

# CHASE Report

Newsletter of the Department of Mathematics and Statistics

May 2011



SIR WILLIAM YOUNG GOLD MEDAL - 1891



**DALHOUSIE  
UNIVERSITY**

*Inspiring Minds*

*Faculty of Science*

## CONGRATULATIONS

### AWARD WINNERS

**Sir William Young Gold Medal in Mathematics**

*Adam Alcolado*

**Emil and Stella Blum Award in Mathematics**

*Adam Forget*

**University Medal in Statistics**

*Robert B. Dexter*

**Ellen McCaughin McFarlane Prize**

*Yuxin Chen*

**Ralph & Frances Lewis Jeffery Scholarship**

*Matthew Stephen*

*Kira Scheibelhut*

**Professor Michael Edelstein Memorial  
Graduate Prize**

*Neil Ross*

**Barry Ward Fawcett Memorial Prize**

*Yuxin Chen*

**Bernoulli Prize**

*Olivia Roberts*

**Ken Dunn Memorial Prize**

*Abdullah Al-Shaghay*

**Heller–Smith Scholarship**

*Lingyun Ye*

**Katherine M. Buttenshaw Prize**

*Zhenyu Guo*

### PRESIDENT'S AWARDS

*Emma Connon*

*Rebecca Keeping*

**Waverly Prize**  
*Travis D. LeBlanc*

*Chris Levy*

**NSERC AWARD WINNERS**

**CGS-M**                    *Adam Alcolado*

**USRA**

*Ethan Mombourquette (Andrea Fraser)*

*Matthew Stephen (Andrea Fraser)*

**NEW KILLAMS**    *Adam Alcolado*

**KILLAM RENEWALS**    *Emma Connon*

**HONOURS STUDENTS****Honours - Mathematics**

*Adam Alcolado*

*Syeda Amberin*

*Zhenyu (Victor) Guo*

*Benjamin Hersey*

*Katrina Joyce*

*Ryan Kiros*

*Kira Scheibelhut*

*Matthew Stephen*

*Youssef Zaky*

**Honours - Statistics**

*Robert B. Dexter*

*Joey R. Hartling*

**GRADUATE STUDENTS**

***October 2010 Convocation:***

**Mathematics**

*Donald Patterson (MSc)*

*Mark Pavlovski (MSc)*

**Statistics**

*Vaneeta Grover (PhD)*

*Lihui Liu (MSc)*

*Jihua Wu (PhD)*

***May 2011 Convocation:***

**Mathematics**

*Rob Noble (PhD)*

*Angela Siegel (PhD)*

**Statistics**

*Wade Blanchard (PhD)*

*Jinyi Liu (MSc)*

*Ed Reddick (MSc)*

*Caroline Urquhart (MSc)*

## CHAIR'S REPORT

by Karl Dilcher

The Chase Report always begins, as it should, with a list of the winners of our student awards, this year led by Adam Alcolado who just received the Sir William Young Gold Medal. A photograph of an early version of the medal is depicted on the cover of this Report; later in these pages you can read more about this particular medal which was awarded exactly 120 years ago.

While the most prominent pages are still dedicated to our students, award winners as well as graduates, we can also celebrate a greater than usual number of awards and other recognitions for faculty and staff: Sara Faridi and Gretchen Smith are among this year's recipients of the Rosemary Gill Award; Andrea Fraser received the Faculty of Science Award for Excellence in Teaching; and Ed Susko has been awarded the CRM-SSC Prize in Statistics. Furthermore, Jeannette Janssen has been appointed Director of AARMS, and Keith Taylor will be President-Elect and then President of the CMS; both these appointments will increase the visibility of Dalhousie and of our Department on the national level. Finally, Theodore Kolokolnikov has been promoted to Associate Professor, with tenure, and Bob Paré to Professor Emeritus. Congratulations to all on these awards and appointments.

There will also be changes to most of the important positions in the Mathematics Division: Rob Milson has just been appointed Director of Mathematics; on July 1 he will take over from Jason Brown. Because of his new duties, Rob will step down as Honours Coordinator, with a successor yet to be confirmed. Keith Johnson is once again going to be Mathematics Graduate Coordinator, taking over from Sara Faridi who will go on sabbatical leave on July 1st.

This past year also brought its share of challenges to the department. In the previous Chase Report I mentioned the renovations to the inside and the outside of our Building that had just begun. The disruptions and noise turned out to be worse than had been expected, but as reported elsewhere in these pages, Gretchen and our office staff did everything to minimize the impact of this. They were

largely successful, in spite of the flooding of our basement last July which further complicated matters, and the delays in the completion of the outside renovation.

This summer the inside renovations will continue, with most faculty offices on the 2nd and 3rd floors receiving new flooring and new paint jobs. For those offices it will be the first such renewal since the Department moved into the Chase Building in 1985.

As I enter my 5th year as Chair, I would like to thank the office staff, Ellen, Gretchen, Maria, and Paula, for providing such a positive atmosphere in the office and for invaluable support and help, along with Balagopal, our Systems Administrator. It has also been a pleasure to work with the Directors, Hong Gu and Jason Brown, and with the Graduate Coordinators, Sara Faridi and Bruce Smith. My thanks to all, and I wish everybody a successful and productive year ahead.

## MATHEMATICS DIVISION

by Jason Brown

This year there were two major developments regarding the undergraduate curriculum. First, a new course was introduced, MATH 4450/5450, Applied Analysis, to offer students interested in applied mathematics an alternate approach to analysis. This course is of note particularly for graduate students, where, in conjunction with the graduate coordinator, a student can successfully complete any two of MATH 5010, 5020 and 5450 in place of the non-specialist analysis examination.

The double major program in science and mathematics, with mathematics as the second subject was streamlined into pure and applied, and takes the place of a combination of two previous options. Students will have a clearer picture of what they need to complete in order to fulfil their mathematics requirement in a double major. I have seen an increase in students interested in taking a double major this year, with a number from the "2+2" program in Economics.

The teaching schedule for next year is set, and we have offered some courses that we haven't offered in a while, ranging from Wavelets to Algebraic Topology and

Logic. It should be a good and interesting upcoming year for students!

Also, I have hired a student to bring the course curriculum forms online this year. The forms are of significant use to students who leave the university and need course information from previous years. In the past the administrative staff and director have had to manually dig up the requested forms and fax it along, all of which was cumbersome and inconvenient. Also, filling out the forms was time consuming for each instructor, with inconsistent submissions from instructors. The current online form, newly created and with searching features for students, is intended to make the process seamless for one and all.

This my last year as Director of Mathematics, and I'd like to thank Karl Dilcher, Gretchen Smith, Hong Gu, and all administrative staff for their assistance along the way. I wish Rob Milson all the best in taking on the directorship. And thanks to everyone in the department!

## **STATISTICS DIVISION**

By Hong Gu

Congratulations to Joe Bielawski for his successful CIHR Microbiome Initiative application. He and the co-PI's (Ford Doolittle, Rob Beiko, Olga Zhaxybayeva) ranked first of 21 in the competition. Joe Bielawski was on sabbatical leave from July 2010 and returned in January 2011. Joe has worked throughout his sabbatical leave on the exciting new projects funded by CIHR.

Congratulations are also due to Ed Susko for the 2011 CRM-SSC Prize. This prize is in recognition of outstanding research accomplishments by a statistical scientist during the first fifteen years after earning their doctorate. Ed Susko is on sabbatical leave from January through June 2011. He has mostly stayed in Halifax during his sabbatical leave to work on research.

Congratulations to both David Hamilton and Joanna Flemming for successful NSERC discovery grants.

David Hamilton takes his half-year sabbatical leave starting from Jan. 2011. Upon his return from sabbatical leave, David will serve as the next graduate coordinator. We thank Bruce Smith for many years of

heavy administration duties; including serving again this winter as the graduate coordinator. Bruce Smith will be on sabbatical leave from Jan 1, 2012 to June 30, 2012.

