UofT Math
THE NEWSLETTER OF THE U of T MATHEMATICS DEPARTMENT
2015: YEAR IN REVIEW

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From the Chair

This Departmental Newsletter is filled with warm welcomes, hearty congratulations and fond farewells and remembrances. This past year has seen us welcome six new faculty members from a wide variety of backgrounds and the awarding of five prestigious awards including two Sloans, a Royal Society membership and a Wolf Prize. It has also seen a dramatic increase in our undergraduate enrolment numbers, which now makes MAT the second largest program of study in the Faculty of Arts and Science. We are also in the process of moving to a new building where our lecturers and graduate students can finally have space to spread out and collaborate, and where we can launch our Centre for Applied Mathematics.

On a more somber note the department lost three valued members this year: Professors Arthur Sherk, Andres del Junco and Graduate Administrator Ida Bulat. Their losses were felt deeply by members of the department.

In memory of Ida and her contributions over the years to the Department, a memorial fellowship was set up in her name, to help the Department to continue to support graduate students, whom she held so dear.

This year also saw the inaugural awarding of the CMS Doctoral Fellowship prize. This is one of four new graduate fellowships that have been made possible by generous donations from faculty, non-profit organizations and industry. Our outreach efforts also continue to grow and this year reached over 2000 pre-university students through its various programs.

We continue to do well in international rankings. The QS World University rankings for 2015-2016 have us at 16th in the world and 11th in North America.

Finally, for some time now, we have been discussing the importance of increasing the role of Applied Mathematics in our Department. This direction is motivated both by research opportunities as well as the need to help our students equip themselves for the broader manifestations of mathematics in society. The Centre for Applied Mathematics is meant to focus those ideas into a concrete form.

Initially, the Centre will be based around six research clusters. The clusters are:

- The mathematical analysis of risk
- Applications of mathematics to Information Technology
- Mathematics of imaging
- The mathematics of fluids
- Optimal Transport
- The mathematics of big data

The first two already have a lab associated with them, namely RiskLab and GANITA. The Centre should enable us to establish labs for the other themes as well. These themes were chosen as the foundation for the Centre because we already have strength in these areas. The Centre will help us to build that strength and expand it to other domains.

Initially, the Centre will partly be located in the Physical Geography Building which we have started to occupy. However, we feel that it will soon outgrow that space.

Working with University Advancement, we are preparing to launch a major campaign to raise funds for positions and more space, as well as funding for postdoctoral fellows and graduate students. It seems to be the right time for this project as there is a heightened awareness of the fundamental role that mathematics is playing in many aspects of society.

The Centre for Applied Mathematics represents an important opportunity for our Department, both in terms of teaching and research. I will be giving you regular updates as this project moves forward, and your feedback and suggestions will be crucial.

We are on an upward trajectory and great things lie ahead!

University of Toronto Department of Mathematics
Our congratulations go to Professor James (Jim) Arthur, University Professor and Ted Mossman Chair, for being awarded the 2015 Wolf Prize in Mathematics.

Jim received the prize for “his monumental work on the trace formula and his fundamental contributions to the theory of automorphic representations of reductive groups.”

This is only the second time a Canadian has won this highly prestigious award for research in Mathematics. The first time was to Robert Langlands, of the Institute for Advanced Study, Princeton. In fact, Langlands was Jim’s advisor and Jim’s work constitutes major progress on the ‘Langlands program’. However, Jim is the first Canadian to win the Wolf Prize in math for work done in Canada.

According to their website (http://www.wolffund.org.il/) the Wolf Prize was founded in 1978. Each year the Wolf Foundation awards five or six prizes in the fields of Agriculture, Chemistry, Mathematics, Medicine and Physics. There are also prizes in the Arts which rotate annually between: Architecture, Music, Painting and Sculpture.

To date a total of 253 scientists and artists from 23 countries have been honoured with an award.

From the Wolf Foundation website (http://www.wolffund.org.il/): “Arthur’s development of the trace formula for reductive groups is a monumental mathematical achievement. It generalizes the Selberg trace formula for SL(2) from 1956. In his work, Arthur introduced many major tools in non-commutative harmonic analysis on general reductive groups. Building on the work of Langlands, Shelstad, Kottwitz, Waldspurger and others, Arthur obtained the trace formula in stable form. Using the Fundamental Lemma proved by Ngo, Arthur’s work culminated in his description, as envisioned by Langlands, of the structure of automorphic representations of classical groups (symplectic groups and quasi-split special orthogonal groups). Some of the highlights are the functoriality associated to the standard representation, the multiplicity formulas in the discrete spectrum, the classification of the expected counter-examples to the generalized Ramanujan conjecture, and the description of local L-packets and global A-packets. Arthur’s work had an enormous impact. For example, it had been a central tool in Lafforgue’s proof of the Langlands correspondence for function fields. Recently it has been used by Clozel, Harris, Taylor and others in constructing Galois representations associated to automorphic forms via p-adic methods. Arthur’s ideas, achievements and the techniques he introduced will have many more deep applications in the theory of automorphic representations, and the study of locally symmetric spaces. Arthur’s work is a mathematical landmark that will inspire future generations of mathematicians.”
Faculty Members Help Represent Canada at IMO

Department members Jacob Tsimerman and Lindsey Shorser spent the last two weeks of June in Banff training Canada’s 2015 IMO team for their competition in Chiang Mai, Thailand, from July 4 to 16, 2015.

