# McGill University

# Department of Mathematics and Statistics

# Annual Report

# Year: 2013

# Presented to

# The Cyclical Unit Review Office

**ANNUAL REPORT – Summary of Activities and Achievements**

The Department of Mathematics and Statistics continues to thrive, though I must admit that the source of this statement is not entirely objective. We had a new Faculty member arrive last summer: Payman Kassaei joined us from University College London, bringing some much needed extra manpower to our group in number theory, which has been simultaneously enjoying and suffering from their great popularity with students. More needed reinforcements in other areas are on the way this summer: Linan Chen, a talented probabilist, will be joining our Department after a few years as a post-doc; we also have, arriving from Poland, Piotr Przytycki, a geometric group theorist of great talent and Marcin Sabok, a logician of depth who will have the task of reviving the subject in our Department after the premature departure of Jim Loveys. We have had one departure this year - Wilbur Jonsson, a long standing fixture in our Department, is retiring after almost forty-eight years at McGill. We wish him all success in this new phase of his life.

The year saw our Faculty receive a good share of honours. Dani Wise won a richly deserved Veblen Prize from the American Mathematical Society, for his work on geometric group theory. He will be speaking on his ground-breaking work at this summer's International Congress of Mathematicians. Niky Kamran was awarded Canada's premier prize for senior mathematicians, the CRM-Fields-PIMS prize, following on last year's award to our colleague Bruce Reed, making two in a row for McGill. Our emeritus colleague Peter Russell was made an AMS Fellow, "*for contributions to algebraic geometry, for mentoring the next generation of mathematicians, and for professional leadership at the highest levels."* Louigi Addario-Berri will be spending his first sabbatical in Britain supported by a prestigious Leverhulme fellowship. On the local front, Johannes Walcher was awarded (overdue!) tenure and promotion to Associate Professor. Lastly, not so much an honour as a remarkable feat: Christian Genest achieved the remarkable feat of increasing the Institut des Sciences Mathematiques (ISM) funding from Quebec in the face of the Ministry of Education's rather severe budget cuts.

Our researchers continue to do well on the granting front (for mathematicians and statisticians, that is; we are the church mice of science). Each year's NSERC crop of grants is gone over collectively by the Canadian Mathematics Chairs, and the reports are ones of increasing gloom, with cuts to various eminent people. I have been fortunate in being able to say that ours seem to be trending ever upward, I suspect much to the secret irritation of my fellow Chairs. One particular bright point was the award to our new colleague Piotr Przytycki, not only getting an unusually large first grant but also an Accelerator grant. These grants are particularly important to our graduate program, as it depends on them in a crucial fashion.

Our teaching numbers are ever increasing, with 1,254 FTE in 2010, 1,311 in 2011, 1,355 in 2012, and 1,455 in 2013. This is in the context of a decline in faculty numbers; with this year being particularly difficult, with only 32.5 faculty members on staff (taking phased retirements into account). Our students are extraordinarily good: the last two years 23 of our students received NSERC graduate scholarships, with this year's group of 13 being absolutely remarkable. Our BSc-MSc programme is picking up speed: Ben Landon graduated last

summer, and was snapped up by Harvard; Leo Raymond-Belzile and Mashbat Suzuki are following this summer. Congratulations should be extended to Mathilde Gerbelli-Gauthier and Olivier Martin, who won first prize for their poster "Two Perspectives on mod p and p-adic Galois Representations" at the Undergraduate Science Research Competition.

Our graduate students have continued to do well, with last year's Pelletier prize going to Yaiza Canzani, who got an extraordinary series of offers before settling on Harvard and Princeton, and this year's to Lisa Powers Larsson and Luca Candelori. Marc Ryser is the recipient of the 2013 CMS Doctoral Prize for some remarkable applied work on materials, co-supervised with Dentistry! The prize recognizes outstanding performance by a doctoral student. These students come to us mostly now from Canada, funding oblige; but we have developed some strong international links. Indeed, our number theorists participate in the EU Aligant network, while our analysts have developed a remarkable joint school with the French and seem to be the main beneficiaries of a CNRS Unité Mixte Internationale in Montreal; the statisticians have, until recently, seen a remarkable succession of Iranian graduate students, though visas, are, alas, becoming more and more difficult.

