



FACULTY OF SCIENCE

annual report 2013

RENAMED | REFOCUSSED





In 2013, we celebrated a milestone: the rebirth of the Faculty of Science as it returned to its original name. We also celebrated the tremendous achievements made by our dedicated staff, faculty and students, as well as the significant contributions we made through our research. We maintained our position as an established home to recognized experts in the sciences and became involved in a number of exciting new pilot projects.

HIGHLIGHTS OF THE PAST YEAR INCLUDED:

- **STRENGTHENING OUR TIES WITH BRAZIL THROUGH *Science without Borders*** by putting together a memorandum of understanding;
- Providing students with the best teaching and learning experiences with our **AWARD-WINNING** teaching and technical staff;
- Recognizing more than **375** of our undergraduate and graduate students for academic and research excellence at our annual awards and honours ceremony;
- Receiving over **\$10 MILLION IN FUNDING** from Tri-Agency, private foundations and industry for our researchers, while 100 per cent of our first-time (junior faculty) applicants received funding from the Natural Sciences and Engineering Research Council of Canada (NSERC);
- Recognition in a feature article in *Nature – Spotlight on Canada*, both for the support we offer our researchers, as well as our Life Sciences Building. The building was noted for its innovative architecture, environmentally friendly features, and its role as a hub for **COLLABORATIVE RESEARCH OPPORTUNITIES** and experiential learning for first-year undergraduates;
- Standing at the **forefront of discoveries** such as the 20,000th bee species; winds moving towards black holes; and explaining the spread of infectious diseases through mathematical modelling;

- Expanding on and introducing new programs in our **OUTREACH** efforts;
- Fostering and building on our relationship with more than **13,000 Faculty of Science alumni**; and
- **Hiring new faculty members** to strengthen the areas of animal physiology, cellular and molecular biology, and science and technology studies.

The Faculty of Science remains committed to providing the **HIGHEST QUALITY UNDERGRADUATE AND GRADUATE EDUCATION IN THE BASIC AND APPLIED SCIENCES** – informed and strengthened by excellence in research. This could not be possible without the tireless hours of our administrative, technical and teaching staff, curious and brilliant researchers, and supportive donors, government agencies and alumni.

This year has been a standout year for the Faculty. As we move forward with existing and proposed initiatives under the leadership of a new dean, the Faculty of Science will cement its place as an innovative nucleus for top-quality teaching and research.

Don Hastie
Interim Dean

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Our strong commitment to **research** allows our researchers to push the boundaries of science and knowledge in creative and innovative ways. Research excellence is recognized as a primary driver to enhance the quality of our undergraduate and graduate teaching, learning and training.

\$ 3.7 MILLION
in funding from non-federal government foundations and agencies

\$10M OVER
in external peer-reviewed **FUNDING**



CHUN PENG

China-Canada Joint Health Research Initiative

Dr. Chun Peng, professor of biology, received a significant research grant from the Canadian Institutes of Health Research (CIHR). The grant was part of a special China-Canada Joint Health Research Initiative. This research initiative aims to promote the development of Canadian-Chinese scientific cooperation between universities, hospitals and research institutions in Canada and China. It is jointly managed and funded by the CIHR and the National Natural Science Foundation of China (NSFC).

100%
OF OUR FIRST-TIME NEW FACULTY
RECEIVE AN NSERC DISCOVERY GRANT

8th
in Canada for publications and impact of research in the sciences and engineering



JOHN McDERMOTT
receives more than

\$7M in FUNDING

\$1 MILLION
from CIHR for research project investigating the function of a gene that regulates skeletal muscle growth

from the federal government granting agencies: NSERC, CIHR and SSHRC



BIOLOGY

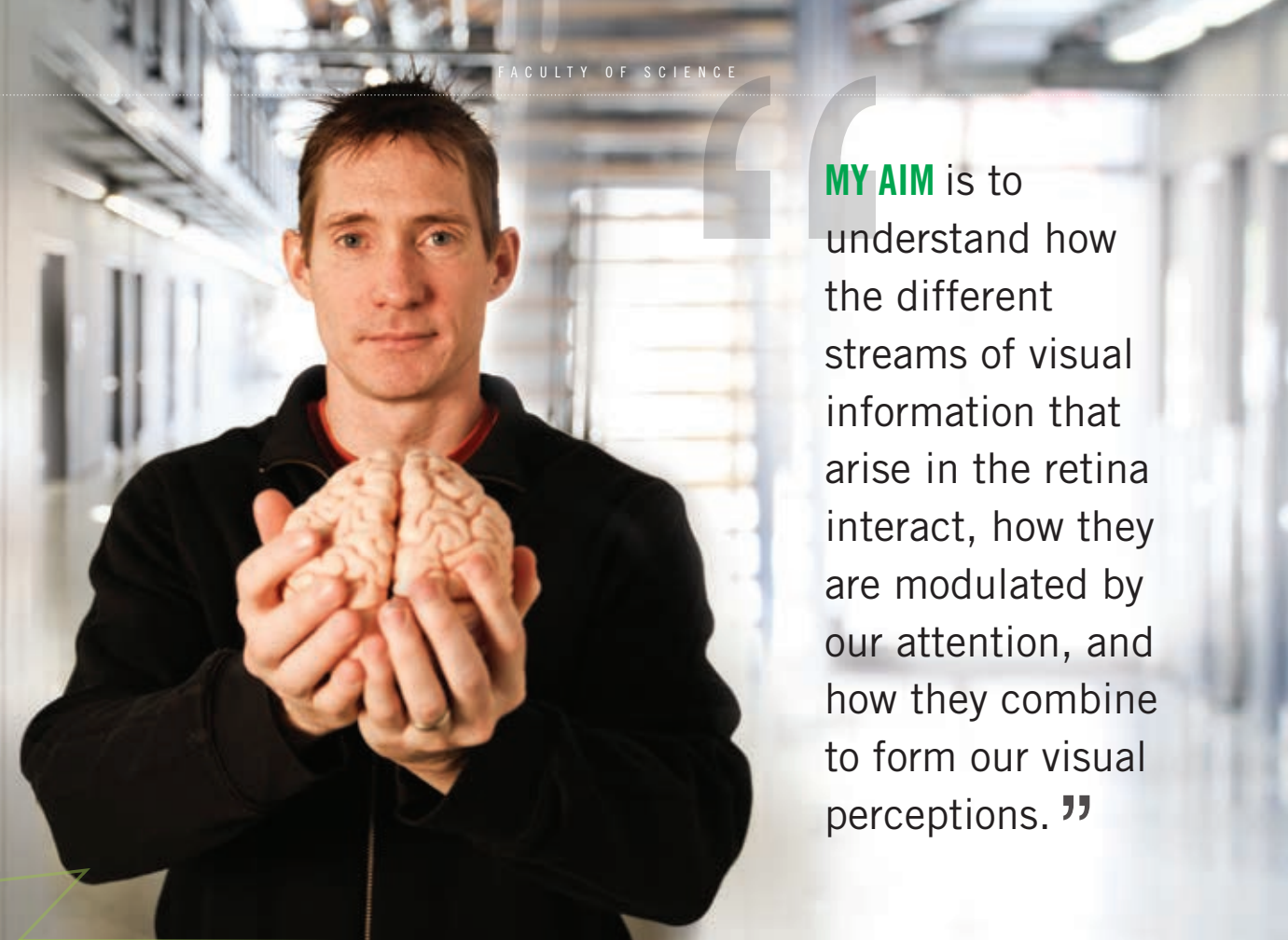
KATHI HUDAK

Nature does it best: Uncovering the potential of pokeweed antiviral protein

“POKEWEED ANTIVIRAL PROTEIN INHIBITS REPLICATION OF PLANT AND ANIMAL VIRUSES, INCLUDING HIV-1.”

