

Math & Computer Science

U N I V E R S I T Y O F L E T H B R I D G E

DEPARTMENT NEWSLETTER

CONTENTS

P. 1 - INTRO

P. 2:

- * Tenure Track, at last
- * Co-op Student

P. 3

- * Associate Dean (J. Rice)

P. 4-5:

- * Three D printer

P. 6:

- * Special Recognition

P. 7:

- * ACM programming
- * LUMACS

P. 8:

- * Jeff Bleaney, MSc 2014

P. 9:

- * Tom Arjannikov, MSc 2014

P. 10:

- * Kangaroo

P. 11:

- * PIMS Day of Math

P. 12-13:

- * Pi Day

P. 14:

- * Seminars
- * Colloquia
- * Conference(s)

The time has come for us to brag a little... about who we are and what we're doing.

I'm aiming for three publications a year, timed with the end of each semester. So I'm open to contributions from everyone.

I plan to archive them on the department website, for future reference and for historical purposes.

THE BIGGEST NEWS... The conversion of four positions from term to tenure-track: Jana Archibald, Abbas Momeni, Soroosh Yazdani and Robert Benkoczi. Congratulations! Now if only the letters of offer would come...



TO RUSSIA... We are once again going to Russia, at least via the ACM Programming Contest team. Coach Howard Cheng is pushing them hard, so hopefully, we'll see great results when they compete in Moscow this June!

WEBSITE OVERHAUL... I've spent a fair bit of time this semester upgrading our website, to make it more compatible with this department, and not a generic clone.

I'm continually adding to the department meeting Minutes as I locate missing ones, plus adding seminars, workshops, conferences, graduates students, and even a Hall of Fame.

Please note the tabs on the bottom of the front website page—I've worked with the powers that be to make it exclusive to us, without duplicating too much information already found in the regular drop-down choices on the site.

www.uleth.ca/artsci/math-computer-science

LONG SERVICE AWARDS

The annual long service awards will be held on Wednesday, May 7th at 1:00 pm in the Students Union Bldg. We are very pleased to acknowledge those from our department who are being honored this year. Congratulations!

Adminmohamed Adatia—10 years

Yllias Chali—15 years

Shahadat Hossain—15 years

David Kaminski—25 years

Shelly Wismath—25 years

ON THE RIGHT TRACK... TENURE TRACK



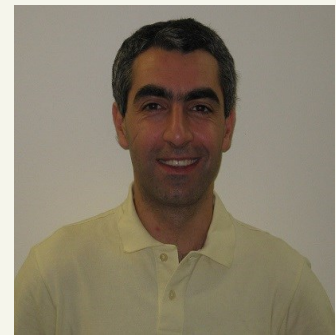
Jana Archibald
Instructor



Robert Benkoczi
Assistant Professor
Computer Science



Abbas Momeni
Assistant Professor
Mathematics



Soroosh Yazdani
Assistant Professor
Mathematics

A VERY COOPERATIVE CO-OP STUDENT

"I am finding this position to be a very good opportunity to gain experience in my desired field."



Once again, we have been fortunate to find an excellent co-op student, to assist Trent in running the systems side of things in the department. **Jay Mikhail** is a computer science major, in his fourth year. His main interest in computer science is Linux-based system administration, which he plans to pursue when he graduates this December.

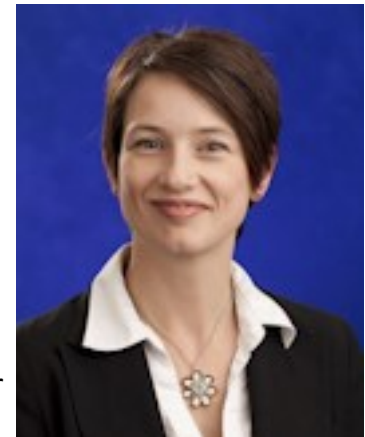
Jay is a very welcome addition to the department, and has proven himself to be both a knowledgeable and agreeable individual to work with.

Thanks, Jay, for all you have done so far... I'm certain we will think of ways to keep you busy!

NEWEST ASSOCIATE DEAN ... ONE OF OURS!

Dr. Jacqueline Rice, herein referred to as Jackie, was already a very busy member of the department, but has now added even more responsibilities to her schedule.

As of January 1, 2014, Jackie has been ensconced as the newest Associate Dean in the Faculty of Arts & Science. She oversees timetabling while Muriel Mellow is on leave, and has also taken over Rene Barendregt's portfolios which oversee space and research equipment allocation for the Faculty, as well as new program proposals. Jackie also oversees the new ASPIRE program, and has been given a mandate from the Dean to grow this to encompass humanities and arts outreach, as well as continuing to expand science outreach to non-traditional groups.



This semester Jackie has continued to teach a computer science course (CPSC3720), oversee several independent study courses and work with her four graduate students. Her main areas of interest include synthesis of Boolean logic functions (logic synthesis) as well as representations and classification of Boolean functions. In particular, much of her work involves research into decision diagrams (DDs) and various types of mathematical transforms such as spectral transforms and the autocorrelation transform. Jackie's most recent research includes reversible logic and synthesis and testing techniques for reversible logic.