The team worked hard to prepare for this year’s contest and their efforts paid off. The team placed 9th overall in the competition. In addition, team member Zhuo Qun (Alex) Song received the only perfect score. Other members of the six person team received a Gold medal and 4 Bronze medals.

Canada has participated in the IMO since 1981. Last year, the Canadian IMO Math Team again placed 9th overall at the IMO in Cape Town, South Africa.

This year the IMO team made headlines and our team was highlighted on CTV Calgary through interviews with the team members and leaders.

Professor Jacob Tsimerman and team member Alex Song were also interviewed on Canada AM after the competition finished.

Thoughts on Mathematics..

*Mathematics is like checkers in being suitable for the young, not too difficult, amusing, and without peril to the state.* -- Plato

*Mathematics is the art of giving the same name to different things.* -- J. H. Poincare

*A mathematician is a device for turning coffee into theorems.* -- Paul Erdos

Comic from XKCD: [https://xkcd.com/435](https://xkcd.com/435)
Announcements

2015 Departmental Award Winners and Scholarship Recipients

The Department would like to congratulate the following 2015 award winners and scholarship recipients:

Frederick V. Atkinson Teaching Award (excellence in teaching by Postdoctoral Fellows):

Nicholas Hoell  
working with Adrian Nachman

Geoffrey Scott  
working with Marco Gualtieri

Daniel B. DeLury Teaching Awards (excellence in instruction for graduate students in mathematics):

Yuri Cher  
student of Catherine Sulem

Ali Mousavidehshikh  
student of Ragnar Buchweitz

Yuan Yuan Zheng  
student of Stevo Todorcevic

Trefor Bazett  
student of Lisa Jeffrey/Paul Selick

Vivekananda Graduate Scholarship (academic excellence in graduate studies for international students):

Benjamin Briggs, student of Ragnar Buchweitz

From L - R: Professor Almut Burchard, Fabian Parsch (Vanier Award winner) and Jemima Merisca (Graduate Administrator)

Student awards

From L - R: Nicholas Hoell, Yuan Yuan Zheng, Geoffrey Scott, Trefor Bazett, Yuri Cher and Ali Mousavidehshikh

Math Union Members and Professor Kumar Murty

Members of the Department watching the awards ceremony
Academic Appointments

Alexander Braverman
Joined the department July 1, 2015 at the rank of Full Professor and holds a joint position with the Department of Mathematics and the Perimeter Institute. Alexander joined us from Brown University where he was promoted to full Professor in 2009. He works in the Geometric Langlands program and is a leading figure in geometric representation theory.

Maxime Fortier Bourque
Joined the Department of Mathematical and Computational Sciences at UTM July 1st as a Coxeter Assistant Professor. Maxime completed his Ph.D. in 2015 from the City University of New York and works in the research area of Teichmüller theory.

Robert Haslhofer
Joined the Department of Computer and Mathematical Sciences at UTSC on July 1st at the rank of Assistant Professor. Robert joins the department from the Courant Institute where he was a Postdoc since completing his Ph.D. in 2012 at ETH-Zürich. He works on PDEs, geometric analysis and Riemannian geometry.

Dmitry Faifman
Joined the department July 1st as a Coxeter Assistant Professor. Dmitry joins the department from CARMIN where he was a postdoctoral fellow since completing his Ph.D. in Mathematics from Tel-Aviv University in 2014. His area of research specialization is Convex geometry.

Maxime Fortier Bourque
Joined the Department of Mathematical and Computational Sciences at UTM July 1st as a Coxeter Assistant Professor. Maxime completed his Ph.D. in 2015 from the City University of New York and works in the research area of Teichmüller theory.

Trefor Bazett
Joined the department of Mathematics September 1, 2015 as CLTA, Teaching Stream. Trefor will complete his Ph.D. this fall from U of T and his research interests are Equivariant K-Theory with applications to Symplectic Geometry, Homotopy Theory.

Siyu Liu
Joined the department of Mathematics September 1, 2015 as CLTA, Teaching Stream. Siyu will complete his Ph.D. this fall from U of T and his research interests are Coding Theory, Applied Algebraic Geometry, Computational Commutative Algebra, and Information Theory.