Christophe Herbinger has also been on sabbatical leave since Jan. 2011 and will return on July 1<sup>st</sup>. During his sabbatical leave, Christophe has been working in CIBNOR (NorthWest Center for Biological Research) in La Paz, BCS Mexico. This is a federal research center with an associated graduate school. He collaborates with two groups on Pedigree and Genetic Management of Aquaculture Populations and on Conservation Genetics of Aquatic Species. He will return to Halifax this summer.

Thanks to Ammar Sarhan, who took up an instructor's position and made it possible for us to fulfil our teaching requirements for this past year, despite the large number of sabbatical leaves. Ammar Sarhan has been well received by his students.

Due to the collective efforts of all the instructors for Stat. 1060, we had a great response from Stat. 1060 students last year. Our enrolment in Stat. 1060 has dramatically increased this year. To relieve the heavy burden on the classroom, we will start a trial version of an online Stat. 1060 course in the 2012 winter term to allow a limited number of on-campus students to register for the online Stat. 1060 instead of the regular version.

Thanks to Michele Millar for her excellent job in the Math Circles outreach program, she has brought a statistics components to this important outreach program.

As another outreach effort, Joanna Flemming and Hong Gu successfully organized the first annual Pizza Party for students interested in further study in Statistics. Chris Field gave an inspiring speech at the party and students who came to the party all had a great time in talking to the faculty members in the statistics division. The party was a great success.

With the success of our above mentioned outreach program, the undergraduate coordinator Mike Dowd is busy advising students. Mike has done an excellent job and will continue to serve as undergraduate and honour's coordinator.

## Statistics Graduate Students

Congratulations to the following students graduating at the May 2011 convocation :

Wade Blanchard - Ph.D.  
 Jinyi Liu - M.Sc.  
 Ed Reddick - M.Sc.  
 Caroline Urquart - M.Sc.

**Sir William Young** was a Nova Scotia businessman, lawyer, and politician. He was born in 1799 in Falkirk, Scotland and moved with his family to Nova Scotia in 1814. Like his father, Young entered politics in 1832. From 1854 to 1857 he served as Attorney General of Nova Scotia, and in 1860 he served briefly as Premier before becoming Chief Justice, a position he held until his retirement in 1881. He died in Halifax in 1887. William Young contributed a great deal to the City of Halifax, and he was instrumental in negotiating use of the land for Point Pleasant Park from the Crown. He also contributed to Dalhousie College and served as chairman of the Board of Governors for thirty-six years (1848-1884). (A more complete biographical sketch can be found at [http://www.library.dal.ca/DUASC/FindingAids/MS\\_2\\_81/](http://www.library.dal.ca/DUASC/FindingAids/MS_2_81/)).

For the official opening of the Reading Room in 1988, a grandson of Agnes Baxter's was invited to attend the ceremonies. He donated his grandmother's Sir William Young Gold Medal to our department. It had remained with the family for almost 100 years, and is the medal you see on the cover of this Chase Report. *-kd*

## ABOUT THE COVER PHOTO AGNES BAXTER AND SIR WILLIAM YOUNG

As mentioned above, the cover of this Chase Report depicts the Sir William Young Gold Medal that was awarded to Agnes Baxter on her graduation exactly 120 years ago.

**Agnes Baxter** was born in 1870 in Halifax and entered Dalhousie in 1887. In 1891 she received her BA with first class honours in Mathematics, the first woman to receive this distinction at Dalhousie, and was awarded the Sir William Young Gold Medal. After receiving an MA in Mathematics in 1892, also from Dalhousie, Agnes went to Cornell University where she did graduate work in Mathematics, won a fellowship, and got her Ph.D. in 1895. Her thesis, "On Abelian Integrals, a Resumé of Neumann's *Abelsche Integrale* with Comments and Applications" was written under the direction of J.E. Oliver. She was the fourth woman to receive a Ph.D. in Mathematics in North America, and the second Canadian woman to do so.

In 1896 Agnes married A. Ross Hill, also a graduate of Dalhousie with an 1895 Ph.D. in Philosophy from Cornell. In 1903 Ross Hill became president of the University of Missouri. Unfortunately, Agnes Baxter Hill was in ill health for many years. After her untimely death in 1917 at the age of 47, President Hill made a gift of books to Dalhousie "... to perpetuate the memory of one of its loyal graduates, who gave her life to assist in my educational work instead of making an independent record for herself." In 1988, the Agnes Baxter Reading Room was dedicated as the Department Library which was at the time located in the room that is now the Student Resource Centre.

## AWARDS DAY SPEAKER

According to his website, this year's speaker at our Awards Day ceremony is "a pianist, professor of computer science, clown, computer animation researcher, music teacher and busker, to name a few things."

To name a few more things, **Dr. Sageev Oore** attended Dalhousie and graduated with an honours B.Sc. in Mathematics and CS; he wrote his honours thesis on a topic in number theory and classical analysis under the supervision of Karl Dilcher. He then went to the University of Toronto and completed an M.Sc. in Neural Networks. He later received his Ph.D., also in Toronto, designing an interface for computer puppetry to create animation in real-time.

For the last few years Sageev has been at Saint Mary's University, where his research program is centered on developing expressive interaction tools, such as those needed for creation of sophisticated visual and audio content.

While studying Mathematics and C.S. at Dalhousie, and before, Sageev also became an accomplished concert pianist. He performed as guest soloist with Symphony Nova Scotia and his recordings of classical to early 20th century piano music were broadcast on a CBC special. Sageev soon branched out into various other genres of music and performing art, and locally he is perhaps best known as a member of the award-winning group "Gypsophilia", and as a performer at several Atlantic Jazz Festivals, sometimes together with his brother Dani. Among numerous other musical activities he also accompanied silent movies on the piano.

We are happy to welcome as our Awards Day Speaker a Dalhousie alumnus who has combined mathematics, computer science, music, performing arts, and teaching in such an unusual and innovative way. *-kd*

## POSTDOCTORAL FELLOWS

**Mahya Ghandehari** received her Bachelor's Degree in civil engineering in 2001 from Isfahan University of Technology, Iran. She obtained her Master's degree in mathematics at Sharif University of Technology. In 2005, she finished her second Master's degree at Concordia, and in June of 2010 she defended her Ph.D. thesis at Waterloo under the supervision of Brian Forrest and Nico Spronk. She then joined our department as an AARMS PDF to work with Jeannette Janssen and Keith Taylor. Her research interests are in harmonic analysis, Fourier analysis, and combinatorial structures.

**Toby Kenney** received his Ph.D. at Cambridge University in 2006, and came to Dalhousie in September of that year as an AARMS postdoctoral fellow. His research interests are in category theory and topos theory, and he had been working with Bob Paré and Richard Wood. From August 2008, until October 2009, he had a research position at Matej Bel University in Banska Bystrica, Slovakia. Since January of 2010 he has again been a postdoctoral fellow in our department, this time working with Dorette Pronk. More recently his research interests branched into statistical genetics and biological networks, and he has been working with Joe Bielawski and Hong Gu.

**Peter Lumsdaine** joined our department in September of 2010 to work with Peter Selinger as an AARMS PDF. His current research is in categorical logic, higher category theory, and constructive mathematics. He obtained his Bachelor's and CASM at the University of Cambridge, and last December he defended his PhD at Carnegie Mellon University, supervised by Steve Awodey.

**Mahdi Shafiei** received his PhD in Computer Science here at Dalhousie in 2009. But already from November 2008 he did postdoctoral research at Acadia University under the supervision of Hugh Chipman, on statistical learning for networks, including social networks and transactional network modelling. In January 2011 Mahdi joined our department to work with Joe Bielawski and Hong Gu on network modeling of complex microbial communities most closely associated with the human body.

**Francis Valiquette** will be working as an AARMS post-doctoral fellow under the supervision of Robert Milson. Francis received his undergraduate degree in Mathematics and Physics from the Université de Montréal. He did his graduate work at the University of Minnesota, receiving his PhD in 2009 under the supervision of Peter Olver. His research is in mathematical physics and the geometry of differential equations. Francis spent the next two years at McGill University as an NSERC post-doc where he pursued research in infinite-dimensional transformation groups.