Plants produce hundreds of defence compounds essential for their survival. These factors help them respond to environmental cues and fend off pathogens. My lab is focused on understanding the function of a specific group of enzymes called RNA glycosidases. These enzymes damage certain RNAs, inhibiting the production of their encoded proteins. RNA glycosidases are not toxic to the plants that make them; however, many have been shown to inhibit the replication of diverse plant and animal viruses. For example, the pokeweed plant produces the “pokeweed antiviral protein,” which protects the plant from viral infections. The antiviral protein was also shown to decrease HIV-1 production from infected human immune cells. Therefore, the protective role of this protein in the plant may transcend to human defences as well.

Our two main goals are to understand how the enzyme is regulated in plants and to characterize its activity against viruses in human cells. The decline in virus production is largely due to damage of the viral genome, which terminates various steps in the virus' life cycle. We are currently investigating how the antiviral protein specifically targets the virus without being toxic, in order to develop its potential application as an antiviral agent.



“MY AIM is to understand how the different streams of visual information that arise in the retina interact, how they are modulated by our attention, and how they combine to form our visual perceptions.”

KEITH SCHNEIDER

Understanding through the eyes of those with albinism and dyslexia disorders

Two of the projects we are working on involve clinical populations with albinism or dyslexia. Albinism, a disorder that involves hypopigmentation of the skin – reduced colour and skin pigments – also affects the development of the visual system. In the normal population, half of the information from each eye crosses over and is analyzed in the opposite side of the brain. In albinism, there is an overabundance of crossing fibres. We examined the optic nerve, optic tract and lateral geniculate nucleus (LGN) using high-resolution magnetic resonance imaging (MRI) and found that these structures were malformed and smaller in the albinism group.

Similarly, we looked at the LGN in individuals with dyslexia, a language-based learning disorder, with the aim of testing the controversial “magnocellular theory of dyslexia,” which suggests that deficiencies in one particular stream of information from the eye are associated with dyslexia. We are looking in the LGN, because this is the one place in the human brain where this magnocellular stream can be isolated. In the rest of the brain it is intermixed with all of the other information channels. We have created an atlas of the LGN shape and location in the dyslexia and control populations to be able to isolate differences.



CHEMISTRY

MIKE ORGAN

The catalyst effect

“We’re pioneering the use of flow technology to increase reaction to completion time.”

chemical manufacturing will be built. The premise is that reactions can be performed on a small scale at any point in time in small diameter reactors (chips or tubes). This will allow for rapid reaction condition assessment and optimization literally on single drops of effluent from the reactor, thus drastically reducing chemical inventories and potential environmental impact.

My lab is pioneering flow technology using microwave irradiation to rapidly drive reactions to completion in the relatively short time that they reside in the flow reactor. This new technology, which operates at very high temperatures and pressures, will provide a conceptually unique approach to chemical synthesis and a solution for sustained chemical manufacturing in Canada and beyond.

Many business sectors have moved production to a just-in-time operation that offers numerous practical advantages, leading to improved efficiency and cost savings. Fine chemical synthesis, such as the preparation of drugs, may have the most to gain by moving to this format. Yet chemical manufacturing continues to be conducted by following traditional scaling-up strategies, with the goal of producing single batches of large quantities of final material.

Flowed chemical synthesis is currently being evaluated as the technological platform upon which sustained



DASANTILA GOLEMI-KOTRA

Superbugs: Mission possible!

“THE STUDY of superbugs – bacteria that are resistant to antibiotics – is the research area my lab is focused on.”

We discovered an extracellular protein that modulates *Staphylococcus aureus* cell surface charge by removing D-Ala from a polyanion polymer bound to the cell wall. This activity has great impacts into understanding *Staphylococcus aureus* adaptability to antibiotics.

We also showed that two independent signal transduction pathways communicate in *Staphylococcus aureus* to coordinate cell wall synthesis and stress response to antibiotics. Further, we discovered the evolution of resistance enzymes can be predicted by studying the structural dynamics of these enzymes. These findings have led to the design of novel approaches in targeting antibiotic resistance.



MATHEMATICS & STATISTICS

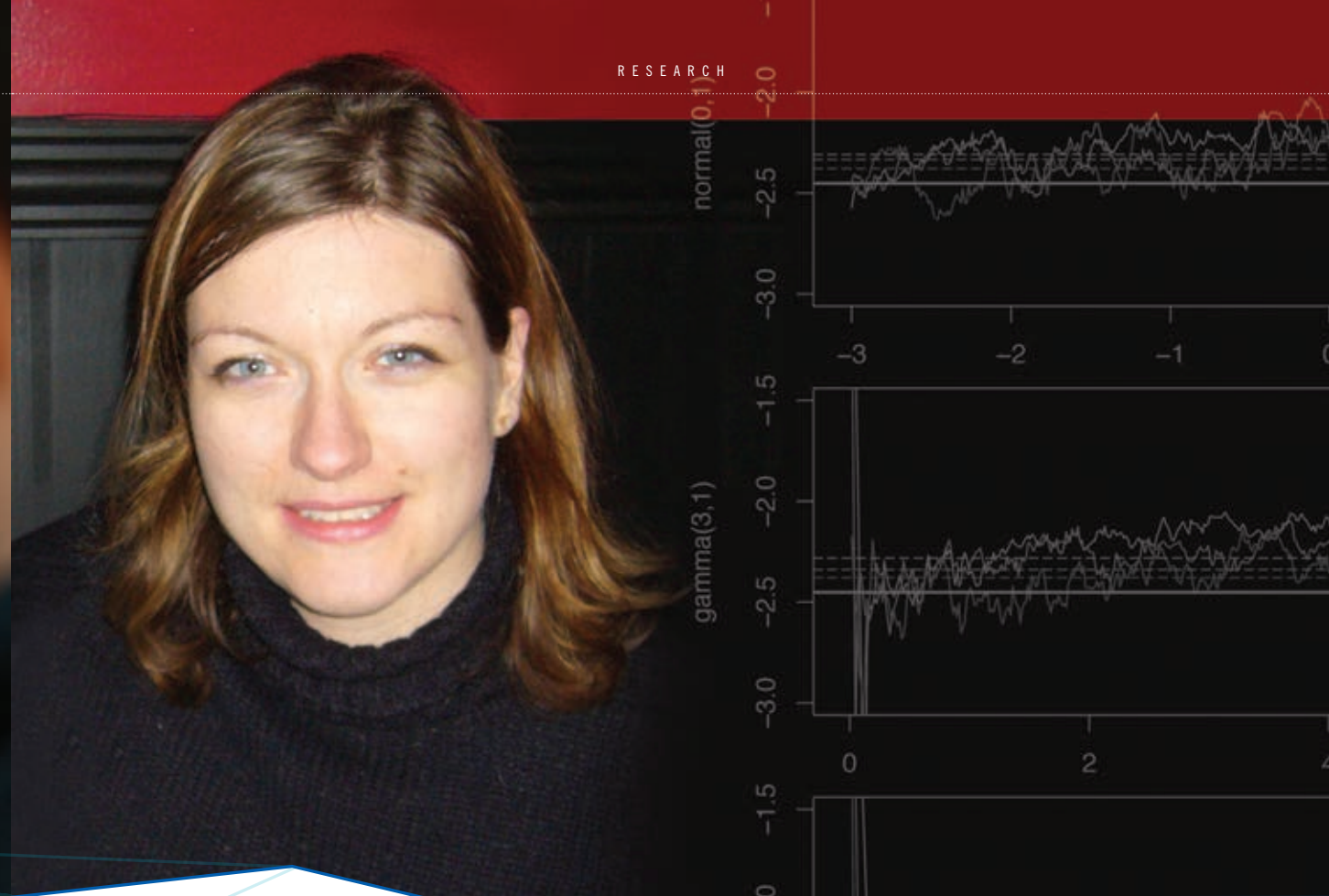
NEAL MADRAS

How reliable are simulation results?

My PhD student Oliver Jovanovski and I are studying the efficiency of Markov chain Monte Carlo methods, a class of simulation algorithms used to tackle computationally challenging problems in statistical analysis (e.g., in a digital picture blurred by random noise, what are the likely true images?) and other fields of science. The user must decide how long to run the simulation so that the results are not biased by the algorithm's initial state. We prove upper bounds on the time required to make this bias arbitrarily small (formally, we bound the rates of convergence of the Markov chains to equilibrium) in some simplified models, which we hope can serve as guidelines for more complex situations that arise in practice.

