

UofT Math

THE NEWSLETTER OF THE U OF T MATHEMATICS DEPARTMENT
YEAR IN REVIEW 2015 - 16



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Mathematics
UNIVERSITY OF TORONTO

From the Chair



Math is becoming more and more prominent in the University. Firstly, we are seeing a very significant growth in the number of students that are taking Math courses. This year, the total undergraduate enrollment in Math courses is at 17,722. Moreover, 2,857 students are enrolled in an undergraduate Math program and this is a 12% increase from the previous year. We are expecting this trend to continue as more and more opportunities, both

academic and employment, are dependent on a competency in basic mathematics.

Secondly, the Department hosted a series of events to increase general awareness of Mathematics and the diverse ways it manifests through problems of general interest to the public. Our new lecture series “It’s All About Math” was very successful in attracting large audiences, including students, faculty, alumni and the general public, to hear excellent speakers describe some mathematical ideas and their applications. We also hosted a panel discussion with prominent speakers representing a broad spectrum of involvement with mathematics, from the pure mathematician, to the theoretical physicist, to the “quant” who models the behaviour of capital markets, to those driving innovation in manufacturing.

Thirdly, our Outreach activities, that we have been growing for the last 7 years, have really taken off in a big way with the involvement of more than 2500 elementary and secondary school students, and the involvement of close to 300 volunteers, including 200 undergraduate students. The Girls in STEM program this year attracted 100 female students and we expect it to continue to grow. Perhaps the best testimonial to the success of our efforts is that our Outreach activities are now being emulated by the Faculty of Arts and Science.

Fourthly, our initiative in Applied Mathematics has been recognized both by the central as well as the Faculty administration. A few months ago, the Dean of the Faculty of Arts and Science formally announced the creation of the Centre for Applied Mathematics which is an ambitious project to launch research clusters in the mathematics of big data, imaging, optimal transport, and fluids to complement our existing labs in mathematical finance (RiskLab) and information security (GANITA).

Perhaps partly as a result of all of these developments, the Department of Mathematics is in a growth phase. This year, we welcomed five new faculty members. Jacobo de Simoi (PDE

and Dynamical Systems) and Arul Shankar (Number Theory) were appointed as Assistant Professors in the Department of Mathematical and Computational Sciences, UT Mississauga. Giulian Tiozzo (Dynamical Systems) and Stefanos Aretakis (Mathematical Physics) were appointed as Assistant Professors in the Department of Computational and Mathematical Sciences at UT Scarborough. In addition, Ben Rossman (who was jointly appointed as Assistant Professor in the Department of Computer Science and the Department of Mathematics a year ago) actually arrived this year to take up his position.

This year, we are actively searching seven positions. One of these is in the teaching stream and the remaining six are in the research stream. While our first and foremost criterion is to hire those who will raise even higher the bar of academic excellence in the Department, we are also concerned about addressing diversity and gender issues. We have to be pro-active in soliciting applications from under-represented groups.

At the St. George campus, we have two junior Applied Math positions and one junior position in Pure Math. If we find a stellar candidate we can combine the two Applied Math positions into a single senior position. There is also a position in Pure Math based at UTM. Since we are a single tri-campus Graduate Department of Mathematics, research-stream searches at all three campuses are conducted by a single committee, while each campus is responsible for its own teaching-stream searches.

In addition to these four, we have a senior position in Mathematical Physics which is joint with the Perimeter Institute of Theoretical Physics. We have already one joint hire with Perimeter, namely Alexander Braverman who joined us from Brown University, and we are hoping to make another appointment which is equally strong if not stronger.

Finally, we have a junior position in Privacy and Security which is joint with the Department of Computer Science. This opens up a new area of collaboration with DCS.

This is an excellent opportunity for the Department to recruit some really outstanding mathematicians and we will need everyone’s help in making sure we identify the best candidates. There are four committees which collectively have the responsibility of reviewing all the applications and finding the most promising candidates. You can help these committees be effective by soliciting excellent applicants, and by providing confidential feedback to the committees on particular candidates.

Math is on the move! Be a part of it!

In The News

Arts & Science Profile



Photo Credit: Diana Lyszko (photo from Arts & Science News)

The Faculty of Arts and Science profiled Professor Jacob Tsimerman, who is currently the Math Department's youngest faculty member. Professor Tsimerman was awarded this year with the prestigious SASTRA Ramanujan Prize. His most recent breakthrough proves the Andre-Oort conjecture, which he compares to “a line of wooden Russian nesting dolls with potentially infinite numbers of dolls within.” The article discusses Professor Tsimerman's research, his love of comic books, Judo, playing guitar, and wishing he “had Spider-Man's powers”.