**Huaichun Wang** received his Ph.D. in Biology at the University of Ottawa in 2005, and is a Postdoctoral Fellow funded by the Center for Comparative Genomics and Evolutionary Bioinformatics. His research interests include Molecular Evolution and Bioinformatics, and he has worked with Ed Susko and Andrew Roger of the Department of Biochemistry and Molecular Biology on statistical modeling of protein sequence evolution.

**Michael A. Warren** has been with us since September 2010, as an AARMS PDF under the supervision of Dorette Pronk and Peter Selinger. He received his undergraduate degree from the University of St. Andrews (Scotland) in 2002 and obtained his Ph.D. in 2008 from Carnegie Mellon University. Before joining

us, he was a postdoctoral fellow at the University of Ottawa, supported by the Fields Institute. His research is in category theory, mathematical logic and homotopy theory. He will leave us at the end of the summer to take up a fellowship at the IAS in Princeton.

### THE CHASE FAMILY

Perhaps it was the noisy renovations, or the flood in the basement. But after the previous four Chase Reports listed a total of 11 weddings and 13 babies, there is only one wedding and one baby to report for this past year; but rumor has it that at least one other Chase baby is on its way.

On August 22, 2010, **Balagopal Pillai** and his wife Ramya were married in India.

A baby girl, Evelyn, was born to **Stewart Carson** and his wife Pam in late November, 2010.

Congratulations and best wishes to both families! *-kd*

### GOURD GRIEF!

In some previous Chase Reports I was able to report on the sons of one or two department members who ran in the Boston Marathon. However, there are some people, among them **Angela Siegel** and family, for whom a marathon, even of the Boston variety, is much too pedestrian as a racing venture.

In fact, it has been reported that some time last October, somewhere in the Valley, the Siegel family got hold of a 963 lb pumpkin, carved it to make it seaworthy (well, let's say lake-worthy), painted it with nice flowers, and participated in a race across a lake. They finished third, and made page 3 of the *Chronicle Herald* the following day. But more importantly, Angela and Eric upset neither their pumpkin nor their children who were watching from the shore. Their bib number, by the way, was 43, and so they were obviously primed for success. *-kd*

### THE DEPARTMENTAL LIBRARY

Elsewhere I reported on the flood disaster that befell our library last summer. In addition to the 1200 volumes of journals that were affected, a few dozen out-of print textbooks were also destroyed, but fortunately none of the more valuable advanced monographs that have been stored in the library. As most department members know, I keep a stock of old mathematics, statistics, and C.S. books, with the more elementary books stored in Room 107, and the more advanced ones in the library and in Room 305. All are for sale, with the proceeds going towards the purchase of new books. Many of the more advanced books are catalogued at

<http://www.mathstat.dal.ca/~dilcher/oldbooks.html>

Finally, I thank Danielle Cox for looking after the day-do-day operation of the library, and Swami who continues to send out the weekly "New Books" mailings, with those interesting biographical/historical sketches. *-kd*

### NEWS OF RECENT GRADUATES

Le Bao (M.Sc. Statistics, 2005) is completing the Ph.D. in Statistics at the University of Washington and has accepted a faculty position at Penn State University.

Vaneeta Grover (Ph.D., October, 2010) has taken a position as a Consulting Statistician at Dupont Corp.

Lihui Liu (M.Sc., October, 2010) is a Ph.D. student in Statistics at the University of Alberta.

Jihua Wu (Ph.D., October, 2010) is a postdoctoral fellow in Statistical Genetics at the University of Alabama.



## TWO LETTERS AND ONE GRADUATE

There are different ways of finding lost graduates. A fairly unique one is probably by way of a letter in a well-known national newspaper. On May 12, your attentive department chair spotted a familiar name, **Ben Sichel**, in the Letters section of said paper. This led to a brief correspondence and the following biographical sketch:

Ben Sichel (BA History and Math, 2002) trained as a high school math teacher but soon found himself teaching Spanish instead. Last year he took a group of his Prince Andrew (Dartmouth) High School students on a trip to Guatemala, where he managed to slip in a quick lesson or two on Mayan mathematics. In his spare time he pens the occasional polemic for alternative media.

## YOUNG AT HEART

While much of this publication recognizes and celebrates the achievements of the younger members of the academic community in our disciplines, our department has always benefitted from the tremendous contributions by our (officially) retired colleagues. At this place I just wish to recognize the *teaching* contributions of three of our more senior colleagues.

**Fred Kennedy** holds a Ph.D. in Physics and, as science librarian, was also responsible for Mathematics and Statistics, and taught 1st- and 2nd-year courses for us for decades. He has continued to teach for us well into his official retirement, most recently teaching MATH 2040, our second linear algebra course, this past winter term.

**C.C.A. Sastri** returned last Fall after a 3-year post-retirement position at the Missouri University of Science and Technology in Rolla, Missouri. This past winter term he taught MATH 3120, our second course in differential equations.

**W.R.S. (Dick) Sutherland** taught MATH 3300, Optimization, in the Fall of 2010, thus teaching again for the first time since his retirement several years ago.

By all accounts, all three greatly enjoyed their teaching experience, and this was reciprocated by a great deal of student satisfaction. I would like to thank Fred, Sastri, and Dick, for helping us out in a year that saw more than the usual number of sabbatical and other leaves. *-kd*

## EXCELLENCE IN TEACHING AWARD

Since I'm on the topic of inspired and inspiring teachers, I'm happy to report that **Andrea Fraser** is this year's recipient of the Faculty of Science Award for Excellence in Teaching. Science is a very large faculty, so this is indeed a great distinction.

The citation states that Andrea has taken traditional classroom teaching to its highest level through meticulous preparation, great clarity, and sensitive presentation. This is combined with individual guidance and respect for students at all levels of ability. In the words of a student:

"Dr. Fraser displays all aspects of a wonderful teacher: immense knowledge, solid organization, clear love of the subject matter, genuine interest in the students, complete approachability, and an ability to convey even advanced principles from the ground up without losing the students."

Congratulations to Andrea on this prestigious award!  
*-kd*

## THE ROSEMARY GILL AWARD – DOUBLE RECOGNITION

The quality of a university education is not only determined by teaching, but also by other services to students. *The Rosemary Gill Award* recognizes outstanding service to students, other than teaching. I am happy to report that two of this year's four University-wide awards go to members of our department, namely **Gretchen Smith** and **Sara Faridi**.

Gretchen was already one of the first recipients of this award after it was established in the 1990s. This renewed award is the well-deserved recognition of her continued excellent service, caring, and kindness towards our students.

## A BORWEIN BIRTHDAY BASH

Sara has had a great impact on the graduate program in Mathematics, and is known as a most competent and caring supervisor to her own students, and advisor to all mathematics graduate students.

On Tuesday, June 7th, 4:00 - 5:30 p.m. there is going to be a reception to honour the awardees. This will likely be in the Victoria Room in Shirreff Hall. A previous winner was Paula Flemming who received this award in 2007. Congratulations to Gretchen and Sara on this recognition. *-kd*

## A NATIONAL RESEARCH AWARD

After writing about a teaching and two service awards, I'm happy to add a national research award to this list. As already mentioned above, **Edward Susko** is this year's winner of the CRM-SSC Prize. The Centre de recherches mathématiques (CRM) and the Statistical Society of Canada (SSC) give this award in recognition of outstanding research accomplishments by a statistical scientist during the first fifteen years after earning their doctorate. The award citation reads:

"To Edward Susko, for his pioneering work in probabilistic and statistical modeling in biology, evolution and genetics, and his important collaborative and interdisciplinary contributions to the understanding of comparative genomics and molecular phylogenetics".