Staff Appointments

We extend a warm welcome to Ashley Armogan who joined our administrative team this Spring in the position of Undergraduate Assistant. Ashley was recruited to provide additional administrative support to the undergraduate office as a result of the increase in our program and course enrolments.

Sonja Injac also joined us in the capacity of temporary Receptionist in March of this year will continue in this role in the interim.

Congratulations to Jemima Merisca and Patrina Seepersaud who were appointed to the positions of Graduate Administrator and Department Office and Academic Programs Assistant respectively July 2015. Both Jemima and Patrina were seconded to these positions since January 2013 during Ida’s absences and we would like to thank them for their tremendous support and contribution during this time. We wish them success in their new roles.

Welcome as well to Allison Andres who joined us on November 10th in the capacity of Executive Assistant to the Chair. Prior to joining the Department of Mathematics, Allison was the Assistant to the Chair in the Department of Biochemistry.
Professor Ian Graham
retired from the University on June 30, 2015. Ian joined the Department of Mathematics July 1, 1974 at the rank of Assistant Professor and was promoted to the rank of Associate Professor July 1, 1979 and to the rank of Full Professor July 1, 1986.

During his tenure, he served in the capacity of Graduate Coordinator at the Department of Mathematics, St. George and Associate Chair at UTM. Thank you Ian for your excellent research, teaching and service to the Department of Mathematics both at St. George and UTM over the years and wish you all the best. Enjoy your retirement!

Dr. Paul Kergin
retired on June 30, 2015. Paul completed both his Master’s and Ph.D. at the University of Toronto and prior to joining as part-time Lecturer, he was also a post-doctoral fellow and Research Associate. Thank you Paul for your teaching contribution to the department over the years. We wish you well in your future endeavours and enjoy your retirement!

Professor James Colliander
resigned his position as Professor of Mathematics July 2015 after 9 years of service with the Department including a term as Associate Chair (Research). Jim joined the Department of Mathematics at UBC as Professor and also serves as Deputy Director of the Pacific Institute of Mathematical Sciences. We thank Jim for his tremendous research and teaching contribution to the department over the years and wish him continued success in his new roles.

We also wished “bon voyage” to Sarah McNiece, Executive Assistant to the Chair who resigned May 2015 to return home to Ottawa. She has recently accepted a position at IRDC. Sarah was a refreshing and valuable addition to the Administrative team and we surely miss her presence in the department.
## New Postdoctoral Fellows

The Department welcomed eleven (11) new postdoctoral fellows for the 2015-16 academic year, which brings our total postdoctoral fellows for 2015-16 to 37.

<table>
<thead>
<tr>
<th>NAME</th>
<th>CAMPUS</th>
<th>SPONSOR(S)</th>
<th>MAIN TOPIC OF RESEARCH</th>
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<tbody>
<tr>
<td>Biborski, Iwo</td>
<td>St George</td>
<td>Bierstone</td>
<td>Quasianalytic geometry</td>
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<tr>
<td>Garcia Fritz, Natalia Cristina</td>
<td>St George</td>
<td>Tsimerman Herzig</td>
<td>Arithmetic geometry</td>
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<td>Garcia Martinez, Luis Emilio</td>
<td>St George</td>
<td>Kudla Herzig</td>
<td>Number theory</td>
</tr>
<tr>
<td>George, William</td>
<td>St George</td>
<td>Murty</td>
<td>Number theory</td>
</tr>
<tr>
<td>Le, Daniel</td>
<td>St George</td>
<td>Herzig</td>
<td>Algebraic number theory</td>
</tr>
<tr>
<td>Lin, Chen-Yun</td>
<td>St George</td>
<td>Wu</td>
<td>Massive data analysis</td>
</tr>
<tr>
<td>Manin, Fedor</td>
<td>St George</td>
<td>Nabutovsky Kapovtich Rotman</td>
<td>Quantitative geometry and topology</td>
</tr>
<tr>
<td>Peng, Yinhe</td>
<td>St George</td>
<td>Todorcevic Weiss</td>
<td>Set theory, applications in topolgy</td>
</tr>
<tr>
<td>Qing, Yulan</td>
<td>St George</td>
<td>Rafi</td>
<td>Geometric group theory, CAT(0) spaces</td>
</tr>
<tr>
<td>Vagharshakyan, Armen</td>
<td>Crosslisted with UTM</td>
<td>Khanin Binder</td>
<td>Analysis (singular integrals, discrepancy theory)</td>
</tr>
<tr>
<td>de Thanhoffer de Volcsey, Louis</td>
<td>Crosslisted with UTSC</td>
<td>Buchweitz</td>
<td>Noncommutative algebraic geometry</td>
</tr>
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This year the department was saddened by the loss of three department members: Professors Arthur Sherk, Andres del Junco and Graduate Administrator, Ida Bulat. Each of these remarkable people made deep and long-lasting impressions on the department and all will be truly missed. The following is a small tribute to each of these outstanding people.