The full article can be found here: <http://news.artsci.utoronto.ca/all-news/jacob-tsimerman/>

Planet ArtSci Podcast



Photo Credit: ArtSci News

Our Chair, Professor Kumar Murty, sat down with Planet ArtSci to discuss Mozart, mathematics, Kung Fu Panda

and the world of cyber security

Listen here: <https://soundcloud.com/planetartsci/episode-13-mozart-mathematics-kung-fu-panda-and-the-world-of-cyber-security>

Beyond 2016

The Faculty of Arts and Science discussed with the Chairs of Mathematics, Computer Science and Statistics the future of their fields and what lies in store for us in 2016 and beyond. They all saw one major trend in common: Big Data. Chair, Professor V. Kumar Murty spoke about the future of the department and its focus on “blurring of the line between pure and applied mathematics” and “solving centuries-old problems.” He also spoke on a new course on training in computation techniques at the undergraduate and graduate levels and our first graduate course in computational techniques, instructed by Professor Dror Bar-Natan.

The full article can be found here: <http://news.artsci.utoronto.ca/all-news/forecasting-2016-and-beyond-in-computer-science-mathematics-and-statistical-sciences/>

Overcoming Our National Math Phobia

This powerful article, written by the Dean of the Faculty of Mathematics at the University of Waterloo, features important concepts to us here in the Department about the growing fear of mathematics and the impact of this fear in our society.

The full article can be found here: <https://t.co/0fONvOjBAu>

Another recent article describes a mathematics professor being escorted off a plane because the passenger beside him didn't understand that he was writing out differential equations and not some foreign (and dangerous) language.

The full article can be found here: <https://www.washingtonpost.com/news/rampage/wp/2016/05/07/ivy-league-economist-interrogated-for-doing-math-on-american-airlines-flight/>

Girls in Mathematics

The article, co-written by one of our colleagues in the Department of Computer and Mathematical Science at the University of Toronto Scarborough campus, Associate Professor Sophie Chrysostomou, addresses concerns about promoting mathematics to the young women. Aimed at promoting the abilities of girls in mathematics and how to help support and foster this subject, the article touches on issues faced by the young ladies of our society today.

The full article can be found here: <https://www.thestar.com/opinion/commentary/2016/05/12/we-must-multiply-efforts-to-support-girls-pursuit-of-math.html>

Interview with Magical Mathematician Manjul Bhargava

See the UofT News interview with honorary degree recipient Manjul Bhargava: <https://www.utoronto.ca/news/uoftgrad16-magical-mathematician-manjul-bhargava>

Announcements

Birth Announcements

Robert and Carolyn McCann are pleased to announce the arrival of their third son Aiden Justin Luke McCann.

Born 16 June 2016.

Jacopo and Lorenza De Simoi and their first daughter Emilia are pleased to announce the arrival of Antonia.

Born 19 September 2016.

In Memoriam

Yuri Cher was working in the area of nonlinear PDEs under the supervision of Professor Catherine Sulem. He graduated from the Math Specialist program in 2009 and joined our graduate program in 2011. Yuri was a wonderful course instructor and TA. He was awarded the Daniel B. DeLury award in 2015. He will be sorely missed and fondly remembered.

Promotions

The following members of the Department have been promoted to Full Professor:

- **Spyros Alexakis**
- **Marco Gualtieri**
- **Joel Kamnitzer**

Florian Herzig has been tenured and promoted to Associate Professor.

New PostDoctoral Fellows 2016-17

Name	Faculty Supervisor	Field of Research
An, Xinliang	Alexakis	General Relativity, PDE
Bermanis, Amit	Wu	Big Data Analysis
Crooks, Peter	Jeffrey	Lie theory, equivariant geometry
Eskandari, Payman	Murty	Number Theory and Algebraic Geometry
Fenyés, Aaron	Gualtieri	Cluster algebras and integrable systems
Jacelon, Bhishan	Elliott	Operator Algebras
Jagannath, Aukosh	Panchenko	Probability and stochastic processes
Keast, Ryan	Tsimerman/Fields-Ontario PDF	Hodge Theory
Lipnowski, Michael	Tsimerman	Number theory
Maor, Cy	Jerrard	Mechanics of deformable solids
Matetski, Kanstantsin	Quastel	Probability and stochastic processes
Sarquis Aiex, Nicolau	Nabutovsky	Differential Geometry, geometric analysis
Randecker, Anja	Rafi	Geometry and topology
Sasaki, Shinji	Gualtieri	ODEs
Schober, Bernd	Bierstone/Fields-Ontario PDF	Algebraic geometry - resolution of singularities
Shapiro, Alexander	Kamnitzer/A&S PDF	Nonassociative rings and algebras
Adame, Joseph (UTM)	Yampolsky	General Relativity, PDE
Carlson, Jeffrey (UTM)	Karshon	Big Data Analysis
Dudko, Artem (UTM)	Yampolsky	Lie theory, equivariant geometry
Gamse, Adina, (UTM)	Karshon	Cluster algebras and integrable systems

NAME THAT GROUP CONTEST!