“WE USE MATHEMATICS TO MODEL THE EFFECTS OF CHANGE IN PHYSIOLOGICAL PARAMETERS.”

I am also working on mathematical modelling of the immune system using differential equations. My colleague Dr. Jane Heffernan, mathematics professor at York University, and I developed and analyzed a model of HIV and its progression to AIDS within an individual, and used it to understand the effect of changes in various physiological parameters over time. Using another model, three collaborators from Winnipeg and I attempted to understand conditions for pathogens to mutate rapidly enough that they escape being eliminated by the body's T-cells.



HANNA JANKOWSKI

The shape of numbers

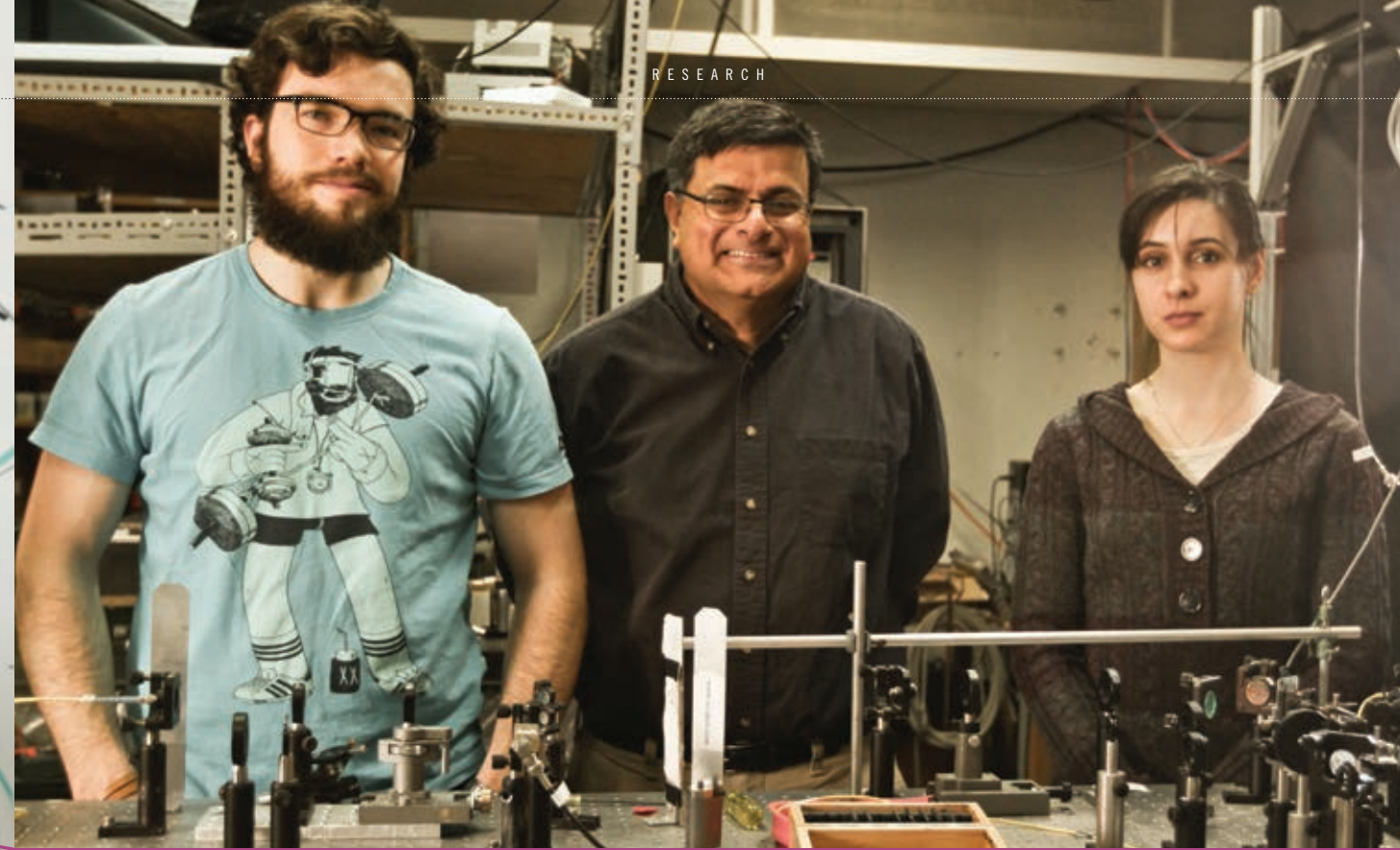
“My statistical methods are used to analyze and improve estimation ranging from insurance claims to mammogram imaging.”

As a statistician, I develop novel statistical methods that can be used to analyze various types of data. For example, my work in shape-constrained nonparametric function estimation has been used to better understand data from the H1N1 pandemic in Ontario. This work has also been used to analyze and model actuarial insurance claims.

In addition, my work in statistical inference for random sets has been used in various settings, including the analysis of geological shapes (to understand the difference in sand grains from different locations) and in medical imaging (to improve estimation of the skin/breast boundary in a mammogram image).



PHYSICS & ASTRONOMY



“Unexpected results will occur when hundreds of astronomers come together.”

PATRICK HALL

Charting the galactic winds

In 2013, I used the eight-metre-diameter Gemini telescopes to observe dozens of quasars with winds of hydrogen and trace elements newly appeared in our direction. This helps us to understand how winds driven off of disks of matter spiralling into supermassive black holes at the centres of galaxies work. Currently, I study how the winds change with time, to learn how fast they move and how much they are affected by changes in the amount of light reaching them. This has all led to an unexpected discovery: winds seem to be driven toward the accretion disks around black holes instead of away from them.

Studying quasar winds as part of the Sloan Digital Sky Survey III, an international collaboration of hundreds of astronomers, has resulted in numerous peer-reviewed scientific publications and has sparked new ways to test models of these winds.

Future observations will reveal how well our models match the real conditions in these fascinating galactic winds.

ANANTHARAMAN KUMARAKRISHNAN

Atomic physics: From theory to application

The goal of my research group is to better understand the theoretical foundations of atomic physics and develop techniques and portable instrumentation for industrial applications in photonics and optics.

We have developed a distinctive class of atom interferometers that use laser cooled atoms. Using these devices, we have measured the momentum transferred to atoms by lasers with high precision. The momentum transfer can be related to a fundamental constant that plays a central role in the theory of quantum electrodynamics (QED), the theory that describes the interaction between light and matter.

Another experiment relates to precise measurements of gravitational acceleration that can be used for calibrating industrial gravimeters. These sensors are widely used for oil and mineral exploration, seismic studies in remote areas and correction of tidal charts.

“In 2013, both experiments achieved improvements in precision amounting to more than a factor of 100,000 compared to our first results in 2003.”

Our industrial partner Scintrex Ltd., an Ontario-based company, is the leading manufacturer of industrial gravimeters. This partnership will enable my research group to perform comparative measurements with state-of-the-art industrial gravimeters and cold atoms so that systematic effects can be understood and controlled.

The rapid advances in the gravity measurements allowed the industrial partnership with Scintrex Ltd. to be expanded to include the development of a new class of laser systems. These lasers, which were originally developed for cold atom experiments, can be frequency stabilized with respect to an atomic spectral line without human intervention. In recent field trials, laboratory prototypes of the laser system met the desired performance specifications, which led to a U.S. provisional patent application.

“I aim to understand the human aspects of technology.”

EDWARD JONES-IMHOTEP

Cultural history of our trust in machines

My research focuses on the cultural history of technology. Specifically, I am interested in how making machines trustworthy has historically been bound up with anxieties about the kind of people we should be. In particular, I am interested in the pianist Glenn Gould, who embraced recording technologies and electronic media as a way of nurturing individual judgment.