In Memoriam

Born in Stayner, Ontario on May 20, 1932, Arthur passed away peacefully on September 23, 2015. The son of a pastor, he grew up in Stayner, Sunnidale, Aylmer, Stouffville, Markham, and Kitchener (Centreville). He attended McMaster University and received a Ph.D from the University of Toronto. He and Anne were married in 1954.

Arthur straddled a number of different worlds. Foremost came his family, to whom he was devoted. He loved playing with his four children and numerous grandchildren and great grandchildren, and he and Anne created a warm and closeknit family who enjoyed being together. Arthur played the ukulele with great verve.

He was also a vigorous member of his community, where he was known as “Doc” Sherk. A deeply religious man, he was for many years a member of Banfield Memorial Missionary Church (now Wellspring Worship Centre), filling various leadership roles and participating actively as a deacon and Bible class teacher. He was a member of the Board of Emmanuel Bible College.

But he also had a wide range of friends. Many of them he met through his professional life, and quite a few shared his passion for golf. After his retirement, he and Anne spent much of the winter in South Carolina, visiting friends they had met during two sabbatical years at Clemson University, and playing golf whenever the weather permitted.

Professionally, Arthur was a professor of Mathematics at the University of Toronto and a member of University College. In addition to his scientific work, he filled a wide range of posts in the University, including Assistant Dean of Graduate Studies, Member of Governing Council, and Vice-Principal of University College.

He was a student of Professor H. S. M. (Donald) Coxeter, who is generally regarded as the greatest geometer of the twentieth century. Arthur’s doctoral thesis was entitled “Regular Maps”. He worked on questions about projective geometry, especially finite projective geometries: finite sets of points that satisfy the axioms of projective geometry. He published two books and a score of articles about them in various scientific journals.

He was also a longtime member of the Canadian Mathematical Society, serving in a number of executive roles, including Managing Editor of the Canadian Mathematical Bulletin, Managing Editor of the Canadian Journal of Mathematics, and as the Society’s Treasurer. He was given the Society’s Distinguished Service Award in 2000.

He was much respected by his colleagues, who found him wise and supportive, always kind and a gentleman. However, his kindness and gentlemanly behaviour never prevented him from trouncing a rival at chess. Retaining a mathematician’s fascination with complex mechanisms, Arthur also established for himself an unofficial role as self-appointed custodian of University College’s antique clocks, which he coddled with great skill.

Arthur had a dry but lively wit. When an Anglican friend tried to start a theological conversation by observing that Mennonites had never persecuted anybody, Arthur replied gently, “I don’t suppose we ever got the chance”.

Arthur Sherk understood the value of working together with people with shared interests and vision, and he was extremely effective at creating this miraculous form of community, not only in his family and his religious community, but also in his professional work in the University of Toronto, University College, and the Canadian Mathematical Society. He will be sorely missed by a great many people.

Written by: Professor Joe Repka
Andres del Junco - Professor, Musician and City Cyclist

Andres del Junco passed away in Toronto, on June 17th, 2015, after a long battle with ALS. He is survived by his wife Paula, and his daughters Clara and Nina.

Andres was a man of many parts. Coming from a large and lively family, he grew up surrounded by people, and always valued that aspect of his life. He was a loving husband and father and a loyal friend, but he also had an intensely private side.

His early fascination with motorcycles matured into a lifelong commitment to cycling. In recent years, he also became an active and valued member of the inline skating community. He enjoyed the social side of sports, but seemed to gravitate to activities in which he was ultimately competing with himself.

His early work was on Chacon’s transformation. He had the vision to see special properties of this transformation beyond what it was initially constructed for. Since that time the Chacon transformation has become one of the most important sources for examples and counterexamples in ergodic theory. Later he worked with the late Dan Rudolph on simple actions and joinings. Their beautifully written papers have been very influential in the theory of joinings.

After many other significant papers on joinings, on codings, on Bernoulli shifts, his last project was a joint work with one of his colleagues on the essential variations of functions and the divergence theorem. All the arguments in this work had been finalized before he passed away. The paper will soon be ready for submission.

His graduate students remember fondly the time they spent with Andres. He was a hands-on supervisor, working closely with them on their projects, immersing himself in the problems they were addressing. He was always extremely generous with his time and his insights.

One of his graduate students remembers working with Andres: “I recall very warmly my weekly meetings with Andres, when we discussed, in detail and for months, a difficult research article. Slowly, we came to understand the techniques being used, and what we would need to do to extend them. I appreciated his candour and collegiality during this time: there was a strong sense that we were understanding this work together. I remember very clearly a moment in his office at Sid Smith, on an afternoon with the sun streaming in, where I was failing to articulate an obstacle which he did not see. He started to explain, very patiently, his way of seeing things, but then came to the issue. That was the first time that I felt that spark and joy of discovery, and collaboration in mathematics, a moment I shall always cherish.”

