipient of the Stephen and Jane Savidant Science Undergraduate Research Award (SURA) in Public Policy, worked with a team from McGill’s Office of Science and Society and Colgate University in the New York state to develop a science education program that will provide elementary school students with a unique experience: a virtual exploration of the Galapagos islands to help them learn fundamental concepts in geology, volcanology, conservation ecology and evolutionary biology. “The project will enable students to ‘make their own adventure,’ giving them the capacity to delve into the science at considerably greater depth than is usually presented in conventional documentaries,” he says. The project involved travelling to the Galapagos Islands with the research team, where they shot film to be used with virtual reality technology.

Mendes, a third-year Political Science and Philosophy major, was also involved with designing educational modules for students focusing on various aspects of Galapagos geology and biology. Once the project is complete, a VR headset will enable students to gaze over the Galapagos landscape, to hear wildlife all around them, and to pick up and manipulate volcanic rocks. “The trip to Galapagos was a once-in-a-lifetime experience, but a vacation it certainly was not. By the end, we were exhausted,” Mendes says. “This experience taught me some invaluable skills, including how to explain scientific concepts in accessible ways and how to work and communicate clearly in a team.”
Undergraduates Advancing Research

The Science Undergraduate Research Award program benefits not only students, but also the faculty researchers who supervise them. “I’ve worked with two SURA students, who have really moved my research projects forward, while also acquiring hands-on experience in a large-scale research project,” says Geography professor Graham MacDonald.

MacDonald’s 2016 SURA project involved assessing McGill’s nitrogen footprint. The SURA student, Aidan Goertzen, BA/BSc’17, did the bulk of the research on the nitrogen footprint assessment and also participated in a public symposium on “Nitrogen, Nitrogen Footprints and their Management,” sponsored by the Trottier Institute for Science and Public Policy. “Think of the nitrogen footprint as like a carbon footprint,” says MacDonald. “Aidan looked at the impacts of the university’s operations, gathering data from across the university, and then used a model to estimate the loss of reactive nitrogen to the environment, basically getting at its environmental impact. She also tracked how McGill does or can do things to alleviate that impact.” Goertzen’s work also helped MacDonald shape his much larger and more complex project assessing the Island of Montreal’s nitrogen footprint.

Professor MacDonald’s other SURA-supported research, in Summer 2017, saw Sally Maxwell, an environmental science student, carry out a literature review and analysis of research related to water use in global food systems and food security. Maxwell collaborated with numerous scientists in her research, and her findings may lead to a scholarly publication in an academic journal – a big step for a young researcher!
Jagannath Wani: a lifetime of giving, and more

Dr. Jagannath Wani spent his career engaging students in Actuarial Sciences, which applies mathematical and statistical analyses to assess risk – an application that is relevant across a range of professions, including in the insurance and finance industries. Born in a small village in the Indian state of Maharashtra, Dr. Wani completed his bachelor’s and master’s degrees in Pune, that state’s second largest city, before coming to McGill for his PhD in Mathematical Statistics. After graduation, he held various teaching positions at University of Lethbridge (Alberta) and St. Mary’s University (Nova Scotia) before going on to spend the majority of his career at the University of Calgary. He established a number of philanthropic initiatives in Canada and India, across education, the arts, and health; his commitment to bettering the lives of others was recognized with his 2013 induction to the Order of Canada.

At his passing on May 5, 2017, Dr. Wani left the proceeds of a life insurance policy to create the Dr. J. Wani Endowment Fund in Actuarial Science, to support a lecturer for a semester in that discipline. “Dr. Wani was interested in supporting actuarial science teaching at the undergraduate level, getting students interested in this field,” says David Stephens, Chair of the Department of Mathematics and Statistics. “We don’t have any researchers currently working primarily in Actuarial Science, so Dr. Wani’s bequest will enable us to offer a course in Actuarial Science every year.”

The initial offering in Winter 2018 will be a related course in statistics, but in coming years the course – which will bear Dr. Wani’s name – will focus directly on Actuarial Science. The course will find a ready and receptive audience: the McGill Students’ Actuarial Association was founded in 2014 to meet the growing interest in this field among students; it is composed primarily of mathematics and statistics undergraduates, along with some from Management and Arts, and aims to provide members with information on the field to help them break into the world of actuarial science.

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– David Stephens, Chair
Department of Mathematics and Statistics
Since 1821, McGill has been offering outstanding educational opportunities to students from across the globe, pioneering new areas of research and discovery, and changing how we understand the world. As we approach our University’s 200th anniversary, McGill’s professors, researchers and students continue to tackle the biggest questions in science, culture and human endeavour.

Looking towards McGill’s third century, we hope you will join with us in celebrating and supporting this important work as we embark on The Road To 200 and beyond, and as, together, we create an even better world and a brighter future.