THIS EDITION OF THE NEWSLETTER CONTAINS A CONTEST, COMPLETE WITH PRIZES!

WE ARE LOOKING FOR ENTRIES FOR A COLLECTIVE NOUN THAT DESCRIBES A GROUP OF MATHEMATICIANS. SOMETHING SIMILAR TO A GAGGLE OF GEESE OR A MURDER OF CROWS BUT APPLICABLE TO THOSE WHO STUDY MATHEMATICS!

IF YOU HAVE ANY IDEAS YOU CAN ENTER THEM BY EMAILING YOUR SUGGESTIONS TO PAMB@MATH.TORONTO.EDU BY FEBRUARY 15, 2017

In Memoriam: Harriet Botta

Written By Debby Repka



Harriet Botta, Professor of Mathematics at York University, died on June 23, 2016. She was the wife of the late Peter Botta, Undergraduate Coordinator in the Mathematics Department for many years. Harriet's high intelligence and gift for mathematics made her unique. There were very few women of her generation who had the courage to pursue this subject; in fact, women were directed away from the sciences. Harriet faced great adversity as she entered the job market. She was told by the then Chair of the Department at the University of Toronto that she shouldn't apply for a position here because she would be taking a job away from a male who had to support a family.

Despite her disappointment, she persevered and eventually was hired by York University. No department chair today would dare turn away a talented woman scientist, and this is thanks in part to the determination of Harriet and a few other female pioneers to remain academic mathematicians.

Harriet had a special relationship with her husband Peter. Finding a soulmate was not an easy task given the prejudice of most men of her generation against smart women. Peter was progressive beyond his time and wished to share his life with someone who could appreciate his scientific interests. Together they had a rich intellectual life, engaging in lively discussions on a wide range of topics. They were generous in these explorations, opening their home to all those who wanted to join in. Both Peter and Harriet were avid readers, so they had a broad perspective on many issues, challenging friends to think beyond their preconceptions. Often these conversations took place around the dining room table, while Peter served rarefied treats like blini and caviar and, on other occasions, heartier fare like the sausages and flapjacks of the lumberjack breakfasts of his youth.

Harriet deeply appreciated Peter's achievement of moulding the members of the administrative staff in the Department into a family. With his encouragement, they established harmonious relationships that extended beyond the office, and their long-lasting friendships will endure into the future. Because of the spirit of cooperation and the dedication that Peter fostered, he was able to bring about important innovations in the undergraduate mathematics program. To honour his legacy, Harriet established a fund that, each year, treats the administrative staff to lunch in an elegant restaurant. Her thoughtful gift makes a continuing vital contribution to the Department. She will also be remembered by her many friends among the faculty.

What her friends and colleagues will recall most about Harriet is that she was a true lady. She was raised in an era in which good manners were inculcated in young people, and she never abandoned her high standards. While the society around her became more and more crass, she retained an air of refinement and sophistication. Even towards the end of her life, when her physical suffering was great, she never lost her dignity. To quote Plutarch: "The generous mind adds dignity to every act, and nothing misbecomes it."

Honours + Awards

**Tracey Balehowsky
Beatriz Navarro Lamed
Nikita Nikolaev
and Asif Zaman**

Recipients of the Daniel B. DeLury Teaching Assistant Awards which are given each year to graduate students in mathematics for outstanding work as teaching assistants

Peter Crooks

Winner of the 2016 CI Teaching Excellence Award. This is the second year for this university wide award.

The award “recognizes one graduate student whose outstanding work as a sole-responsibility Course Instructor shows evidence of educational leadership, meaningful contributions to course and curriculum development, and impact on student learning.”

Peter is co-supervised by Lisa Jeffrey and John Scherk and is working in the area of Lie Theory and Equivariant Geometry.

Beatriz Navarro Lamed, Payman Eskandari and Tyler Holden

Recipients of the Inaugural Ida Bulat Teaching Award for Graduate Students

Ida was a long time staff member of the department who served as the Graduate Administrator. She passed away in May 2015 and the award was established to honour her memory.