I have a longstanding interest in alternative methods for researching and thinking about history, particularly those that involve making and handling material artifacts. I also look at how, in a profession dominated by texts and language, we might use material resources to help us explore the history of science and technology. In collaboration with the Canada Science and Technology Museum, for instance, I am interested in using 3D scans of scientific artifacts to reproduce them at remote locations through rapid-prototyping tools.



JAMES ELWICK

How did people become scientists 150 years ago? What can we learn from them today?

“I want to IMPROVE UNDERGRADUATE SCIENCE TEACHING AND ASSESSMENT by researching how it has changed since 1800, and also how it has *not* changed since 1800.”

If an instructor does not sigh and view undergraduate science exams as a necessary evil, then they usually take the exam's result – the grades – for granted and do not look at the form the exam takes. This overlooks all the work that has gone into standardizing and refining how exams are used to assess students. It is analogous to overlooking communication systems and infrastructure, which are boring and invisible because they usually work so well. This has also been the case with standardized achievement exams. The creation of this infrastructure of standardized exams was a historical event that began about 150 years ago. I claim that we can understand the emergence of networks of examinations with the historical tools previously used to understand the emergence of other forms of infrastructure, like plumbing or power grids. The relevance of this project is that if we can understand how exams have been standardized, then not only can we make them work more fairly or accurately – we might also imagine alternatives to them.



Memorandum of Understanding between York and USP

Leadership - Partnership - Internship

YORK



\$1.6

MILLION
AWARDED OVER
SIX YEARS



The Centre for Atmospheric Chemistry (CAC) hosted the 2nd Annual Training Week in June 2013 for graduate students and professionals as part of the NSERC Collaborative Research and Training Experience (CREATE): Integrating Atmospheric Chemistry and Physics from Earth to Space (IACPES). The week included a one-day symposium that featured presentations by graduate students and postdoctoral fellows, a three-day course in atmospheric chemistry and physics with 15 lecturers and panelists, and one day of hands-on training in the use of IGOR-Pro scientific software for programming and plotting. The IACPES is the first successful NSERC CREATE Grant awarded to York University. In total, \$1.6 million has been awarded over six years.

The last overview paper (of 21 papers in total) of a special issue devoted to the Border Air Quality and Meteorological Study (BAQS-Met) was published in 2013 in *Atmospheric Chemistry and Physics*, a top journal in the field. This special issue was organized by members of CAC, including three of the four guest editors.

Members of CAC also conducted research near Fort McMurray, Alberta for six weeks this past summer, measuring air composition at a ground site and on board the NRC Convair 540 aircraft (in photo) close to oil sands operations. This large study, funded by Environment Canada, involved 40 to 50 scientists in the field.

BRAZIL

Canada-Brazil partnerships

In January, members of the Centre for Disease Modelling and the Dean's Office in the Faculty of Science, travelled to Brazil to attend a two-day workshop at the University of São Paulo, participate in the ICMC Summer Meeting on Differential Equations held at the Instituto de Ciências Matemáticas e de Computação in São Carlos, and meet with the president and research administrators at the University of Campinas (UNICAMP) to discuss strategies for graduate and undergraduate student exchanges. The Brazilian principal partners included the University of São Paulo and the BIOMAT Consortium/BIOMAT Institute of Advanced Studies of Biosystems, Instituto de Ciências Exatas/ICEx, Universidade Federal Fluminense.

The workshop and conference provided an opportunity to formally establish **Canada-Brazil partnerships** through the signing of a memorandum of understanding. They also facilitated the development of concrete plans for the advancement of joint research projects, commercialization opportunities, technology transfer and student training. The coming together of researchers and industry partners from both countries allowed these opportunities to be discussed and fully realized.



These partnerships have enabled the researchers to address disease-specific concerns and emerging issues that affect the society and economy of both Canada and Brazil. These include the emergence of tuberculosis drug resistance, which has become an urgent global public health issue, and the risk of dengue fever to sports enthusiasts travelling to Brazil for the FIFA World Cup in 2014 and the Summer Olympics in 2016. The capacity to address these challenges, which have been exacerbated by globalization, climate change, and environment degradation, relied on leveraging a wide range of expertise from both Canada and Brazil spanning disease modelling, analysis and simulation, health policy evaluation, and knowledge translation and dissemination.



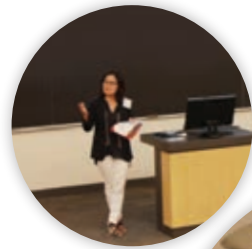
SOUTH KOREA

Canada-Korea Diabetes Research Initiative Symposium

Department of Biology faculty members Dr. Gary Sweeney and Dr. Robert Tsushima organized a Canada-Korea Diabetes Research Initiative Symposium on August 2, 2013. Its purpose was to **ENHANCE CANADA'S CAPACITY FOR EFFECTIVE TRANSLATIONAL STUDIES VIA RESEARCH PARTNERSHIPS BETWEEN CANADIAN AND SOUTH KOREAN scientists with expertise in diabetes research.**

The symposium was part of a reciprocal visit by Korean scientists and clinicians following a trip to South Korea, in February 2012, by York University Faculty of Science researchers. During the 2012 visit, faculty members from the Faculty of Science established contacts and collaborations with South Korean scientists at a number of different institutions.

The York University symposium built on research activities between the two countries, and between York University and South Korean research institutions. It represented an *outstanding opportunity for dissemination of information resulting from research activities and findings in the area of mechanistic and translational studies in diabetes.* The symposium encompassed the entire scientific community and was open to the general public.



CHINA

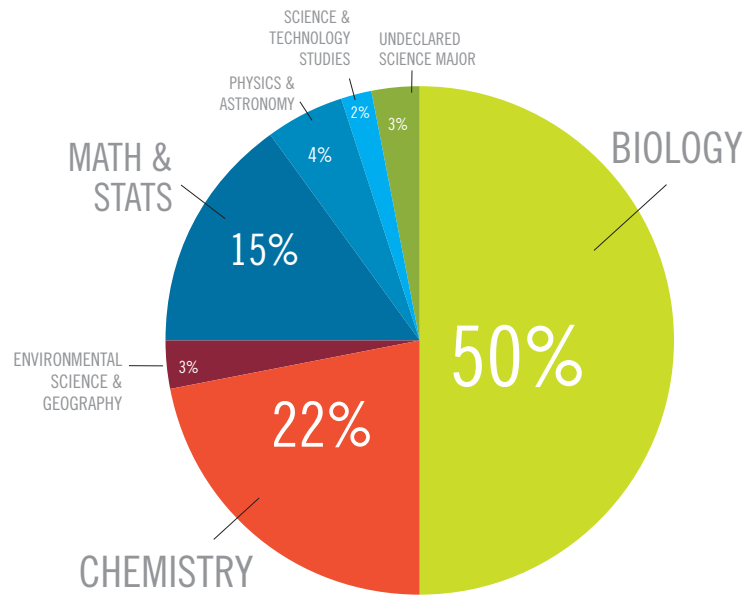
Second Workshop on Modeling and Analysis of Environmental Impact on Tai Lake

A second workshop was held to report on the progress of and to **exchange ideas on modelling, data analysis, model simulation and calibration of the environmental impact on TAI LAKE**, the third largest freshwater lake in China. In recent years, Tai Lake has been plagued by pollution as a result of rapid industrialization and the growing use of fertilizers and livestock agriculture in the surrounding region.

At the workshop, methods and practices in environmental management were compared across a range of parameters, including fishing, groundwater impact, harvesting or recreational benefits for society, and maintenance of lake species biodiversity. **New developments in aquatic biology and community ecology research were examined to devise optimal analytical and monitoring strategies for maintaining the lake biota and productivity under changing climatic conditions in the future.** Department of Mathematics and Statistics faculty members Dr. Huaiping Zhu, Dr. Jorg Grigull and Dr. John Deng, and Department of Biology faculty members Dr. Sapna Sharma and Dr. Jonathan Ruppert, presented their research at the workshop.