In addition to being a witty and engaging conversationalist, Andres was a gifted musician. He played the piano magnificently and had a profound knowledge and love of music. While his interests were quite broad, he felt most at home with Beethoven, Brahms, Mozart, and Schubert.

It was quite a common occurrence to see Andres racing around town on his bike at all hours of the day and in almost any weather. Although his life was cruelly cut short by ALS, those who knew him will continue to imagine at odd times that we see him still, crisscrossing the city.

Written by: Professor Joe Repka and Professor Emeritus Mustafa Akcoglu
Ida Bulat joined the Department of Mathematics at U of T in 1985 and immediately began to enrich the lives of all those around her. She was an exemplary Graduate Administrator, who somehow managed to stay on top of the myriad of tasks required, completing them all with clockwork precision and meticulous attention to detail.

She made an equally important contribution after the formalities were attended to, when her warmth and generosity came to the fore. As most of you will likely recall, Ida befriended our students and became part of their lives, including helping to resolve problems that went far beyond the academic routine.

She was never one to pass up an invitation and was often seen at students performances, picnics, lunches, and weddings where she showed pride in their accomplishments.

Her generosity extended to everybody—to Canadians who knew the ropes, and to students from other countries and other cultures for whom she demystified the challenge of finding accommodation and establishing themselves.

She always found time for a chat, offering a sympathetic ear and keeping everybody abreast of what was going on with colleagues.

Ida was an ambassador for the Department. She made a point of keeping in touch with graduates across the globe, encouraging everyone to maintain their connection with mathematics in Toronto.

One of her great passions was travel, and wherever she and husband Andrzej went, there was an excellent chance that she would find a mathematician to visit, using the opportunity to catch up on old times and perhaps share a meal.

In early 2010 Ida was recognized for this commitment to her students by being awarded with the 2010 Student Life Award from the Faculty of Arts & Science.

Ever the humble person, Ida initially protested being nominated saying she didn’t do what she did for the recognition but just because it was her job and the right thing to do. After she was awarded with the honour she was quoted as saying “Maybe the award is just a really big thank-you. And now it’s payback time, so I’m starting with lunches. I need to thank those who did this for me.”

That was how Ida was, selfless and dedicated to those around her. She earned the nickname the ‘guardian angel’ for her work with the graduate students in the department. For her work not only keeping them all on track with forms, deadlines and bursary information, but occasionally with meeting someone at the airport, finding someone else a place to live, and even taking one to the hospital in an emergency.

Sadly, after many years struggling with cancer, Ida Bulat passed away in May 2015. She will be sadly missed by all who knew her.

A memorial service was held on November 2nd.

Honouring Ida’s Legacy

The Department has established the Ida Bulat Memorial Graduate Fellowship in Mathematics that will annually support our graduate students.

You may make a contribution online at: www.donate.utoronto.ca/math

All donations will receive a charitable tax receipt.
New Hires

This year the Department welcomed a number of new faculty including a new full professor, one Assistant Professors and two CLTA Coxeter Assistant Professors.

We also welcomed 11 new PostDocs who are expected to stay for 2-3 years.

Hiring

The Department is hiring for multiple positions at our three campuses:

UTM
- Assistant or Associate Professor in Pure Math
- Assistant Professor in Pure Math
  We are seeking candidates with research expertise in the Mathematical Analysis of Large Data and its Foundations

UTSC
- 2 Assistant Professor positions in Pure Math
- Assistant Professor in Applied Math
- Associate Professor in Applied Math

UTSG
- Assistant Professor in Applied Math
- Assistant Professor in Applied Math

New Building

The Department is excited to announce that it is currently in the process of occupying the newly renovated Physical Geography Building (PGB) at 45 St. George St.

Renovations are expected to be completed by the fall of 2016. The building will be home to graduate students, teaching faculty and other members of the Department.

It will also be the future home of the Centre for Applied Mathematics.

The Centre for Applied Mathematics

After many years of hard work and planning the Centre for Applied Mathematics is closer to being a reality.

The Centre will focus on six labs/clusters including RiskLab, Imaging, Fluids, Big Data, Optimal Transport and GANITA. It will also have other labs working in collaboration with it including Geometric Structures.

We are working with the Advancement office to prepare a major campaign to raise the funds (around 72.5M) to fund 6 faculty positions, annual PDF positions and graduate student support.

The Centre will initially be housed in PGB.
Graduate

Enrolment Numbers

This year, 55 students commenced new graduate programs in the department: 35 full-time MSc, 18 PhD (8 of these students are continuing from our Master's program), 1 exchange student, 1 visiting student. We began the term with a total of 150 students.

We had 4 doctoral students graduate from the program in June 2015 while another 13 graduated at the November convocation.