Ed will deliver the CRM-SSC Prize in Statistics Address at the 39th Annual Meeting of the Statistical Society of Canada to be held in Wolfville, NS, June 12 to 15. Further information about Ed's work and this prize can be found in the May issue of the SSC "Liaison", at [http://www.ssc.ca/webfm\\_send/597](http://www.ssc.ca/webfm_send/597). Congratulations to Ed on this great distinction. *-kd*

**Jonathan Borwein** spent a total of 20 years at Dalhousie, 15 of them as a member of this department which he first joined as a postdoctoral fellow in 1974. It is therefore fitting that our department was well represented at a conference organized by Simon Fraser University, where he had also spent 11 years of his illustrious career. The conference ("Workshop on Computational and Analytical Mathematics in honour of Jonathan Borwein's 60th Birthday") took place between May 16 and May 20 and was attended by Keith Taylor, Rob Noble, Karyn McLellan, and Karl Dilcher, all of whom gave talks.

A good number of former Dalhousie colleagues, postdocs, and sabbatical visitors also attended: Heinz Bauschke, Peter Borwein, David Bradley, Marc Chamberland, O-Yeat Chan, Eva Curry, Ron Ferguson, Frank Garvan, Alexander Ioffe, Adrian Lewis, Dante Manna, Tony Thompson, and Jane Ye.

At the conference banquet Karl Dilcher presented birthday wishes on behalf of this department. We wish Jon and his family all the best on the occasion of his 60th birthday, including a continued productive career in Newcastle, Australia, where he has been since 2008. *-kd*

## ACROSS THE UNIVERSE....

... may be an exaggeration, but **Jason Brown** traveled across the continent to first present his public lecture "*A Hard Day's Math* : The Connections Between Mathematics and Music" at the CMS Summer Meeting in June, 2010, in Fredericton, NB. "Lecture" may actually not be the right term, as he appeared with a band. Again with a band, Jason will just have presented "Science Sings the Blues" on May 25th of this year, at an event in California sponsored by the U.S. National Academy of Science. This follows similar appearances elsewhere in previous years, and here at Dal in the "Science Seminar" on October 5th of last year. Jason also continues to write a regular column on mathematics in every-day life for the Halifax *Chronicle Herald*. *-kd*

## A FLOOD DISASTER

When the department library moved into the basement in 2008, we all thought that it was a perfectly safe place for our journals; after all, the lowest shelves were several inches above the floor. However, the unexpected happened on the night of July 23 of last year when there was a fairly insignificant fire in the greenhouse area of the 8th floor of the LSC. As a result, the sprinkler system was activated, as it should, but it led to the rupture of the water main which went through the tunnel attached to the Chase Building. This in turn resulted in the flooding of our basement with about a foot of water.

Fortunately, our main computer servers were just high enough above the floor to avoid damage, but other electronic equipment in the machine room, in Balagopal's office, and in the temporary office in Room 007 was destroyed. The bulk of the damage, however, was sustained by the library, where all journal volumes on the lowest shelves ended up sitting in water. The library immediately sprang into action, and the following morning, a Sunday, about a dozen library personnel packed the soggy volumes into boxes and shipped them off for storage in a freezer. Since restoration is very expensive and few of the volumes are irreplaceable, they will likely be discarded and replaced by (mainly) electronic subscriptions.

All drywall in the basement was also damaged and had to be repaired, and the renovations, much of it overseen by Gretchen, lasted into September. *-kd*

## MATHEMATICS AND STATISTICS RESOURCE CENTRE

by Pierre Stevens

If you guys still wonder, well let's set the record straight:

The Resource Centre is still THAT wonderful place. I still drag visitors to the Centre and proudly show them our "new" place. Hopefully that feeling will last a long time. And, it's true, it's wonderful to see grad students sitting in the easy chairs, chatting away and doing mathematics the social way. It's still neat to see first year students sitting down for a game of chess. It's a joy to see some of our students relaxing with a game of Gomoku.

And it is so satisfying to, in general, see a good turnout from first year students to third year students; struggling solitarily, or in groups, through their assigned work. And there is some "schadenfreude" when 5 o'clock comes around and one has to "kick them out", because it is closing time. Not exactly schadenfreude, but a little bit of joy on my side when they protest that they have to leave and can't go on doing mathematics.

And then there is the other type of joy: the joy of seeing the initially reluctant TA, one who does not really know what the job in the Resource Centre is going to be like, turn into the TA who is loving it and blossoming into a competent communicator in mathematics.

And the TA's have again been a wonderful bunch this year from the beginners to the experienced. They are the ones that make it happen, they do the lion's share of our work, either on a one-to-one basis, or in group work through class tutorials. In no particular order they were this year:

Chris Levy,  
Youssef Zaky,  
Daniel MacKeigan,  
Mark Pavlovski,  
Rob Noble,  
Melanie Abeysundera,  
Karyn McLellan,  
Stuart Carson,  
Rebecca McKay,

Matt Hurshman,  
 Neil Ross,  
 Tom Potter  
 Andrew MacDougall,  
 Zhenyu (Victor) Guo,  
 Jian Li,  
 Liwen Zou,  
 Ed Reddick,  
 Jinyi Liu,  
 Wei Dai,  
 Jing Zhang,  
 Jessica Wong,  
 Wei Chen,  
 William Cai,  
 Colin Pentney,  
 Donald Patterson,  
 Setareh Modirian,  
 Greg Britton and  
 Caroline Urquhart.

Guys, you were terrific!!! You are so essential in making the Resource Centre what it is! Thank you for your positive attitude, your openness, your constructive approach, your enthusiasm and your share and care; it all contributes to a culture of learning. Thank you for keeping it all going.

And shame on me if I forgot someone.

Some of you will not be here anymore next year. Others will continue and I will look forward to welcome you all back in the fall to continue being an excellent resource for our first and second year undergraduate community.

Good luck to all.

### IN MEMORIAM

**Kevin J. Moriarty**, a member of our department from 1983 until his retirement in 2005, passed away August 24, 2010, at the age of 70.

Having grown up in Halifax, Kevin graduated in 1961 with a B.Sc. in Mathematics and Physics from SMU and in 1963 with an M.Sc. in Solid State Physics from Dalhousie. He subsequently studied at Imperial College, London, where he received a Ph.D. in

Mathematical Physics in 1971. He remained at the University of London until 1983, first as a Lecturer in Mathematics, and then as a Reader in Applied Mathematics, both at Royal Holloway College. In 1983 Kevin returned to Canada and to Dalhousie as a professor in our department which at that time included Computing Science, with a cross-appointment in Physics.

Kevin was a prolific researcher; he authored or co-authored more than 260 academic papers in theoretical physics in international scientific journals and books. He held research grants throughout his career at Dalhousie, and attracted substantial research funds from other sources. His research in particle physics led him to be an early user of parallel computing. He became an advocate for establishing a supercomputing centre in Nova Scotia, and formed relationships with supercomputer centres in the United States. In the early 1990s he founded his own company that produced and marketed software development tools for high-performance computing applications.

Kevin is survived by his wife Shizuko, sister Eleanor and brother Patrick Moriarty, all of Halifax. He is also survived by his daughter from a previous marriage, Debbie Tearle of Surrey, England, with husband and three children. -*kd*

### MATH CIRCLES by Angela Siegel

This marks the second year of our province-wide expansion project. The Math Circles team has grown as has the area of our coverage. We are excited to have reached into new regions this year, particularly to many new schools in the Tri-County Regional School Board as well as one in the Acadian school board. We are also thrilled to be able to revisit many of the schools in which we had previously-established relationships.

Angela Siegel remains the Program Director and continues to coordinate the expansion efforts. She is responsible for the marketing and outreach efforts of the organization. Marketing efforts have expanded beyond the Nova Scotia Math League schools this year. In October 2010, Math Circles was

represented at the Nova Scotia Science Teachers Association, in order to promote the program to the many math and science teachers attending. A large mailing campaign to previously-attended schools resulted in many visit requests. An effort has also been made to make our events more present on various websites. Not only are upcoming events made public on the Math Circles website ([www.nsmathcircles.com](http://www.nsmathcircles.com)), but we are also maintaining links and coverage on various other sites, with the most productive being a Dalhousie site that promotes outreach activities available to P-12 students in the province.