Shuangjian Zhang

Recipient of this year’s Margaret Isobel Elliott Graduate Scholarship

Huan Vo

Winner of this year’s Vivekananda Graduate Scholarship for international students

Zhifei Zhu

Winner of this year’s Canadian Mathematical Society Graduate Scholarship

Anne Dranovski

Winner of this year’s Coxeter Graduate Scholarship

Chia-Cheng Liu

Winner of this year’s International Graduate Student Scholarship

André Belotto da Silva and Anton Izosimov

Winners of this year’s F. V. Atkinson Teaching Award for Postdoctoral Fellows

Awards 2016

**Inaugural Ida Bulat Teaching Award
for graduate students**



Left to right: Tyler Holden, Beatriz Navarro Lameda,
Payman Eskandari

**V. Frederick Atkinson Teaching Award
for Postdoctoral Fellows**



André Belotto da Silva (left), Anton Izosimov (right)

**University-wide Course Instructor
Teaching Excellence Award**



Peter Crooks



Prof. Kumar Murty addressing guests

**Margaret Isobel Elliott
Graduate Scholarship**



Shuangjian Zhang

**Vivekananda Graduate Scholarship for
International Students**



Huan Vo

**Daniel B. DeLury Teaching
Assistant Award**



Left to right: Asif Zaman, Nikita Nikolaev,
Beatriz Navarro Lameda,
Tracey Balehowsky

Other awardees absent from the event include:

- ◇ Anne Dranovski, Coxeter Graduate Scholarship
- ◇ Chia-Cheng Liu, International Graduate Student Scholarship
- ◇ Zhifei Zhu, CMS Graduate Scholarship

CLASS OF 2016

Master's Degree Graduates



Jesse
Bettencourt



Lennart
Doppenschmitt



Deshin
Finlay



Ian
Greig



Zahra
Hodjat



Hashiam
Kadhim



Jonathan
Love



Christopher
Mahadeo



Aaron
McCreight



Neil
Reed



Andrew
Ross



Simon-Pierre
Roy



Mona
Sayehban



Daniel
Sigal



Oleksandr
Sokolov



Adam
Venis



Rachel
Youngson



Richard
Zhang

PhD Graduates



Trefor Bazett



Peter Crooks



Payman Eskandari



Jackson Feng



Greg Fournodavlos



Parker Glynn-Adey



Iva Halacheva



Tyler Holden



Marcin Kotowski



Michal Kotowski



Boris Lishak



Ivan Livinskyi



Ali Mousavidehshikh



Andrew Stewart



Louis-Philippe Thibault



Kyle Thompson



Jennifer Vaughan



Jeremy Voltz



Alex Weekes



Tyler Wilson

Spotlight

The Centre for Applied Mathematics

Earlier this year, the Department embarked on a mission to bring mathematicians and industry leaders together in the form of the Centre for Applied Mathematics.

The Centre will harness the boundless power and potential of mathematics to meet global challenges by creating an incubator here in the University of Toronto.

Individuals with strong computational, analytical and theoretical tools will come together with industry leaders to help train the next generation of mathematical minds. It will be housed in a dedicated space designed to foster exchange and collaboration and will bring together a critical mass of pioneering principal investigators working in cutting-edge research clusters. They will lead cross-generational teams of postdoctoral fellows, visiting professors and graduate students working with industry and international partners.

These clusters will focus on the following areas:

- Digital Security
- Risk Research
- Big Data
- Imaging Research
- Fluids Research
- Optimal Transport Research



Members of our faculty involved with this project include Professors:

- Kumar Murty
- Luis Seco
- Hau-tieng Wu
- Adrian Nachman
- Almut Burchard
- Catherine Sulem
- Robert Jerrard
- Robert McCann
- Michael Sigal

The Centre will focus on the development of theoretical and practical techniques for modeling, analysis and computation, leading to industrial and societal innovation and the creation of new business enterprises. It will be designed to address sectors ranging from environment and health, to information and communication technologies, to advanced manufacturing. The laboratories will be hubs of innovation, exchange and collaboration as our scientists work to ideate and design solutions to some of the most pressing issues facing societies today.

The Centre has the potential to accelerate advances in research across many sectors, and to train professionals who—in a world in which literacy and ingenuity in math are increasingly in demand—are essential to drive the economic agenda forward.

The Centre is also part of our “It’s All About Math” theme and hopes to bring mathematics research to the world around us.

Departmental Outreach

Each year the Department of Mathematics offers a number of programs aimed at promoting the world of mathematics to youth and communities around us.

This year our March Break and Summer camps saw over 300 students in grades 2 - 8 participate in a week of hands-on, interactive math programming.

In addition, we closed off yet another year of highly successful school visits in which nearly 1000 students from around the GTA came to the University of Toronto campus to participate in workshops lead by our undergraduate and graduate students as well as postdoctoral fellows and faculty members.



The experience was well received by all participants and presenters and we are looking for ways to expand this program in the new academic year.

Part of this expansion includes the launch in September of the “It’s All About Math” Student Club, which was organized by one of our undergraduate students. Through the club our undergraduate (and graduate) students will gain skills and experiences in teaching mathematics to those in under-represented areas and also to promote mathematics to those students who see mathematics simply as something they ‘have to get

through’ and have not yet seen the beauty of the subject.

Finally, this past May, we hosted the second annual Girls in STEM conference, which saw nearly 125 girls from grades 6 - 8 register for a day-long conference highlighting the possibilities available to females in the Science, Technology, Engineering and Math (STEM) fields.