Graduation Numbers and Positions

In 2014-15 we had 14 PhD students graduate; 10 of these students went on to research positions (see list below). 18 students completed their master's degree of which 9 continued on to the doctoral program.

- Ioannis Angelopoulos (J. Colliander) 1-year PDF, Harvard University
- Aaron Chow (K. Murty) Information Security Specialist, TD Bank
- Oleg Chterental (D. Bar-Natan)
- Alexander Dahl (V. Blomer) PDF, York University
- Christopher Eagle (F. Tall) PDF, UTM/ Assistant Professor University of Victoria
- William George (K. Murty) PDF, University of Toronto
- Mikhail Gudim (R. Buchweitz)
- Brandon Hanson (J. Friedlander) Chowla Fellow Penn State University
- Yevgeniy Liokumovich (A. Nabutovsky/R. Rotman) Chapman Fellow at Imperial College London/ PDF, MIT
- Alexander Pavlov (R. Buchweitz) 1-year PDF, MSRI / 2-years PDF, UWisconsin
- Micheal Pawliuk (S. Todorcevic)
- Mustazee Rahman (B. Virag) 3-year Instructorship, MIT
- Daniel Rowe (J. Kamnitzer) PDF, PIMS/UCalgary
- Daniel Soukup (W. Weiss) 3-year Assistant Professor Northern Michigan University

2015 CMS Doctoral Prize

Graduate student Yuval Filmus, who completed his PhD in 2013 for his thesis Spectral methods in extremal combinatorics at the University of Toronto, was recently awarded the 2015 CMS Doctoral Prize along with Hector H. Pasten Vasquez (Queen's University).

This is the first time the award was given to two recipients which speaks to the quality of both their work.

CMS Doctoral Fellowship

This year’s inaugural CMS Doctoral Fellowship was awarded to Thaddeus Janisse.

This Fellowship was made possible by a generous contribution from the Canadian Mathematics Society.

Thaddeus was admitted to our program as a doctoral-stream master's student in Fall 2012. His first year in the program was funded by an NSERC CGSM scholarship. His undergraduate studies (major in mathematics) were completed at the University of Windsor. During his undergraduate degree, he held six research oriented Outstanding Scholar’s appointments as well as three undergraduate summer research assistantships, two of which were through NSERC.

In summer 2013, he completed his Master's supervised project under the direction of Professor Fiona Murnaghan where he had the opportunity to study the representation theory of finite groups and compact topological groups, and the structure and representation theory of Lie groups. Since then, he has been working with Professor Joe Repka and plans to investigate questions about embeddings of real semisimple Lie algebras and their abelian extensions.

Vivekananda Scholarship for International Students

This year’s Vivekananda Scholarship (made possible by a generous donation from the Vedanta Society of Toronto) went to Benjamin Briggs who works with Ragnar-Olaf Buchweitz on commutative algebra, homological algebra, and algebraic geometry.

He is currently working on understanding certain algebraic aspects of flag varieties.
Undergraduate

Student Growth

This year the undergraduate student numbers grew substantially. Mathematics is now the second largest program of study in the Faculty of Arts and Science (after Human Biology). This year we effectively have 22,535 students enrolled in H level courses (not including those enrolled in the Faculty of Applied Science & Engineering, or the FAS students who take our Summer courses).

Student Distribution (Gender and International Students)

Some interesting statistics were discovered by our department this year with respect to gender distribution in our programs. We currently have 58% male and 42% female in our Major/Minor programs. Specialists consist of 60% male and 40% female in general. The Applied Mathematics Specialist is 53% male and 47% female. The remaining three (Math, Math & Physics, Math & Philosophy) are 83% male and 17% female.

Our programs of study are popular with international students as well. There are 301 more international students in our programs this year than last year.

Undergraduate Activities

The Department continues to participate in the Faculty of Art and Sciences STEP initiative.

These and other activities include:
- Orientation and re-orientation activities
- Career development workshops and programs
- Mentorship connections
- Completion of training and development through the Certificate in Leadership Awareness Skills (CLASP) and Math Enthusiast Intellectual Development Series (MEIDS)
- Backpack to Briefcase (b2B) sessions
- First-year Learning Communities – MAT137Y and MAT157Y1
- Putnam exam training sessions, Putnam-oriented problem-solving course

New Instructor Training

This year, Alfonso Gracia-Saz provided training sessions to new instructors (both graduate students and postdocs). This included two hours of training before the start of the semester as well as classroom visits and post-visit debriefing sessions. The sessions were well received and valued by our new instructors.

Putnam Results

This year’s Putnam team ranked 21 out of 577 schools with 41 participants. Our highest ranking students were Michael Chow (left) and Itai Bar-Natan (right).

We also had a great year for individual achievements of participants with:
- 2 Honorable Mentions ranked < 86
- 2 students ranked < 190
- 6 students ranked < 500

This is out of a total of 4320 participants in the content.