Richard Nowakowski and Dorette Pronk continue to serve on both the Ideas and Presentation Teams. Both have worked with us to produce new materials and topics for the program. As faculty members, the ability to travel is more challenging for them during the normal school year. As such, we will be expanding our Presentation Team over the 2011 summer months to include four graduate students. Nowakowski and Pronk will remain integral components of our Ideas Team as we continue to develop new materials.

Danielle Cox remains an essential part of our team. She will work closely with the new staff members to help them develop materials that work within the framework of our program. The goal for our summer 2011 will be to have each member of the Ideas team develop 3-4 new topics, along with presentation slides and pre/post-lesson materials for the teachers.

Our Evaluation Team met over the school year to consider the topics that we've developed so far and discuss the directions that we should move in the future. As a wrap-up to the summer, we will reconvene to evaluate the new materials that are to be developed by the Ideas Team over those months.

The primary target during the fall was the Tri-County Regional School Board (TCRSB), which we had previously not had strong contacts in. In the fall of 2010, we were able to make two separate trips down to TCRSB schools. We spent an entire week in that school board touring the bulk of their high schools and then returned the following week to hit most of those that we had missed. In total, we gave 17 different presentations to 10 TCRSB schools,

presenting to 634 students during that time. We feel that this represents a very solid coverage of this school board, which we are quite pleased with.

We were also very fortunate last year to have two schools from the Conseil Scolaire Acadien Provincial (CSAP), the Acadian school board, attend our first annual Math Fun Days event. This exposure served to help us gain our first presentation tour in a CSAP school. In the fall, we were able to give a days' worth of presentations at École Secondaire de Clare. The primary instructor that we worked with at this school, Alain Gamache, was enthusiastic about our future involvement in his and other CSAP schools. His enthusiasm was such that he has volunteered to be a part of the Evaluation Team, that vets the materials that we plan to distribute to schools, and offer French translations of marketing materials.

This spring, for the second time, we made a week-long trip into the Cape Breton – Victoria Regional School Board. We were able to visit 6 high schools and gave 11 presentations to over 200 students in that region.

We continue to survey teachers after presentations are given. Their input guides our topic choices and decisions as we move forward. We have found a need for more topic choices as we have been requested to return to schools much more often than we had at first anticipated. This need has driven our decision to expand our Ideas Team and focus our efforts on presentation generation over the summer months.

We look forward to continued growth and success in the 2011-2012 school year!

**DALHOUSIE UNDERGRADUATE  
MATHEMATICS AND STATISTICS SOCIETY  
(DUMASS) Report**  
by Sarah Vinette

Council Members:  
President: Sarah Vinette  
Vice President: Oleg Zarakhani  
Treasurer: Mina Cernescu  
Secretary: Matt Pinnell  
Communications Representative: Chelsea Wichert  
DSS Representatives: Matt Dempsey & Chris Rector

This year was a fun and successful year for DUMASS. We started the year off with our display at the Society Fair in September to encourage students to take part in our events. We also had a welcome back barbecue on the Chase balcony. The barbecue had a great turn out of faculty, graduate, and undergraduate students. We followed this up with a Hallowe'en party with the giant calculator in attendance, of course. The annual faculty wine and cheese event in February was a success with the Colloquium room transformed for one night into a classy venue for professors and students to mingle and taste wine. We had a display at the Dalhousie Science Society Science Expo to promote math and stats for first year students and answer any questions and our pool nights at Locas were a great opportunity for us to relax in the evenings.

We are pleased to report that the December and April tutorials were a success with an excellent turn out. The annual general meetings were full of accomplishments including the election of the council members for next year.

We would like to congratulate those students who graduated this year and wish them luck in their future endeavors. Thank you to everyone who came out to our events and supported this year's society in hosting these events.

Welcome and best of luck to next year's council:  
 President: Oleg Zarakhani  
 Vice President: Chris Rector  
 Treasurer: Jasper Dupuis  
 Secretary: Matt Dempsey  
 Communications Representative: Thomas Crowell  
 DSS Representatives: Catherine McGivney & Abdullah Al-Shaghay

### **DISTINGUISHED SPEAKER SERIES**

This year's lecture in our department's Distinguished Speaker Series took place on March 10th in the Scotiabank Auditorium. The title was "Our Evolving Climate", and the speaker, Dr. Francis Zwiers, is a leading climate researcher, and is President and CEO of the Pacific Climate Impacts Consortium at the University of Victoria. He received his Ph.D. in Statistics in our department in 1980, under the

supervision of Jean Thiebeau.

The brief synopsis of the lecture, taken from the poster, states:

"Climate variability and change, particularly extreme events, continually occupy headline space. While short-term climate variability is predominantly natural in origin, evidence is mounting that human influence has affected long-term climatic averages and even the odds of some kinds of extreme events."

As usual, a great deal of preparation for this public lecture and for the reception that followed was done by Gretchen Smith and R.P. Gupta. *-kd*

*The Distinguished Speaker Series*  
 Department of Mathematics and Statistics

# OUR EVOLVING CLIMATE

Presented by  
 Francis Zwiers

Thursday, March 10, 2011  
 7:00 p.m.

Scotiabank Auditorium, McCain Building,  
 University Avenue

**DALHOUSIE  
 UNIVERSITY**  
 www.mathstat.dal.ca

Climate variability and change, particularly extreme events, continually occupy headline space. While short-term climate variability is predominantly natural in origin, evidence is mounting that human influence has affected long-term climatic averages and even the odds of some kinds of extreme events.

Francis Zwiers, FRS, FRM  
 Director, Pacific Climate Impacts Consortium  
 University of Victoria

## OUR LATEST EMERITUS

A special honour for distinguished retired scholars is the appointment as Professor Emeritus. Just recently **Bob Paré** has been awarded this well-deserved designation.

After 40 years as a member of this department, Bob had to officially retire on June 30, 2009, having missed the abolition of mandatory retirement by just an epsilon. Bob was born in Québec City, and received his B.Sc. at Laval University in 1966. After finishing his M.Sc. and Ph.D. degrees at McGill, he came to Dalhousie in 1969, to join as a postdoctoral fellow the very vibrant Category Theory group then led by Bill Lawvere.

After two years as a postdoc, Bob was appointed Assistant Professor, and he quickly rose through the ranks. He soon became a leader in the field himself, and he supervised four M.Sc. and six Ph.D. students, among them our colleague Richard Wood and Robert Rosebrugh of Mount Allison. Under Bob's and Richard's leadership, Category Theory continues to remain a strong research area at Dalhousie, and one of the recognized centres in the World for research in the field.

Bob has remained an active member of this department, and we will continue to benefit from his wisdom, his legendary sense of humour, and his contributions to the research profile of our department. Congratulations, Emeritus Bob! -kd

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## ALPHANUMERIC PUZZLE

**FORTY** Find the arithmetic sum hidden behind  
**TEN** these letters using deductive logic. Each  
**TEN** of the letters stands for one of the digits  
**SIXTY** 1, 2, ..., 9.

Answer to this puzzle on page 22.

## DALHOUSIE GRADUATE MATHEMATICS AND STATISTICS SOCIETY

2010-2011 Year-end Report by  
Rebecca Keeping

The Graduate Student Society had a great year. In the fall semester we held two board game nights in the Chase building, which were well-attended by graduate students in both math and statistics, and even attracted a few undergraduates. We also organized an end-of-term group dinner at Opa downtown and had a great turnout.

In the winter semester we held another board game night, this time at the Grad House, and were joined by some students from the physics department. For March 14<sup>th</sup> ("pi day") we served free slices of pie to students and faculty on the second floor of the Chase. Later that month we had a bowling night at the Halifax Shopping Centre.

At the end of both semesters we helped the undergraduate society coordinate final exam tutorials for statistics and calculus. These continue to be well-received by first-year students.

For the upcoming summer semester we are planning a potluck / games night at the Chase.