Based on the success of this program we have officially launched the Girls in STEM Monthly Club: a group that meets on the first of every month from October to May, culminating in the conference in May. The purpose of the club is to encourage girls to explore the world of STEM and see what it has to offer.

If you would like further information on these initiatives, or our many other programs, please visit our website at:



<http://mathplus.math.toronto.edu>

It's All About Math!

Our newest series of workshops, lectures and events taking place in and around the Department is called "It's All About Math".

It's a theme in which we are seeking to bring together everything we do, including the Centre For Applied Mathematics and our Outreach and Engagement programs.

So far we have had the following public lectures:

- DR. JOHN CONWAY (Princeton University) on Surreal Numbers
- DR. STEPHEN WOLFRAM (Wolfram Alpha) on The Future of Computation and Knowledge
- DR. ALLEN KNUTSON (Cornell University) on The Mathematics of Juggling



Dr. Wolfram



Dr. Conway (Photo Credit: Princeton University, Office of Communications/Denise Applewhite)

We hope to continue to offer these public lectures into the new academic year.

Keep an eye out on our website for videos of the above talks along with a brand new design that we hope will showcase everything we are working on in the department and highlighting our theme: "It's All About Math!"

If you would like to contribute to the series please contact pamb@math.toronto.edu



Dr. Knutson

Panel Discussion

On June 10th the department hosted a panel discussion bringing together leaders in academia, government and industry to discuss the importance of mathematics in today's society.

The panel was hosted by Professor Kumar Murty, FRSC (Chair, Department of Mathematics, University of Toronto) with a welcome by Professor David Cameron, FRSC (Dean Of The Faculty Of Arts & Science) and included

- Professor Manjul Bhargava (R. Brandon Fradd Professor of Mathematics at Princeton University, 2014; Fields Medal winner and 2016 U of T honorary doctorate recipient)
- Professor Luis Seco (Director of U of T's RiskLab and Co-Founder, President and CEO of Sigma Analysis & Management)
- Irene Sterian (Director Technology & Innovation Development, Celestica and Executive Director of the Refined Manufacturing Acceleration Process, (ReMAP) network)
- Dr. Neil Turok (Director and the Mike and Ophelia Lazaridis Niels Bohr Chair in Theoretical Physics at the Perimeter Institute, Waterloo)



L-R: D. Cameron, N. Turok, M. Bhargava, L. Seco, I. Sterian and K. Murty (Photo Credit: Jaclyn Shapiro)

The panel touched on such topics as mathematics education, how math shapes various aspects of our lives and what mathematics meant to each of the panelists.

The event raised awareness of the importance of mathematics, celebrated Manjul Bhargava' honorary degree and promoted the Centre for Applied Mathematics.

Tune in! Videos of all the talks and more can be found on our YouTube page: <https://www.youtube.com/user/itsallaboutmath>

Undergraduate Mentorship Program

Each year the Department hosts an Undergraduate Mentorship Program. This year we asked one of our mentor-mentee pairs to share their thoughts on the program.

Gil Katz was our Undergraduate Program Mentor. He is the owner/operator Giant Step Inc. (<http://giantstep.ca>), creator of the ComicReply platform (<http://comicreply.com>).

Olivia Simmons was our program mentee. She now works at Polylabs (<http://polylabs.ca>) and works on a virtual conferencing platform called ConferenceCloud (<https://www.conferencecloud.co>).

We asked each of them to tell us a bit about their experiences with the program:

Tell me a bit about the Mentorship program and how you were involved?

Olivia: I was looking at the mentorship program to access department alumni to help get advice and support, as I had started my own company and was a young and learning entrepreneur. Donna recognized this and matched me up with Gil. Since then we have launched our company been funded by MaRS and University of Toronto, and are now working out of IBM's new Innovation Centre. I was a fourth year specialist in mathematical applications in economics and finance at the time.

Gil: In my last year at UofT I participated in a Career Centre job-shadow program with a film industry executive and learned about the various aspects of content production. Later on I participated as a mentee at two other mentorship programs:

- The AMA-TO Mentor Exchange (<http://www.mentorexchange.ca>) - connected with the president of a public company in order to learn how agencies pitch their services so I can improve the way I present my agency.
- Work in Culture mentoring program (<http://www.workinculture.ca>) - connected with an entrepreneur who built a public company from scratch and learned more about building traction and funding options.

So when I got the email about the Math Department Mentorship program I had a good idea of how it works and how I could help.

What was your role in the program?

Olivia: I was the mentee of Gil for the 2014/2015 mentorship year.

Gil: The program gave me the opportunity to create some diagrams I always wanted to make but didn't get around to. While building my business I slowly learned about everything from sales to tech and taxes, but never saw detailed diagrams that covers everything. So the first thing I did was create those diagrams. That way most situations would fit somewhere in the diagram.