The team was organized by Bernardo Galvao-Sousa and Alfonso Gracia-Saz.

Training and information sessions for the next contest will start in October and further details can be found here: http://uoft.me/putnam-math

Mathematics Education Seminar/Working Group

Thanks to the efforts of graduate student Tyler Holder there is a new Mathematics Education Seminar/Working Group. It’s focused on pedagogy for undergraduate math courses. The first presentation was on October 5 and was given by Alfonso Gracia-Saz who spoke on “Inquiry-Based Learning and the Moore Method”. It was attended by more than twenty people. A second event took place on October 19 and was given by Jeff Adler of American University, followed by a group discussion. The topic was “Michigan Calculus: an education reform that passed the test of time”.

DEPARTMENTAL UPDATES
Outreach and Engagement Programs

This past year has been a busy one for the department’s outreach and engagement programs and has seen a large increase in the reach of the department into the community outside the University.

Some of the programs we ran this year included:

- **Canada Math Camp**: This invitation only camp is open to students in Grades 8 - 10 to help prepare them to try out for the Canada and International Math Olympiad teams.

- **March Break and Summer Camps and Saturday Programs**: These camps/programs are open to students in Grades 3 - 12 including our Math Kangaroo camps and our prestigious Math Academy.

- **Competitions**: These include the Math Kangaroo Contest, the Tournament of Towns competitions, the AMC and the COMC.

- **Mentorship Program**: This prestigious program pairs high school students who show a strong aptitude and potential for mathematics with our faculty and graduate students.

- **School Visits**: This year we had over 250 students from various local schools visit our department and participate in a lecture/hands-on workshop.

- **Girls in STEM**: Over 100 girls in Grades 6 - 8 participated in this one day event focused on providing these young STEM researchers with workshops, discussions and inspiration.

- **Science Rendezvous**: A one day science festival which takes over St George St in May each year. The mathematics display gets bigger every year.

This year we also participated in Science Literacy Week. In partnership with the Mathematical Sciences Library we created a display that showcased “Mathematics Through Time” where visitors were shown posters describing some famous mathematicians of the past and then provided with information on a contemporary link to a member of our department. The success of this display has sparked an on-going project to find out what our faculty do and who inspired them.

Get Involved

The outreach and engagement programs are always looking for people to get involved. From workshop leaders to contest markers and invigilators, we want you!

We’re also beginning a project investigating the types of mathematics research going on within the department so if you are involved in mathematics research please contact us to set up some time to discuss (this also includes those who are involved in mathematics as a career as well).

Further details on current calls for assistance can be found here: [mathplus.math.toronto.edu/home/opportunities](http://mathplus.math.toronto.edu/home/opportunities)
The **main computing help page** is at: [www.math.toronto.edu/cms/computing](http://www.math.toronto.edu/cms/computing) (or click on “Computing” on the top menu of the departmental homepage).

There you will find information about **email and spam filtering**, wireless networking, contacting people for help, webmail, and so on. Spam, phishing, spear phishing, and similar email attacks continue as always and it is important that everyone is careful when dealing with email.


Please remember that **any computer that contains personal information (perhaps of students in classes that you are teaching) must have that information encrypted** (preferably on an encrypted hard-drive or partition).

For more information please see: [http://www.enough.utoronto.ca/onlinesmarts/data.htm](http://www.enough.utoronto.ca/onlinesmarts/data.htm) & [http://www.enough.utoronto.ca/onlinesmarts/data/encryption.htm](http://www.enough.utoronto.ca/onlinesmarts/data/encryption.htm)

Our main server, **coxeter**, does have filesystem-level encryption, but you do have to have a strong password that is not shared to make that effective.

There is a Search button on the upper right corner of the departmental homepage and that can be helpful for finding information. A **very short introductory page** is available at: [www.math.toronto.edu/intro.html](http://www.math.toronto.edu/intro.html)

The **IT Status blog** is at: [http://itstatus.math.toronto.edu/home](http://itstatus.math.toronto.edu/home)

It has important information about the state of the departmental computing systems and is normally the place to go to check the status of our systems. Please note that **Wednesday afternoons are the usual times for system updates and that the departmental computer systems could be down at those times** (if possible warnings are given when systems need to be taken down).

The **main departmental printers** are two Xerox Phaser 5550DNs with duplexers for two-sided printing and with the maximum supported amount of RAM (1GB). “lw3” is in the computer room (Room 6200). There are other printers in various other buildings on campus where the department has offices.

We have a local command “Print” for handling most print jobs on coxeter (the main departmental server which supports TeX, our X-terminals, access to editing your webpages, etc.).

Running “Print -d file” on coxeter will display the file on your screen (if you are running an X server) and you can preview what will be printed. Running just “Print” will give a summary of options for the Print command (for example “-M” selects manual feed).

If the **printers run out of paper or if the toner is low** please see reception at the front desk (in BA6290).