## GRADUATE REPORT – MATHEMATICS

by Sara Faridi

In the past year our graduate program has grown: we welcomed 6 Master's and 5 Ph.D. students into the department. One of the features of last year's class was the larger-than-usual number of international students. We had three students from Saudi Arabia, two from Iran, and one Canadian student from France. If all goes well, we are expecting around 15 new students from around the world next year, including Canada, China, Iran, Libya, Madagascar, Saudi Arabia, Turkey, and the U.S.A.

Thanks to new NSERC policies and the global economy, student scholarship support has gone down this year and our pockets are emptier. We have, however, succeeded in recruiting first-class graduate

students, and very much look forward to the vibrant mathematical environment that will result from their presence among us.

Over the last year, the graduate committee has been looking at the Ph.D. comprehensive exams, and at the courses that prepare students for them. We have created a new core course in Applied Mathematics (Applied Analysis) and are in the process of developing a core course in Combinatorics. We are hoping that in the next few months, we will have updated syllabi and references for many of our comprehensive exams.

We have also created two new courses (AARMS I and AARMS II) that students can register for over the summer to receive credit for courses that they take at the AARMS Summer School. This is expected to simplify the many hoops we have all had to jump through to process these courses in the past.

Finally, last year our departmental graduate handbook, a collaboration between the two graduate coordinators of Mathematics and Statistics and Paula Fleming, came to life. The handbook covers the details of our graduate programs, and is meant to be used by all members of the department. The plan is that it will be updated and improved every year with a new version printed every summer for the incoming class of students.

## CONFERENCES

### **Combinatorial Games Workshop at Banff** by R. J. Nowakowski

The Department was well represented at the Games Workshop, at the Banff International Research Station (BIRS), January 10-14, 2011. All local expenses are paid by BIRS so there is great competition to get a Workshop accepted. (This is the third Games Workshop that BIRS has hosted.) Dr Richard Nowakowski was the Chief Organizer with Dr David Wolfe (adjunct) on the Organizing Committee. Forty people attended, coming from Asia, Europe and North America. Dalhousie is becoming a major centre for the field of combinatorial games and this was shown by its representation at the conference. Not only did Drs Nowakowski and Wolfe attend but so did

Nowakowski's PhD students, Neil McKay and Angela Siegel, both of whom gave talks, "Uptimals" and "Lattices in Games" respectively. In addition, Dr Paul Ottaway (Dal PhD 2009) gave a talk as did Dr Carlos Santos (Lisbon PhD 2010, external supervisor Nowakowski). Dr Meghan Allen's (Dal PhD 2009) latest work was also mentioned but she was unable to attend.

One of the main topics was the Monte Carlo methods that have revolutionized the Go-playing programs. Not only did we have many math and computer science experts, the conference attracted the attention of a world class Go professional. (In Asia, top Go professionals can make as much money as the top Golf professionals can in North America.) His insights were a revelation to many. He played against a computer program that reported its confidence in winning. As a human, it was gratifying to see the computer's confidence steadily rise from 50% to 80% as the game continued only to have it crash to 2% near the end.

As is typical at the Games Workshops, we held a human and a computer tournament. Each time we play a new game that no-one has played before in order to level the playing field. This year, the tournament game was NoGo, a new game with very simple rules introduced by Neil McKay. The computer programs written were based on the Monte Carlo methods and they provided immediate insight into the game. The simplicity of the rules belie the subtlety of the game. Because of these reasons and also because of the ease of computer implementation one of the experts already has a paper out touting NoGo as a new standard game to be used by researchers in the field.

## OKTOBERFEST

The title may be a bit misleading, but the Category Theory Oktoberfest is an annual workshop, traditionally held in Oktober, bringing together researchers in category theory and its applications. This year's meeting was hosted in our department.

There was an informal welkom reception on Friday evening, Oktober 22; the scientific program started on Oktober 23, and consisted of one and a half days of



research talks. The 17 speakers included some of the leaders in the field, but also a fairly large number of postdoktoral fellows and young fakulty members. Several of the talks have been archived on-line, and can be found at

<http://www.mathstat.dal.ca/~selinger/ofest2010/>

The Oktoberfest was organized by our kolleagues Peter Selinger and Dorette Pronk (who are from Europe where things are spelled differently). -*cd*

### SUCCESS AT THE APICS MEETING

The annual APICS Math, Stats and CS Conference took place at SMU in mid-October, and the much-anticipated annual mathematics competition was once again won by a Dalhousie team, the team consisting of **Yuxin Chen** and **Zhenyu (Victor) Guo**. Thanks to Dorette Pronk and S. Swaminathan for the competition training, and congratulations to Yuxin and Victor!

While Victor was already part of the previous year's winning team, this was Yuxin's first such success. The reader will also have noticed that both Yuxin and Victor are among our prize winners this year. Victor is graduating this year and will leave us for the University of Missouri to do graduate studies in number theory. -*kd*

### 2009 PUTNAM COMPETITION

by Dorette Pronk

Ethan Macaulay scored 18 points on the Putnam competition in December. This is a very respectable score on a competition for which it is considered a significant achievement when one can solve a complete problem for 7 points. (Unfortunately, Zhenyu (Victor) Guo had to miss the Putnam competition due to illness.)

### MATHEMATICAL TRICKS

by Dr. S. Swaminathan

In the following self-working mathematical tricks the outcome of seemingly random choices can be predicted in advance. Follow the instructions of each trick carefully and obtain the answer to the question at the end of the trick. Then turn to page 22 for a prediction of the outcome.

1. There was a young fractal named Fracta  
Who certainly knew how to factor  
She tried out ceramics but switched to dynamics  
And married a strange attractor.

Select any word in the first two lines of the above poem. Count the number of its letters. Call this number  $n$ . Now count ahead  $n$  words, starting with 1 on the word that follows the word you selected. Let  $k$  be the number of letters in this second word. Count ahead  $k$  words to arrive at the third word. Continue in this matter until you can't go any further. On what word does your count end?

2. Take out a \$20 bill from your wallet. Write down its serial number. Scramble the digits in any way you like, i.e., mix up the order. Jot down this second number. Using your calculator, subtract the smaller number from the larger. From the difference subtract 7. Copy the digits now on display, then add them together. If the sum is more than one digit add the digits once more. Repeat adding digits, if necessary, until just one digit is obtained. What is it?
3. Multiply 191 by 198 in your calculator. Turn the calculator 180 degrees and look at the result. What do you find?
4. Shuffle a deck of cards, then deal 30 cards to form a pile on the table. Count the number of black cards in the pile. From this number subtract the number of red cards in the rest of the deck. What is the difference?

## CHEBUCTO COMMUNITY NET

by Andrew D. Wright

When the Chebucto Community Net was founded in June 1994, text-based Internet access using the Lynx web browser was new technology. Lynx allowed ordinary residents of Halifax and the surrounding area to read the words on any website. Pictures could be downloaded and opened separately.

Seventeen years later, so very much has changed. Today the Internet is a multimedia wonderland with users demanding high-definition video and audio streams, seamless Voice Over IP, and download speeds that can rival the speeds of the hard drives writing the incoming data. For the 30.6% of Canadians who can afford highspeed access.

In 2003 writer William Gibson said, "The future is already here - it's just not very evenly distributed." In 2011, this is still one of the main issues facing us all.

There are three main Digital Divides preventing people from using the new tools of communication. Age, and its accompanying lack of technical experience; Income, and what spare resources are available for Internet; and Location, which in this instance means availability and latency.

Chebucto Community Net offers advice, information and even some hands-on instruction to seniors looking to get online safely. Seniors are the fastest growing sector of the Nova Scotia population and we've identified that a knowledge gap exists between those over the age of thirty five and the rest of the population. Technological skills are best in older people who were exposed to computers in their workplaces.

Income presents a very large block to Internet usage. In the first paragraph I described 1994 Internet technology. In 2011 we are still signing up new accounts for this service. For those who have a computer, modem and landline phone, but little or no money, Chebucto Community Net's text service represents literally the only game in town for home access.