Why did you decide to get involved?

Olivia: I have always been outgoing with the company and being an undergrad I was always looking for a way to develop and support the network of alumni, admin and staff in order to encourage the business and the 4 other U of T students that were working at the company.

Gil: I've been in business for about 10 years, worked with dozens of clients and realized I could probably answer many questions about how things work.

Why do you feel the Mentorship program is important?

Olivia: Especially as an entrepreneur mentorship is extremely important. Bringing new products and developing new markets is not easy and being able to discuss and have access to those that understand the challenges is very valuable to a new entrepreneur.

Gil: There are so many opportunities, challenges and tricks that go beyond the curriculum. The Mentorship program helps fill the gap between academia and work, providing some insights into what to expect in the 'real world'.

Any other amusing anecdotes or stories you would like to share?

Olivia: The best thing about our mentor/mentee relationship is the experience and applicable advice. It turned out that Gil was running his digital agency along with his brother Eyal, and at the same time it was revealed that I was running my software development company along with my brother as well. It was a match made in heaven. It was soo cool that we moved in only a block away from the Katz brothers, near U of T a few months later :)

Gil: It was neat that Olivia and her brother started a similar web agency like I did with my brother. We were also both in the process of launching a software product so we had a lot in common. They ended up moving downtown and now we're neighbors on Spadina Avenue. :)

Events

What can you do with a PhD in math anyway?

A career panel for graduate students in mathematics



Eric Hart, PhD 2014
Data Scientist
Angoss Software



Xiao Liu, PhD 2013
Global Analytics and
Financial Engineering
Scotiabank



Joseph Geraci, PhD 2008
Chief Science Officer
NetraMark



Mario Morfin, PhD 2010
Co-founder
MOAI-Solutions Inc.



Chiara Moraglia, MSc 2013
Actuarial Analyst
Mercer



Patrick Walls, PhD 2013
Mathematics Instructor
University of British Columbia

Written by: Tracey Balehowsky and Jerrod Smith

“What can you do with a PhD in math anyway?”

This was the title of a career panel discussion for mathematics graduate students, hosted by the Mathematics Graduate Students Association (MGSA). The one-hour panel discussion was held on Thursday, May 12, 2016. The master of ceremonies was Jerrod Smith (PhD Candidate, MGSA Graduate Seminar Committee). With the generous financial support of the Mathematics Department, the MGSA additionally held a networking reception after the panel discussion where students could continue the conversation with the panelists and department members.



The career panel consisted of the following University of Toronto mathematics alumni:

- **Joseph Geraci** (PhD 2008), who is a founder and Machine Learning Lead at Netramark. Joseph uses machine learning to understand how diseases can manifest in patient populations.
- **Eric Hart** (PhD 2014). Eric is a Data scientist at Angoss Software. He also runs the online Blockus gaming website pentolla.com.
- **Xiao Liu** (PhD 2013), who is an Associate in Global Financial Analytics at Scotiabank. Xiao supports the Equity Derivative trading desk at Scotiabank, and develops pricing models for exotic derivatives.
- **Chiara Moraglia** (MSc 2013). Chiara is now an Actuarial Analyst at Mercer, and is studying to obtain the Fellow of the Society of Actuaries (FSA) professional designation.

- **Mario Morfin** (PhD 2010), who is a Co-founder MOAI-Solutions Inc. Mario's company aims to solve large-scale decision making problems generated by the Internet of Things (IoT).
- **Patrick Walls** (PhD 2013). Patrick is an Instructor at UBC. He teaches differential equations courses for engineers using MATLAB, a course in scientific computing with Python, as well as calculus for students in commerce and social sciences.

These former mathematics alumni shared their experience and insights on the topics of:

- Career preparation for advanced mathematics degree holders.
- How much graduate-level mathematics is used in the panelist's day-to-day work.
- The value of an advanced mathematics degree in industry.
- Advice for mathematics graduate students, with emphasis on how to find a career outside of academia.



In terms of career preparation, the panelists overwhelmingly emphasized to our attendees the importance of cultivating excellent verbal and written communication skills. The panelists also recommended that some experience with computer programming was useful, especially for mathematics graduates looking for non-academic work. The platforms Codecademy, Coursera as well as programming meet-ups were all highly recommended as ways to begin learning basic programming languages and applications.

The amount of graduate level mathematics that the panelist used in their daily work varied greatly by occupation. However, the panelists still felt that their graduate mathematics degree was extremely useful in their current occupations. They noted that the mathematical training they received during their degree gave them superior problem solving skills, rates of learning new topics, and mental flexibility, which complemented the skills of their non-mathematics-degree-holding colleagues. The panelists were unanimous in stressing that the advanced problem-solving experience of a graduate level mathematics degree was not only in demand in industry jobs, but could be easily applied to a variety of work. They advised the event attendees to sell this marketable value and utility of a mathematics graduate degree to future employers.