The “pdfshuffler” command has been installed for PDF file page manipulation. It has a graphical user interface which is quite intuitive.

The **Seminar Room (BA6183)** has a podium with various connections for projecting onto the screens in that room. There is documentation at the reception desk and there should also be some in that room (although that sometimes is accidentally removed). The documentation is from: [http://wiki.math.toronto.edu/TorontoMathWiki/index.php/BA6183_Video_Instructions](http://wiki.math.toronto.edu/TorontoMathWiki/index.php/BA6183_Video_Instructions)

The department networking has been and continues to be updated with more reliable, secure, and faster switches.

Work on an updated departmental web presence has been proceeding as well.

A projector has been installed in the Board Room (BA6180). Please see [http://itstatus.math.toronto.edu/home/?p=1679](http://itstatus.math.toronto.edu/home/?p=1679) for more information.

Work continues in PGB in order to move more lecturers, postdocs, and graduate students there.

We have a compute server, **sphere**, which has two 6-core CPUs and 64GB of RAM to support Mathematica, Matlab, and other computational software. Please run the “bigjobs” command on coxeter for information about usage, if you plan to have any long-running jobs.
JACOB TSIMERMAN and HAU-TIENG WU both received prestigious Sloan Fellowships.

Only 126 awards were made this year and it is usually an honour for a department to receive 1 such award and an extraordinary honour to receive 2. In Mathematics this year Princeton, Harvard, Chicago, Columbia and Caltech got one each; MIT and Toronto got 2 and Berkeley got 3 so we are in very good company.

JACOB TSIMERMAN was also honoured to be awarded the 2015 SASTRA Ramanujan Prize. This prize was established in 2005 to honour outstanding contributions to mathematics by young researchers under the age of 32 (the same age Srinivasa Ramanujan was when he passed away).

From the SASTRA University announcement (on.fb.me/1Lfbvru):

Dr. Tsimerman is an extraordinary young mathematician who has made deep and highly original contributions to diverse parts of number theory, and most notably to the famous André-Oort Conjecture. He is one of the few mathematicians to have complete mastery over two very different areas of mathematics – analytic number theory and algebraic geometry.

CATHERINE SULEM was elected as a member of the Royal Society of Canada this past year.

From their website (rsc-src.ca):

Catherine Sulem is one of Canada’s most prominent and productive applied mathematicians. Her research on nonlinear waves has made deep and lasting contributions to ocean wave dynamics, to stability theory for nonlinear optical systems, to magnetohydrodynamics and to plasmas. Her predictions of singularities in optical fibres are internationally recognized as a major achievement. Her work presents the highest standards of mathematical analysis and its physical applications.

FABIAN PARSCH is one of this year’s NSERC Vanier Award winners. The Vanier Canada Graduate Scholarships (Vanier CGS) Program supports doctoral students who demonstrate both leadership skills and a high standard of scholarly achievement.

Fabian Parsch holds a Bachelor’s degree in mathematics and computer science from the University of Konstanz, Germany and a Master’s degree in mathematics from our Department. He is currently in the third year of his PhD and is working with Alex Nabutovsky in quantitative geometry and topology, particularly on knots and embeddings of simplicial complexes.

Beyond research, Fabian just finished his two-year term as President of our Department’s Mathematics Graduate Student Association and continues to be involved in its activities. He is the founder and co-owner of a software company developing web applications and spends his spare time playing hockey, singing in a cappella groups and exploring the outdoors.
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Mathematical Sciences Library
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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 either on your research in mathematics or if you are an alumni currently using mathematics 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

University of Toronto Department of Mathematics
### Staff Directory

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Focus on Research

The Department is currently undertaking a project to profile our faculty and build a repository of their research. So far we have reached out to over half a dozen of our faculty and the pattern that is emerging is fascinating.

Mathematics is a subject that touches many different areas of the world around us. However, many of the people who study mathematics do so not for the direct application purposes of their work but to see “where the math will take us”. Mathematical research and discovery has a long, illustrious history of this path of discovery.

Before the invention of computers mathematicians dreamed of complex mathematical patterns that they knew had to lead somewhere but without the technology available to process the calculations they had to leave them simply as theories. Once computers came into existence many of these theories not only became realities but they became applicable realities.

The same can be said of today’s math researchers. They are exploring patterns in a wide variety of ways with many different applications; some that we’re just waiting to see. Professor Dror Bar Natan studies 1 and 2-knots and looks for correlations in knot theory to other areas of mathematics. Professors Rotman and Nabutovsky explore curved spaces and new dimensions of space and its relation to other systems. Professor James Arthur (profiled earlier in this newsletter) works on the Langland program which has yet untold applications across the entire field of Number Theory.

So keep an eye on our website and the next issue of our newsletter for specific examples of this exploration of the enthralling subject known as 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 this tradition of excellence in mathematical education and research.

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