While officially highspeed access is now available to all Nova Scotians, in reality there are still some places

where it has not yet reached. A number of rural Nova Scotians still use dialup Internet access and some of them are using Chebucto Community Net's service.

One person in five in Nova Scotia has no access to any Internet of any kind, including access to public terminals. According to United Nations figures, Internet access in Canada actually declined 9.4% between 2008 and 2009.

Halifax ranks 13th out of 16 Nova Scotian communities for Internet access speed. Nova Scotia ranks 8th among the provinces and territories. Canada has slipped in the rankings to 34th place in international download speeds, 69th place in upload speeds.

About one third of Internet users create and upload new content. When people cannot access the Internet, their voices are not being heard.

Chebucto Community Net is the second oldest community net in Canada, the longest running Internet Service Provider east of Ottawa, and we've helped tens of thousands of individuals and hundreds of community groups get online. We bridge the Digital Divide for many today.

We're also looking to the future. Implementing new secure services, adding new faster email services, becoming IPv6 compliant. The Internet moves ahead and we are here to bridge the Divides it leaves in its wake.

Thanks to the invaluable support of the Department of Mathematics and Statistics and Dalhousie University, we can continue helping to improve the quality of life for all Nova Scotians, no matter which side of the Digital Divide they are on.

## CANADIAN MATHEMATICAL SOCIETY

Our Colleague **Keith Taylor**, whose day job is Associate Vice President Academic (Outreach and International Relations), will put his administrative experience to good use when he joins the Executive of the Canadian Mathematical Society. In fact, Keith becomes President-Elect at the CMS Summer Meeting in Edmonton in early June. A year later he will then

become President of the CMS for a 2-year term.

Our department has a long tradition of strong support for the CMS. Currently, for instance, Swami is Technical Editor of the CMS journals as well as co-editor (with Robert Dawson of SMU) of the CMS NOTES. Renzo Piccinini is now Book Reviews Editor, having recently taken over from Keith Johnson. And our department hosts one of the regional Math Camps, as reported elsewhere, under the leadership of Sastri, Suraj Sikka, and Roman Smirnov. Finally, Karl Dilcher will represent the Atlantic region on the CMS Executive as VP Atlantic.

Keith Taylor isn't the first CMS President from (or affiliated with) this Department. Renzo Piccinini, then at MUN, served from 1983 to 1985, Peter Fillmore 1994-1996, and Jon Borwein (then at SFU) 2000-2002.

Congratulations to Keith on this high-profile appointment of great importance for the mathematical community in Canada. -*kd*

**CMS MATH CAMP**  
**JULY, 2010**  
by Suraj Sikka

The camp was held by the Department of Mathematics and Statistics, Dalhousie University, from July 4 – 9, 2010, under the auspices of Canadian Mathematical Society (CMS) and Dalhousie University. This was the eleventh such camp and once again was made possible by financial support mainly from Dalhousie University and Canadian Mathematical Society (CMS). Suraj Sikka was the organizer.

The goal of the camp was to identify, stimulate and encourage mathematical and statistical talent among the Nova Scotia high school students. Lectures, problem solving sessions and computer activities were given by faculty members from Dalhousie and St. Mary's Universities, graduate students from Dalhousie Math & Stats Department. The instructors were Keith Taylor, Richard Wood, Richard Nowakowski, Theodore Kolokolnikov, S. Swaminathan, Angela Siegel (from Dalhousie University) and Robert Dawson and Wendy Finbow-Singh from the St. Mary's University. We greatly appreciate their support. We are also pleased to

thank Gretchen Smith, the departmental administrator, and the secretaries, Maria Fe Elder, Paula Flemming and Ellen Lynch for their unstinting help. None, among the instructors, organizers and helpers, received any payment for services rendered.

Twenty students, 12 boys and 8 girls, from high schools across Nova Scotia were invited to attend the camp. The students arrived, and registered on Sunday, July 4<sup>th</sup> between 1:30 to 2:30 pm. The organizer and the two chaperons, Matt Hurshman and Danielle Cox received them. Matt and Danielle are graduate students from our department, many thanks to both of them for a job well done. The students and the chaperons all stayed at Risley Hall, a student residence. Following the registration, a reception was held for the students and the parents. Richard Nowakowski, represented the department along with a number of other faculty members were present. The students and their parents had a chance to talk to them and were very impressed. We would like to thank them for their participation.

Each day of the camp was divided into a morning session (9:00 to 12:00 with a 15 minute snack break) and an afternoon session (1:30 to 3:30). After the academic sessions were over, the students spend about an hour and half playing sports or working out at the Dalplex, the university's athletics and sports complex. Computers were an integral part of the camp. Robert Dawson, taught the students how to print on t-shirts some of the work they had done in class. For this purpose, each of the students were provided a t-shirt. They thoroughly enjoyed this activity, and the individualized t-shirts looked great. I would also like to thank Danielle Cox, Balagopal Pillai, Gretchen Smith, Paula Flemming, Maria Fe Elder and Ellen Lynch for their help in printing the T-shirts and looking after the closing ceremony arrangements. There were several extra-curricular activities – bowling, chess, and board games. Pizza party etc. This year, the NS International Tattoo, a very popular annual event in Halifax, took place in the same week as the camp. The chaperons took the students to this show and all of them enjoyed it very much.

We would like to thank Ron Fitzgerald of Math Resources Inc, for donating the package of their Math dictionary. The students were pleased to get them.

I am grateful to Richard Nowakowski and Keith Taylor for their support in the closing ceremonies. A T-shirt and a number of awards were provided by the CMS. A pizza party followed the ceremonies in the Chase building. The students were asked to fill evaluation forms at the end of the camp and it is evident that the students thoroughly enjoyed the variety of events and showed that the camp was a great success.

## **MATH CAMP FOR BLACK STUDENTS**

by R.P. Gupta

The nineteenth mathematics camp for black students was held the second week of July 2010. The camp was organized by the Department of Mathematics and Statistics and the Black Educators Association of Nova Scotia. Thirty-one students were selected to attend the camp from schools all over Nova Scotia.

The aim of the camp is to generate interest in mathematics, statistics, & computer science so these students can pursue further studies in these subjects.

The students are generally of grade six and seven and are brought to the Dalhousie campus. While here they stay in Howe Hall.

Mornings and early afternoons are devoted to lectures in mathematical, statistical and computer activities, while late afternoon and evenings are devoted to extra curricular activities where they can apply the talents they have learned in the classes.

They are taken to Dalplex for one hour each afternoon where they participate in swimming and play other games such as basketball, tennis, etc.

They also visited the Nova Scotia museum of history and science and the Discovery Centre. Students of the Camp also spent an evening at the Black Cultural Centre in Dartmouth where they were told about the mathematicians and scientists of black origin and also saw a film.

The students were taught and cared for by six instructors (three university professors and four school teachers) and four chaperons. The Camp was

organized under the directorship of Professor R.P.Gupta of Dalhousie University and Mr.Gerry Clarke of the Black Educators Association. It was financially supported by NSERC Promo Science Grant, Dalhousie University, the BEA and the Canadian Math Society.

## **AARMS**

by David Langstroth

2010 – 2011 was another busy year for AARMS. A successful summer school offering graduate – level courses was held at UNB in Fredericton in July 2010. We offered courses on non-commutative and riemannian geometry, and a course on applied statistics. There were nine students from the Atlantic region, six from other parts of Canada, and nine from other countries. The 2011 Summer school will take place at Memorial University in St. John's under the direction of Jie Xiao, offering courses on computational, geometric and applied analysis.

Anyone interested in the 2011 summer school can find more information on our website:

[www.aarms.math.ca/summer](http://www.aarms.math.ca/summer).

Over the year we also funded more than 15 workshops, conferences and outreach projects, ranging from the large Canadian Number Theory Conference at Acadia in summer 2010 to special sessions at the APICS conference at Saint Mary's and a variety of specialized events around the region. If you are interested in applying for funding for a future event please visit our website: [www.aarms.math.ca/events](http://www.aarms.math.ca/events).