To help students find a career, Eric

indicated the value of an effective LinkedIn profile — in fact, he was recruited for his current position based on his LinkedIn profile alone! Chiara noted that for students that want to work in industry (especially in finance, insurance, and consulting), applying for an internship would be a valuable way to gain experience. She also said it would help demonstrate to future employers that the student is capable of working in a non-academic environment. For students interested in finance, Xiao recommended that students hold a PhD in mathematics as opposed to a Masters degree, since employers usually favour PhD applicants. To demonstrate to future employers knowledge of some programming, the panelists recommended choosing a mathematical project or two to use as a learning-ground for programming. Patrick advised that students should use a GitHub account to showcase your portfolio of programming work to potential employers. The panelists suggested that programming in Python was a good choice of language to start with. Finally, Joseph and Mario emphasized the importance of project management skills and recommended the project management workshops offered by MITACS.

By all metrics the career event was an incredible success. Thirty three (33) members of the department attended the event, including three faculty members and several post doctoral fellows. The MGSA asked the event participants to complete a follow-up survey, and the MGSA received a lot of very positive feedback from this survey and in person. The participants remarked that they found the topics of discussion to be helpful and gave them insight into possible career paths. Both the participants and the panelists remarked that the following networking reception was helpful in meeting new contacts and

was overall an enjoyable experience. Participants also cited that they were more optimistic regarding the diversity of career opportunities for mathematics graduates after coming to the career panel event. The mathematics students also expressed that obtaining knowledge of resources to learn computer programming, as well as hearing each of the panelist's personal journey to their current career was quite valuable to them. The only negative responses were that the event could have been longer and that such career-centred events should take place more often! Every participant that replied said that they would attend a similar event in the future and gave many great suggestions for improving forthcoming career-events!

The organizers and the MGSA would like to acknowledge and thank the Department of Mathematics for their financial support of the career event. They would also like to extend a sincere thank you to all of the panelists and to Jemima Merisca for all of her support and work for the event. Finally, thank you to Mariya Boyko, who took photos of the event.

— On behalf of the organizers (Tracey Balehowsky, Ana De Luca Iorgulescu, Jerrod Smith, Yvon Verberne) and the MGSA



Photos Courtesy of Mariya Boyko

Spring Reunion

In May the Department participated in the University's annual Spring Reunion events and this year's topic followed our growing theme of "It's All About Math".

Participants in the event were treated to a series of short, 10 minute, lectures by 5 of our faculty members who spoke on what areas of math they research and why mathematics is important to them. Talks were followed by a reception in our Graduate Lounge.

In addition, the Department also participated in the first ever "Kids Passport" event, which saw University departments welcome parents and their children to a series of booths to experience hands on activities from around the University.

The Department was honoured to be a part of this well received and fun event!

CUMC

This July, eight undergraduate students represented the University of Toronto's math department at the Canadian Undergraduate Mathematics Conference at the University of Victoria.

Our delegation gave some of the best talks at the conference on topics ranging from sphere packing, infinite graphs, to new results from their summer research.

There will be a showcase of the talks in October for anyone who is interested in attending, so stay tuned!

The delegation and the Undergraduate Mathematics Union would like to thank the department for its generous contribution to help fund the trip. It was an extremely rewarding and helpful experience.

Until next year!



U of T's delegation at the CUMC: (from left to right) Adam Artymowicz, Zachary Karry, David Pechersky, Matthew Sunohara, Roy Magen, Adriano Pacifico, Angela Wu and Yuan Yao.

Undergraduate Math Competition

The Undergraduate Mathematics Contest was started, Spring 2001, by Professor Edward Barbeau. Since 2007, the contest has been given in memory of Robert Barrington Leigh, an undergraduate student of mathematics who died the previous year.

The contest provides an opportunity for undergraduate students to compete, practice their competitions skills and to help identify Putnam candidates. It is open to all undergraduate mathematics students.

Those interested can find copies of previous papers and their solutions at: www.math.utoronto.ca/barbeau/home.html

This year's winners are:

- 1st place: Michael Chow
- 2nd place: Itai Bar-Natan
- 3rd place: Shijie Xiu
- 4th place (tied): Matthew MacKay
- 4th place (tied) Dmitry Paramonov
- 5th place: Shuyang Shen

There were 38 candidates.

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CANADA

CALL FOR ARTICLES

This edition of the Departmental newsletter covers events, honours and awards from the past academic year. Our next issue will focus on faculty research and careers in mathematics.

If you are interested in providing information on your research in mathematics or if you are an alumni currently using mathematics in your career, we want to hear from you.