TOTAL UNDERGRADUATES *by* MAJOR BREAKDOWN

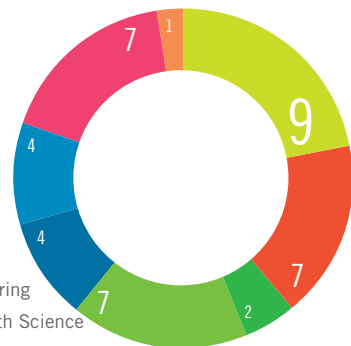


NSERC USRA

The Undergraduate Student Research Awards (USRA) issued by the Natural Sciences and Engineering Research Council of Canada (NSERC) enable undergraduate students to gain hands-on research experience under the supervision of a York University NSERC-funded faculty member. These awards are intended to stimulate undergraduate students' interest in the natural sciences and engineering, and encourage them to pursue graduate school or research-related industry careers.

NSERC USRA BREAKDOWN *by* DEPARTMENT & UNIT

- Biology
- Chemistry
- Computer Science & Engineering
- School of Kinesiology & Health Science
- Mathematics & Statistics
- Physics & Astronomy
- Psychology
- Schulich School of Business



8,980

APPLIED for 1,221 spots

536

DEGREES GRANTED IN 2013
BA, BSc, BScT, IBSc

IN 2013 OUR UNDERGRADUATE STUDENTS RECEIVED OVER

\$2.6 MILLION

IN SCHOLARSHIPS & BURSARIES

OVER 11,000

York students are enrolled in natural science courses

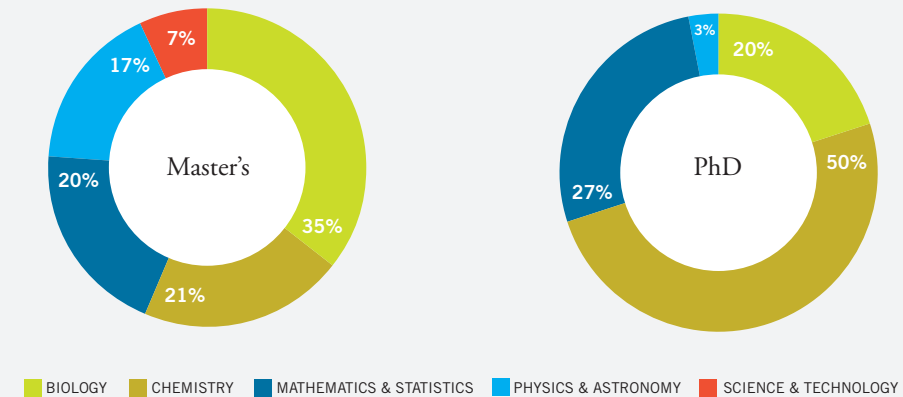
Great teaching in science — whether at the graduate or undergraduate level — goes hand in hand with research excellence. Our teaching and support staff are committed to preparing undergraduate students for whatever path their future life takes, whether it be further studies at graduate or professional schools, business or entrepreneurial activities, or the great diversity of working life.

Courses in science are rich in learning experiences found through a combination of lab work, problem-solving sessions, tutorial discussions, and of course engaging formal lectures.

Graduate teaching is fundamentally based on research mentoring. Courses and seminars provide the disciplinary foundation, but the in-depth research project, whether for the master's or PhD degree, conducted under the daily supervision of a scientist with international stature in their field, forms the heart of the teaching and learning experience.

DEGREES GRANTED

GRADUATE STUDENTS



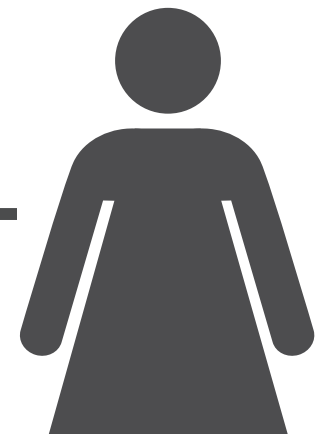
IN 2013 OUR GRADUATE STUDENTS RECEIVED OVER

\$1.7 MILLION

IN INTERNAL *and* EXTERNAL FUNDING

51%

FEMALE ENROLMENT IN STS GRADUATE PROGRAM





TAMARA KELLY

The pedagogical shift

“In labs, we’re moving from rote types of lab activities to guided inquiry approaches, encouraging students to develop their own scientific questions as well as design and perform basic experiments. We are also more mindful of developing scientific literacy skills.”

According to Dr. Tamara Kelly, science pedagogy is changing.

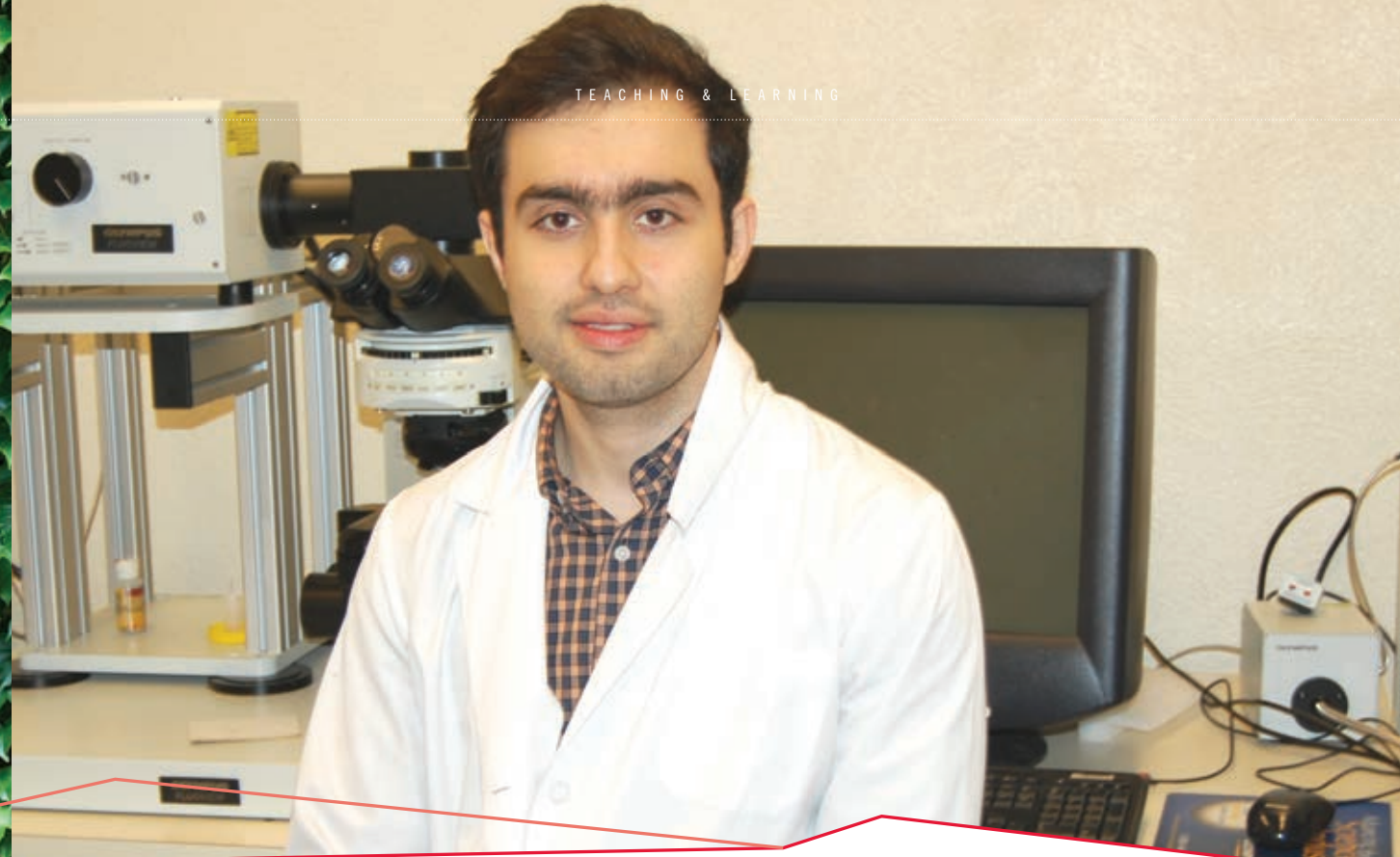
“Science teaching is in the middle of a transition,” the associate lecturer says. “We’re moving from traditional, passive lecture-based courses to more student-focused approaches.”