Thanks to new funding over the past two years from the provinces of New Brunswick and Nova Scotia, AARMS has been able to significantly increase its post-doctoral fellowship support program. Five new postdocs started work in September 2010 and in the spring of 2011 we awarded funding for four more to start in September: Dawood Kothawala, who will be working at UNB Fredericton under the supervision of Jack Gegenberg; Hongying Shu, who will be working at UNB Fredericton under the supervision of Lin Wang; Ryan Tifenbach, who will be working at Memorial University under the supervision of Danny Dyer; and Francis Valiquette, who will be working at Dalhousie under the supervision of Robert Milson. Next year's post-doctoral fellowship competition will open in November 2011. [www.aarms.math.ca/pdf](http://www.aarms.math.ca/pdf)

New in 2011 was the AARMS Collaborative Research Groups Program. This program offers two years of funding of up to \$15,000/year to a groups of 3 or more Atlantic Provinces University researchers who demonstrate that they have common research interests and wish to collaboratively develop some aspects of their research programs. In the spring of 2011 Awards were made to the Collaborative research group in Dynamical systems headed by Theodore Kolokolnikov; the Atlantic Algebra Centre, headed by Yuri Bahturin; and the Mathematical Ecology and Epidemiology group headed by James Watmough. AARMS was also the main sponsor the visit of AARMS Distinguished Lecturer Dr. Atle Minsaas, who attended the CAIMS conference in Newfoundland and gave talks at both Memorial and Dalhousie.

Finally, AARMS is pleased to announce the appointment of Jeannette Janssen as the new Director of AARMS for a four year term, starting in July 2011. We are looking forward to the next few years under her direction; and we would like to offer our thanks to Viqar Husain, who will be stepping down as Director, for his strong leadership since 2008.

### DIRECTORSHIP OF AARMS

Just recently **Jeannette Janssen** was appointed Director of AARMS, the Atlantic Association for Research in the Mathematical Sciences, succeeding Viqar Husain of UNB.

AARMS has become increasingly important for the Mathematical Sciences in the region. Perhaps best known are its flagship programs, the annual Summer School and the important PDF program. However, other important programs include conference series and support for ad-hoc conferences and workshops. Jeannette brings her administrative experience and her experience with various funding agencies to this position, in addition to her interdisciplinary research, close connections with the Faculties of Computer Science and Engineering, and graduate and postdoctoral supervision.

As the AARMS directorship is a part-time position, Jeannette will remain a member of our department and continue with her regular duties, but with a

reduced teaching load. She will receive administrative support from David Langstroth, the AARMS Administrator, whose office is in the CS Building.

Congratulations to Jeannette on this appointment. -kd

### MATHEMATICS COLLOQUIUM IN 2010/2011

Once again we had an active Colloquium program this past year, with a wide variety of talks from all areas of mathematics. In particular, we had the following talks:

Sept. 20: Konrad Schöbel (Friedrich-Schiller-Universität, Jena) *Algebraic integrability conditions for Killing tensors on constant sectional curvature manifolds.*

Sep 27: Ian Anderson (Utah State University) *A symbolic approach to classification problems in differential geometry and general relativity.*

Oct 21: S. Swaminathan (Dalhousie) *Little known facts about well known mathematicians and math-related matters.*

Oct 25: André Joyal (UQAM) *Higher topos theory, higher categories and brave new algebra.*

Oct 28: Alex Hoffnung (U. Ottawa) *Incidence Geometries, Buildings and Hecke Algebras.*

Nov 8: John Cosgrave (Dublin) *What is a Gauss factorial?*

Feb 14: Karen Yeats (SFU) *Patterns in Feynman graph denominators.*

Mar 14: Russ Woodroffe (Washington University in St. Louis) *Minimax chains and topology of the subgroup lattice.*

Mar 21: Peter Paule (RISC, Johannes Kepler University, Linz) *Symbolic Computation in Combinatorics: Recent Progress achieved at RISC.*

Mar 28: Hester Graves (Queen's University) *Lagrange's Four-Square Theorem and its Generalizations.*

Apr 5: Karl Hofmann (Darmstadt) *On some types of subgroups of compact groups.*

May 24: Gert Almkvist (University of Lund, Sweden) *Ramanujan-like formulas for  $1/\pi^2$  and String Theory.*

Many thanks to Andrea Fraser for her services as Colloquium Chair. We look forward to another active season of colloquia, with occasional talks also during the summer months. -kd

## NUMBER THEORY SEMINAR

We also had an active number theory Seminar this past year, starting with a "Number Theory Afternoon" on June 30th, 2010, with the following 4 talks:

Chester Weatherby (Univ. of Delaware)  
*Transcendence of Infinite Series with Applications of Baker's Theorem.*

Karyn McLellan (Dalhousie)  
*Growth Rates of Recurrence Sequences with Periodic Coefficients.*

Rob Noble (Dalhousie)  
*Asymptotics of a family of binomial sums.*

Karl Dilcher (Dalhousie)  
*A mod  $p^3$  analogue of a theorem of Gauss on binomial coefficients.*

The "regular season" talks were then as follows:

October 27: Karen Chandler (Dalhousie)  
*Counting Polynomials with Higher-Order Singularities.*

November 3: Ping Zhou (St.F.X.)  
*Some arithmetical results on certain multivariate power series.*

November 24: Rob Noble (Dalhousie)  
*Conjugate algebraic numbers on plane curves.*

December 6: Karl Dilcher (Dalhousie)  
*Fermat's Last Theorem.*

February 16: Karen Chandler (Dalhousie) *The Regularity of Singularity.*

March 2: Karen Chandler (Dalhousie)  
*The Regularity of Singularity, II*

March 9: Karen Chandler (Dalhousie)  
*The Regularity of Singularity, III.*

March 30: Hester Graves (Queen's)  
*Euclidean Ideals.*

The Number Theory Seminar was once again organized by Rob Noble. (To be more accurate, by Dr. Rob Noble, by the time this Report is published). Many thanks for his efforts. -kd

## STATISTICS COLLOQUIUM

By Joanna Mills-Flemming

The Statistics Colloquium speakers for 2010/2011 were:

September 16th: Introductory Seminar designed to provide some useful information to graduate students and upper level undergraduate students.

September 30: Greg Breed/ Dalhousie University & University of Santa Cruz

October 7: Gary Sneddon / Mount Saint Vincent University

October 21: JC Loredano-Osti / Memorial University of Newfoundland

November 4: Ying Zhang / Acadia University

November 25: Jessica Leigh / University of Otago

December 2: Dan Kehler / Parks Canada

January 20: Amanda Halliday, Statistics Canada

February 3: Michele Millar, Mount Saint Vincent University

February 10: Melanie Abeysondera, PhD student,  
Dalhousie University

March 3: Heather Hobson, The Atlantic Research Data  
Centre

March 10: Hugh Chipman, Acadia University

March 24: Elizabete Almeida/Georg Hoffman,  
Flagstone Reinsurance

April 7: Toby Kenney, Dalhousie University

## ANSWERS TO THE MATHEMATICAL TRICKS

Predictions (Mathematical Tricks on page 16)

1. The count ends on the word 'attractor'. This trick is based on what magicians call the Kruskal Count, a principle discovered by Princeton mathematician Martin Kruskal.
2. The number is 2.
3. You see the word 'BIBLE'.
4. The difference between the black and red cards is 4.

## LATE NEWS

The project Modelling and Mining of Networked Information Spaces (MoMiNIS), of which Jeannette Janssen is project leader (together with Evangelos Milios from CS) had its MITACS funding successfully renewed. The project, now in its 10th year, is one of the longest-running MITACS projects. MoMiNIS has been a significant contributor to graduate funding in our department.

## ANSWER TO THE ALPHANUMERIC PUZZLE

(on page 14)

$$29786 + 850 + 850 = 31486$$

### CHASE REPORT

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We welcome your suggestions and comments  
for future issues.