One nice aspect of our Department is that our graduate students and post-doctoral fellows contribute in a crucial way to our undergraduate teaching. Let me mention in particular the winners of the Teaching Assistant awards in the past two years: Katherine Daignault, Daphna Harel, Sebastien Picard, Tiago Saldanha, Juliana Schulz, Alexandra Tcheng. Our post-doctoral program is also at an all-time high, with 23 fellows in 2011-12, 19 in 2012-13, and 18 for 2013-14. In addition to building the McGill academic network, and contributing to our research, they have also provided us with some remarkably effective teaching.

Our mathematics and statistics community continues to pursue its mission in collaboration with the rest of Montreal's mathematics community; two affiliations remain absolutely crucial to our endeavours, the first being the Centre de Recherches Mathématiques, and the second being the Institut des Sciences Mathématiques, the Quebec mathematical sciences graduate consortium. The support they bring for scientific activities, for post-doctoral fellowships, and for graduate fellowships is absolutely crucial.

Again, I finish on a note that is no less true and heartfelt for being repeated each year. All of what we do would not be possible without the Department's staff, who make it all possible, and to whom we are all very grateful.

Jacques Hurtubise
Chair

**A few facts and figures:**

Our **academic staff** comprises 18 full professors, 10 associate professors, 5.5 assistant professors, 3 faculty lecturers, as well as 12 adjunct professors and 19 associate members. 63 academics visited the Department in 2013-14, for periods ranging from a few days to a whole year.

The Department has strong research groups in number theory, analysis, geometry, geometric group theory, applied analysis and scientific computation, discrete mathematics, and statistics, with an emphasis on biostatistics.

**Training:**

| | **2010-2011** | **2011-12** | **2012-13** | **2013-14** |
|---|---|---|---|---|
| Students taught, full time equivalent | 1,254 | 1,311 | 1,355 | 1,455 |
| Students taught, weighted student units | 1,342 | 1,421 | 1,447 | 1,549 |
| Course enrolment | 11,447 | 11,878 | 12,510 | |
| Undergraduate enrolled, all math programs/graduating | 292/42 | 342/55 | 396/73 | 431/67 |
| Undergraduate research projects supervised | 46 | 72 | 71 | 58 |
| MSc/MA enrolled/graduating | 22/10 | 33/8 | 38/10 | 40/15 |
| PhD enrolled/graduating | 47/7 | 50/8 | 51/6 | 48/7 |
| Postdoctoral fellows | 16 | 23 | 19 | 18 |

**Funding**

Our funding basically comes from two sources, NSERC and FRQNT, from their basic programs. The grants are typically not very large, but our relative success has been high.

| | **2010-11** | **2011-12** | **2012-13** | **2013-14** | **2014-15** |
|---|---|---|---|---|---|
| NSERC discovery | 762,000 | 852,000 | 920,200 | 913,950 | 970,686 |
| NSERC accelerator | 192,000 | 200,000 | 120,000 | 200,000 | 160,000 |
| FRQNT equipe | 102,667 | 93,732 | 123,081 | 106,415 | 104,750 |
| FRQNT Nouveaux Chercheurs | 20,000 | 60,000 | 80,000 | 60,000 | 20,000 |

**Some highlights**: *The NSERC accelerator grants* were introduced seven years ago, as a means of providing a career boost to meritorious researchers. Half of them were targeted to select areas, such as Information technology. There are relatively few outside this area, with perhaps three or four going to Mathematical Sciences each year across the country. Our Department has been awarded thirteen of these so far, with one new one this year.

*FRQNT Nouveaux Chercheurs*. Again, a competitive program for new researchers; our Department's success rate in these has been 100%.

*In and out of NSERC*: Over the last 5 years, our tenure track researchers renewing their NSERC discovery grants, in a context of a downward trend across Canada, have increased their NSERC Discovery grants by an average of 25%. We believe this to be unmatched in Canada.

**Publications** **http://gate.math.mcgill.ca:4096/biblio**

In 2013, our Faculty produced over 175 publications, with papers appearing in the subjects' top journals, such as the Annals of Statistics, Journal of the American Mathematical Society, Journal of the American Statistical Society, Journal of the European Mathematical Society, Biometrika, Advances in Mathematics, and Duke Mathematical Journal.