A two-time winner of the Faculty of Science Excellence in Teaching Award, Dr. Kelly is one to know. As the chair of the Faculty’s Committee on Teaching and Learning, she is working with her colleagues to introduce and sustain initiatives to promote the pedagogical shift.

Some of the strategies in place include the use of case studies, group activities, clickers and peer instruction in large lecture settings, and two-stage exams to help students develop skills to communicate about science and discuss ideas.

One of Dr. Kelly’s initiatives with the Committee on Teaching and Learning is the Science Education Seminar Series, which brings in science and education experts to provide talks and workshops to faculty, staff and students. Another is the Science Education Journal Club, which meets monthly.

“Teaching is not an innate ability,” Dr. Kelly says. “It’s a skill that can be developed, honed and refreshed through workshops, conversations with other educators, and evidence-based approaches. Through the Journal Club, workshops led by experts in science education, and by using social media such as Twitter to share and stay connected, we are creating such a community of educators within our Faculty.”



ARYAN ABADEH

Unique RAY experience

“I always thought it was rare for an undergraduate student to be working in a research lab while taking a full course load. But my strong passion to be involved in real scientific research inspired me.”

Aryan Abadeh, a fourth-year undergraduate biology student, wanted more from his academic experience. He wanted real lab experience. Through the Research at York (RAY) program, undergraduate students such as Abadeh are provided with the opportunity to participate in research projects alongside Faculty of Science faculty members and researchers.

Abadeh found it interesting that while plants and fungi do not utilize a pump as part of their transport mechanism, they can transport nutrients and water distances as far as 100 metres. Working with biology professor Dr. Roger R. Lew, Abadeh used a common bread mould and discovered that, contrary to what many scientists believe, fungi use osmotic gradients for transport.

“The osmotic ‘pumps’ cause differences in pressure that transport cytoplasm inside the pipe-like cells of the fungi. It is micro-hydraulics, with plumbing that has 0.015 mm diameter pipes,” says Dr. Lew.

This work led to Abadeh co-authoring a paper that was published in Microbiology (SGM).

The unique RAY program experience gives students and researchers a chance to transfer knowledge and gain real-world experience.

“I find there is tremendous value in giving undergraduates like Aryan the opportunity to flourish in a real world setting,” says Dr. Lew.

SELECT GRADUATE STUDENT Awards

*CIHR Master's Frederick Banting and
Charles Best Canada Graduate Scholarship (CGS)*
Anna Troshchynsky

Dalton Pharma Services/Dr. Douglas Butler Award
Lucas McCann and David Rosa

*NSERC Alexander Graham Bell Canada
Graduate Scholarship (Doctoral)*
James (Scott) MacIvor

*NSERC Alexander Graham Bell Canada
Graduate Scholarship (Master's)*
Heyam Hayder, Gabriela Krivdova,
Cristina Lento, Ruchi Liyanage,
Spencer Monckton, Marlee Ng

*NSERC
Postgraduate Scholarship (Master's)*
Mariya Cheryomina

*NSERC
Postgraduate Scholarship (Doctoral)*
Stephanie Bernaudo, Mirzo Kanoatov,
David Wegman

NSERC Industrial Postgraduate Scholarship
Andrew Chen

Ontario Trillium Scholarship
Yana Boeva, Francesc Rodriguez Mansilla,
Soma Tripathi

SSHRC Vanier Canada Graduate Scholarship (CGS)
Bretton Fosbrook

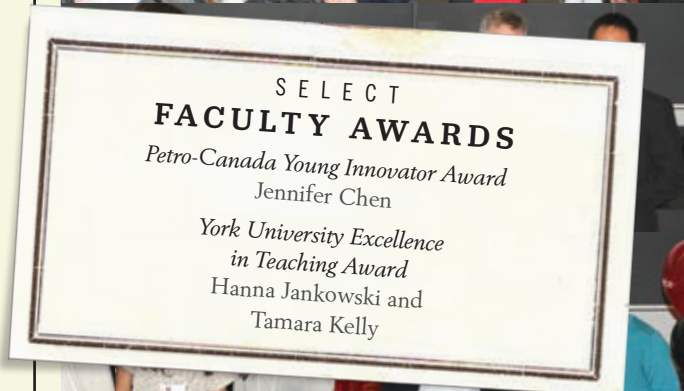
C.D. Fowle Graduate Scholarship in Ecology
Spencer Monckton and Thomas Onuferko

Dr. Ralph Nicholls Graduate Scholarship
Mehrnaz Sarrafzadeh

Nestmann Scholarship
Marlee Ng and Adilya Rafikova

Charles Hantho Award
Amanda Ophelia Jameer
Kevin Marshall Nikelski

Harold I. Schiff Award
Amanda Jameer and Zoey Davis



HIGHLIGHTS

1 **TINA REDDI**, an academic services assistant, received the *President's Voice of York Award* for outstanding service as a first-line-of-contact person for students and visitors.

2 **CESAR CEBALLOS**, a post-doctoral fellow in mathematics, received the *Banting Post-doctoral Fellowship* for research in areas of discrete geometry and algebraic combinatorics.

3 **BROCK HARPUR**, a PhD candidate in biology, received the *Elia Scholars Program Award* for research in evolutionary biology of honeybees.

4 **MIRZO KANOATOV**, a PhD candidate in biology, received the *Alexander Graham Bell Canada Graduate Scholarship* for research in designing methods for analysis of the kinetics of intermolecular interactions.

5 **JEAN-PAUL PALUZZI**, an assistant professor of biology, received the *John Charles Polanyi Prize* for research on physiological mechanisms in blood-feeding arthropods.

6 **MARTINO LUPINI**, a PhD candidate in mathematics, received the *Elia Scholars Program Award* for research in invariant complexity theory.

7 **SHAILI PEREZ**, an undergraduate in biomedical science, received the *York University President's Scholarship* for outstanding academic performance.

8 **SAMPA BHADRA**, professor of physics, received the *Suwa Prize* as a member of the J-PARC Neutrino Beam Group, whose work led to groundbreaking results in neutrino oscillations.

SELECT UNDERGRADUATE STUDENT AWARDS

Governor General's Academic Silver Medal - Michaela Gasner, *Alumni Award of Distinction* - Menal Huroy
The Chancellor Bennett Entrance Award for the Westview Partnership - Kosal Chin

NSERC Undergraduate Student Research Awards - In total, 25 winners
Mojtaba Ahmadi, Mihai Alboiu, Virginia Bertucci, Philip Christian, Miranda Dibiase, Shira Elion-Jourard,
Khashayar Gharavi, Farhad Ghasemi, Rozbeh Kamran-Disfani, Yehoshua Komarovskiy, Cristina Lento,
Yuping Lin, Akshay Lobo, John MacIsaac, Philip Maciukiewicz, Emil Noordeh, Iain Page, Ryan Patak, Dafna Perez,
Leonid Rozenfeld, Juan Sanchez, Goldie Srulovich, Brian Sunga, Andrew Tersigni and Richard Thai

The William & Nona Heaslip Scholarship - Paul Moroz
York University Award of Achievement - Jessica Maloh
York University President's Scholarships
Daniel Kulevski, Shaili Perez, Aryeh Price, Antonette Spagnuolo, Catherine Spagnuolo and Brian Sunga
Schulich Leader Scholarship - Yaakov Green, Arpit Sharma and Ben Shachar



Bethune College

“I have proudly called Bethune my home away from home for the past four years. I am so grateful to live in a community that constantly pushes me to learn and grow each day.”