Please contact Pamela Brittain (pamb@math.toronto.edu) with your suggestions for a story/profile.

Newsletter Editor: Pamela Brittain

Staff Directory

NAME	POSITION	EMAIL (@math.utoronto.ca)	TELEPHONE
Allison Andres	Executive Assistant to the Chair <i>Provides executive secretarial and administrative support to the Chair and assisting the Chair with the department's academic administrative activities – academic searches and hiring, tenure, promotion, PTR.</i>	aandres	416-978-3317
Ashley Armogan	Undergraduate Assistant <i>Provides day-to-day administrative and secretarial support and assistance to the Undergraduate office in the delivery and management of a wide range of undergraduate activities.</i>	aarmogan	416-978-3822
Donna Birch	Undergraduate Administrator <i>Responsible for the administrative activities of the undergraduate program to include counseling undergraduate students; advising students on program requirements, course selection and registration procedure.</i>	dbirch	416-987-5082
Pamela Brittain	Outreach and Special Projects Officer <i>Responsible for creating and implementing a full range of outreach programs to serve the department's outreach goals.</i>	pamb	416-978-4948
Marco De la Cruz-Heredia	Computer Systems Administrator <i>Provides technical guidance and resource, and tutorial service for faculty, staff and students; assists with the development and maintaining of the department's computer systems and network.</i>	marco	416-978-7893
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Emile LeBlanc	Computer Systems Manager <i>Responsible for all aspects of the planning, design, implementation, provision and support of all computer and network related technologies in the Department.</i>	leblanc	416-978-3950
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Jemima Merisca	Graduate Administrator <i>Responsible for a broad range of administrative duties for the Graduate Office and includes responsibility for overseeing the graduate student admissions process, providing academic and administrative staff with information regarding graduate related matters.</i>	jmerisca	416-978-7894
Cynthia Reid	Department Manager <i>Responsible for overall administrative, financial and operational management of the Department.</i>	creid	416-978-5194
Patrina Seepersaud	Department Office and Programs Assistant <i>Provides administrative and secretarial services for the Department. Assisting in organizing the logistics of conferences, colloquia, seminars. Provides assistance to the Graduate office.</i>	pseeper	416-978-3317, 416-978-1149

Our Alumni



Daniel Sigal (M.Sc, 2016);

Heading to University of Western Ontario Medical School

Math is becoming, more and more, a stepping stone into medicine and other similar careers. My mathematics education helped me achieve my dream in many ways, but I'll outline just two here. The first, was that the courses I took from the math department taught me a way of approaching problems that has become invaluable. Specifically, the logical way of thinking and step-by-step breakdown used to solve problems in classes like MAT137, MAT237, and MAT357 helped me approach the verbal reasoning section of the MCAT, and get the score I needed to be admitted to medical school. The second is that

it opened up opportunities that would not have been there otherwise. I was able to do research at SickKids Hospital because there was a professor looking for someone with knowledge of ordinary differential equations. If I hadn't taken MAT244 or APM346 I wouldn't have gotten that position. Math is now central to much of the research done in biology, physiology, neuroscience, and many more seemingly distinct areas. As such, researchers in these areas are now looking for students with a strong mathematics background. I didn't choose a degree in math for these reasons, I chose it because I found it interesting, but it has helped me in more ways than I ever could have imagined.

Maritza M. Branker (Ph.D, 2004)

Actuarial Sciences Program Director and Chair of the Mathematics Department at Niagara University.

Maritza M. Branker graduated in 2004, after completing her Ph.D. under the supervision of Thomas Bloom in the area of pluripotential theory. She stayed in Toronto as a postdoctoral fellow for one year and then spent a year as a postdoctoral fellow at Syracuse University, working with Evgeny Poletsky. Instead of continuing with postdoctoral fellowships to enable her to seek a tenure track position at a research institution, she accepted a tenure track position in the Department of Mathematics at Niagara University. At that point, the mathematics department was in a period of transition moving from being a service department to a full fledged mathematics department. More than half of the faculty were close to retirement with terminal degrees at the Master's level. Maritza spent the next three years revising the curriculum and updating key core courses. The small group of math majors in the Department welcomed her arrival, requesting independent studies to fill the gaps in the course offerings. Of that first cohort, one went on to doctoral studies at University of Rochester and is currently a visiting assistant professor at Amherst College. Another is completing his Ph.D in mathematics education at the University of South Carolina. Maritza was promoted to the rank of associate professor in 2012, having expanded her research agenda to include interdisciplinary collaborations in mathematics education and the history of mathematics.



Giving Back to the Department

The Department of Mathematics at the University of Toronto is a world-leader in mathematics research and is home to over 5500 undergraduate students. Your help will support the continuation of this tradition of excellence in mathematical education and research.

<https://donate.utoronto.ca/give/show/56>



Mathematics

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