- Cassandra Brennan, Senior Don

NORMAN BETHUNE COLLEGE acts as a home away from home for the many science students who live in the residence. In 2013, we welcomed 1,400 new students to our College, and many took part in the numerous events we held throughout the year – Frosh Week, skiing at Blue Mountain in Collingwood, and attending Toronto Blue Jay games, a Charity Ball and our end-of-year Formal. Bethune students were very active in intramural sports and won many campus-wide championships. Bethune is also home to more than 30 science-oriented clubs.

We provide various academic services for our students, and this year we saw an increase in volunteers for the many programs we offer. These include mentoring programs such as peer mentoring for first-year Bethune students; peer tutoring for undergraduate students; and graduate peer mentoring for upper-year students exploring future paths in graduate and professional schools.

We also offer career and learning skills workshops for first-year students on topics ranging from self-care and what to do in your first-year summer, to building research experience and York University employment and volunteering opportunities. In addition,

“Bethune College is your outside-the-classroom home at York University. At Bethune, you will find an amazing array of extracurricular activities, clubs of all sorts, athletics, off-campus events, and serious seminars and lectures. The college academic program includes peer mentoring, free peer tutoring, PASS study groups, Wednesday workshops, the Writing Centre (to help with essay writing), as well as academic and career advising. The Bethune College building provides a comfortable place to drop in, relax, have a meal, study, and meet other students, faculty and staff.”

- John Amanatides, Master of Bethune College

we conduct academic advising and have a student ambassador who acts as a representative at the Ontario Universities’ Fair, Fall Campus Day, Parents Night, March Break tours and Spring Open House.

This past year, we also said good-bye to 547 students who became York University alumni.



Our programs go beyond the regular school curriculum and are designed to spark a passion for science and mathematics.

This past year, we renewed our participation in Actua, a national network of 33 university-based, youth-focused STEM outreach programs. Our association with Actua resulted in sponsorship of over \$100,000. We also remained committed to keeping our programs accessible to at-risk youth, and, through funding from private donors, were able to provide bursary assistance to more than 50 students.

SCIENCE EXPLORATIONS CAMP

There were significant changes made to the Science Explorations Camp for grades three to eight in 2013, including an investment in new curriculum development and a revamped marketing strategy. This resulted in a doubling of enrolment over 2012, with close to 400 students registered for the Camp.

SPEAKERS BUREAU

Throughout the academic year, our professors and graduate students continued to enrich the K-12 educational experience of students across the Greater Toronto Area by sharing their expertise in the fields of science through our Speakers Bureau.

The Speakers Bureau offers an assortment of presentations for youth of various ages, as well as the general public, on topics that include astronomy, biology, chemistry, physics, and mathematics and statistics. In addition, several presentations provide interesting perspectives on topics of an interdisciplinary nature and foster an environment of interactivity and innovation. The Speakers Bureau continues to be a high-value activity that deepens the school curriculum and stimulates students to consider a science-inspired future.



Science Camp

Cultivating the next generation of science students, researchers and leaders.

LET'S TALK SCIENCE

In 2013, the Let's Talk Science chapter at York University reached out to schools from Etobicoke to Alliston, along with home schools, after-school programs, libraries, community events and summer camps. Our volunteer pool, which grew by 30 per cent this past year, is composed of undergraduate and graduate students from a variety of departments. They have all been trained at the Science with Impact Workshop, a program certified by the Canadian Institutes of Health Research (CIHR).

Throughout the year, our volunteers engaged more than 2,100 students across 20 different schools. Our activities included in-class visits, community events, campus lab tours, after-school programs and the annual on-campus competition, the All Science Challenge. Out of the 38 activities that we organized, 67 per cent were directed at children in grades three to eight. Our high-school outreach totalled 25 per cent, along with four full-day campus visits in collaboration with York University faculty and the Speakers Bureau.



SCIENCE RENDEZVOUS

In May 2013, our researchers went into the community as part of the annual Science Rendezvous festival to bring science to the people. Members of the Faculty of Science have been active participants in Science Rendezvous since it was first launched in 2008. Held on the Saturday of the Mother's Day weekend, Science Rendezvous is part of a network of events on campuses and main streets across Ontario. We take science out of the lab and into the street, where young and not-so-young minds can learn about non-Newtonian fluids, brain activity, space science, and much more. The festival seeks to celebrate and inspire children of all ages to learn about the important role of science in their everyday lives.

Last year, the interactive event took place at the popular Main Street Markham Farmers' Market in the City of Markham. There were activities for all ages – from making giant bubbles and extracting DNA from fruit, to walking on water and making elephant toothpaste. Visitors had an opportunity to make plant batteries and look down a microscope to see fern babies. There was also a crater pool that demonstrated how craters are made and everyone could pet a comet. Despite the cool weather and overcast conditions, the event was once again a huge success.



WORLDTVUZE

The Faculty of Science teamed up with WorldVuze on an exciting new pilot initiative. WorldVuze is a novel online platform that lets elementary and secondary students share and explore views with other students, both locally and around the world. For every question asked, student views can be clustered geographically and compared within and between different locations – city to city, region to region, country to country.

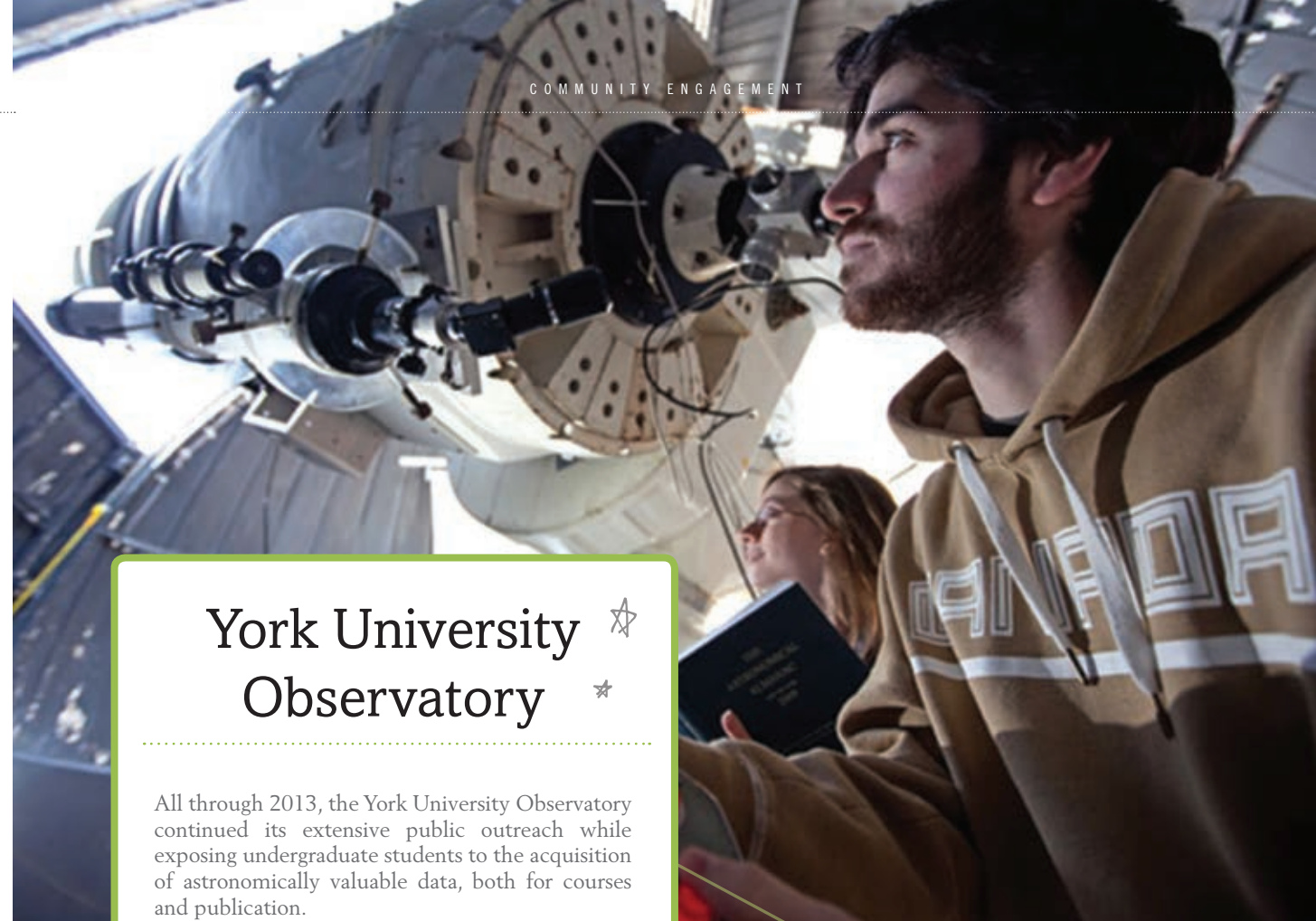
Dr. Patrick Hall, our physics and astronomy professor, was among a small group of international knowledge experts to pose a question to students through the website this past year. He was able to hear diverse perspectives from young people across the globe, on a topic tied to his discipline. This exchange of information provided a great opportunity for teachers and students to actively communicate on a variety of timely subjects. For students, both elementary and secondary, it provided an opportunity to explore new career options and become inspired to learn more.

BIG IDEAS

The Faculty of Science was chosen as a pilot site for an innovation, creativity and design camp called Big Ideas. The camp's curriculum was developed by the University of Toronto's Rotman School of Management and was delivered by York University, the University of Toronto, McMaster University and the University of Ottawa.

IN-SCHOOL WORKSHOPS

A new In-School Workshops program was developed in the spring of 2013. The program has brought undergraduate instructors to elementary school classrooms across the Greater Toronto Area, reaching close to 6,000 students in total. Our enthusiastic instructors lead fun, hands-on interactive workshops designed to excite youth about STEM.

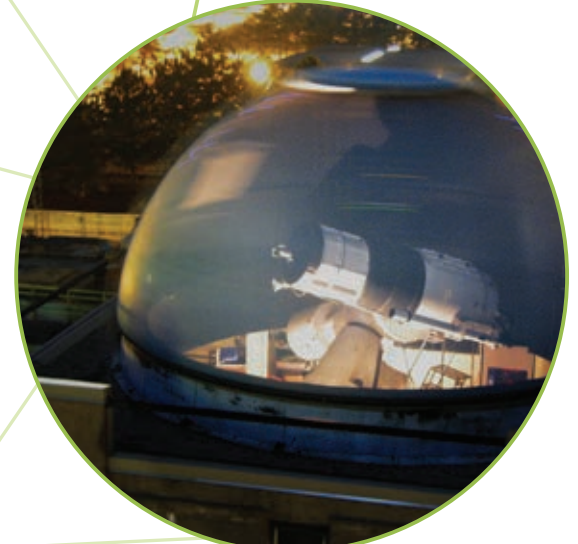


York University Observatory

All through 2013, the York University Observatory continued its extensive public outreach while exposing undergraduate students to the acquisition of astronomically valuable data, both for courses and publication.

The Observatory houses two reflecting telescopes with 40 cm and 60 cm apertures. Undergraduate and graduate students use these telescopes to conduct laboratory exercises. On Wednesday evenings, the public is invited to observe the sky with the 40 cm telescope. In addition, we provide tours of the facility to school classes and community groups, attracting more than 5,000 visitors to the campus annually.

On Monday evenings, people from around the world have the opportunity to observe the night sky online on our website. We also have an Internet radio program called YorkUniverse, broadcast by astronomy.fm at 9pm EST. This one-hour show has been running since 2010 and features undergraduate and graduate students, faculty and York University alumni discussing the latest breaking news in astronomy and space science. Nearly 20,000 listeners tune in each week.



Year in Review

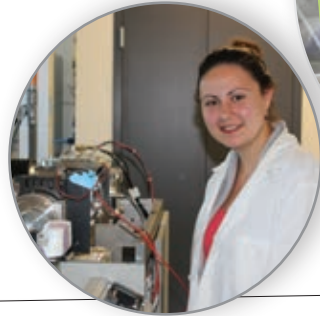


(à la social media)

JANUARY

#yorkuniversity physics alum Steve MacLean, head of Canadian Space Agency, leaves to focus on quantum physics
Jan 16, 2013

Scientists from Canada and Brazil join to fight infectious disease
Jan 30, 2013



MAY

Today marks our first day as the Faculty of Science...again :)
May 01, 2013

Walk on water! #Science Rendezvous
May 11, 2013

Check out Ron Pearlman of @YorkUScience & @RCI_Canada TONIGHT on @CBCTheNational chat about how @Cmdr_Hadfield has helped science outreach
May 14, 2013



Congrats to Sapna Sharma, Jennifer Chen, Matthew Johnson, Christopher Bergevin, Youness Lamzouri - all @NSERC_CRSNG ECRs. That's 5 out of 5!
May 22, 2013

Prof. Samuel Benchimol receives prestigious award from @Progeria
May 31, 2013

JUNE

Michaela Gasner, #YorkUScience student & Governor General Academic Medal winner @BethuneCollege @UGBIOLYorkU
Jun 10, 2013



Congrats to #yorku Prof. Jennifer Chen on receiving the @petrocanada Young Innovator Award

Aug 27, 2013



JULY

Watch Dr. Amro Zayed's postdoc, Dr. Clement Kent talk about the bee crisis on @CTVCanadaAM
Jul 08, 2013

Congrats to all our #NSERC USRA holders!
Jul 16, 2013

MT @YorkUnews: #YorkUScience /#UofT researchers part of international team that caught neutrinos 'in the act' #TRIUMF
Jul 19, 2013

AUGUST

#YorkUAlumni News » Nigel Lockyer to lead #Fermilab in search of the universe's smallest building blocks
Aug 08, 2013

Congrats to #yorku Prof. Jennifer Chen on receiving the @petrocanada Young Innovator Award
Aug 27, 2013

SEPTEMBER

Welcome back students! Enjoy your first week of classes!! #YorkU
Sep 09, 2013



OCTOBER

#YorkUScience is honoured to be featured in the @naturejobs Spotlight on Canada #science #canada #yorku
Oct 04, 2013

Congrats! to Kevin Fraser, #yorku researcher, awarded the #LiberEro conservation fellowship
Oct 10, 2013

Congrats! RT @dawnbazely: @YorkUScience Did you see that I'm the Globe & Mail Hotshot #YorkU prof? 1 for each Canadian university...
Oct 23, 2013

Congrats Mariya, Brock and Nadia! "Student #bee researchers create a #buzz"
Oct 31, 2013

NOVEMBER

Gas Falling into #BlackHoles? @PatrickBHall of #yorku discovers unusual type of #quasar
Nov 07, 2013

DECEMBER

Congrats to #yorku Prof. Emer. Ron Pearlman, Mark Lievonen of @sanofipasteur, Scott Tanner of @DVSScience on receiving @LifeSciencesON awards!
Dec 11, 2013



Biology Professor Mark Bayfield receives more than \$600,000 from CIHR <http://t.co/TMDvX9b6Ne>

Feb 26, 2013



FEBRUARY

RT @walrusmagazine: RT @MissStaceyMay: A @walrusmagazine piece on the "Fight of the Bumblebee," with a slide show of 42 wild bees
Feb 15, 2013

Dr. Jane Heffernan of @YorkUScience weighs in on Gonorrhoea in @excalweb
Feb 22, 2013

Biology Professor Mark Bayfield receives more than \$600,000 from #CIHR
Feb 26, 2013

MARCH

Farmers' lack of bees might be solved by going wild
Mar 04, 2013

Happy Pi Day! #yorku & @Club_Infinity
Mar 14, 2013



APRIL

Kids can explore like Einstein at Science Explorations Summer Day Camp

Apr 08, 2013



RT @YorkUnews: Honeybee housekeeping habits may reduce need for individual immunity
Apr 08, 2013

Congrats @BethuneCollege on winning the 2013 Res Race to Zero!!
Apr 15, 2013

Our Life Sciences Building is ranked 1 of the 5 best new buildings in #Toronto according to @blogTO
Apr 30, 2013