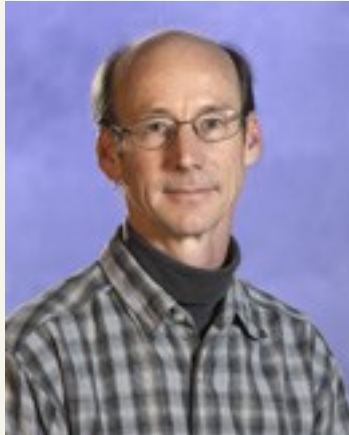
Other secondary areas of interest to Jackie include sociolinguistics in computer programming, particularly in how different groups' use of programming languages may differ, and education in computer science and engineering. She is also a co-founder of the LUMACS program (Life, U, Mathematics and Computer Science), a very successful University of Lethbridge outreach program.

Her primary webpage can be found at <http://www.cs.uleth.ca/~rice>. Please visit this page for information about her teaching and publications.

In the summer, Jackie and her students will be hosting a visiting MITACS student from India, and she will also be supervising two co-op students who will be working on improving automation in the Dean's office activities.

In addition to all this, she is very active in the lives of her three children, and even a pet or two (or four).

DO YOU THINK YOU'RE SEEING IN 3-D?



*Steve Wismath
Professor
Computer Science*

Cause you are! Thanks to one of the department's computer scientists, Steve Wismath, there is a 3-D printer on campus. In his HCI/Vis lab (shared with Kevin Grant), and under his supervision, graduate students and even undergrad students, are working on some amazing things. Joel Bennett, an MSc CS graduate student, added a plugin to the GLuska software for displaying 3D drawings of graphs so the graphs can be directly printed in 3D. His poster was recently accepted at Graph Drawing '13 -- in fact, the 3D printer was brought to France and graphs were printed on site at the conference! [see opposite page]

The students in Computer Graphics (CS3710) have for many years been required to complete a project using 3D modelling software to create an object. Last year, the students received a souvenir -- a 3D printed version of their object. To view their projects, see: www.cs.uleth.ca/~wismath/spring13

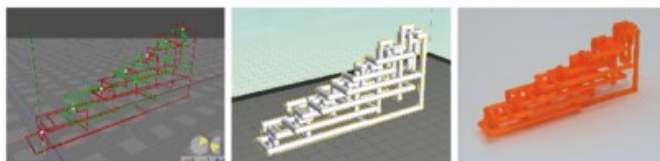
According to Wikipedia, 3D printing or additive manufacturing, is a process of making a three-dimensional solid object of virtually any shape from a digital model. It is achieved using an additive process, where successive layers of material are laid down in different shapes. The MakerBot Replicator 2 uses PLA plastic and has a 100 micron (vertical) resolution. 3D printing technology has been around since the 1980s, but it was not until the early 2010s that the printers became affordable.

The HCI/Vis lab is also working with: active shutter glasses for 3D viewing, the oculus rift for 3D virtual reality environments, Kinect and Leap motion controllers, EEG headsets, and 3D scanners -- all the cool stuff!

Graph Drawing 2013

3D Printed Graphs with GLuskap

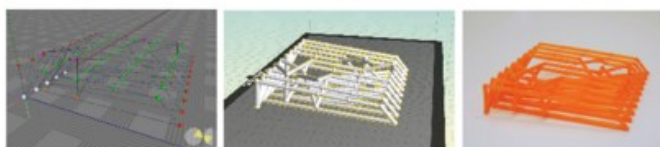
GLuskap is software for creating and editing graphs in 3D, and can now export to the STL file format, which allows graphs to be printed on a variety of commercially available 3D printers.



An orthogonal drawing of a K_7 graph with bends, as it appears in GLuskap, MakerBot® Makerware, and as a printed model.



The Petersen graph, as it appears in GLuskap, MakerBot® Makerware, and as a printed model.



K_5 graph with many endpoints, as it appears in GLuskap, Makerbot® Makerware, and as a printed model.

Available at: <http://github.com/uilethHCI/GLuskap>

All samples on this poster were printed with a MakerBot Replicator 2 on medium resolution with supports which were removed after printing.



Joel Bennett and Stephen Wismath
University of Lethbridge, Canada



JOEL BENNETT, MSc (computer Science)

Joel is currently finishing his Master's thesis, and is also in the process of starting a small business. He and several others recently won \$10,000 the South Venture Business plan competition and are creating a system to help people find local events. You can check out the web version at <https://pylons.info/>

SPECIAL RECOGNITION

The department boasts one of the largest number of graduate students at the University of Lethbridge. Currently, we have an international composite of 37 grad students, representing several nations. There are 28 in computer science (23 Master's, 5 PhD) and 9 in mathematics (7 Master's, 2 PhD). Many are highlighted in the grad student display cabinet, located in the west hall of the department near the main office (C526). A graduate student archives has been established on the department website but for privacy reasons, this is accessible by password only. The password is the same as for accessing department Minutes and course coverage reports.

There were two teams competing from the U of L in the Microsoft Imagine Cup Competition, with representation from the department by Joel Bennett and Mohammad Akbari, both MSc graduate students. The outcome of the competition follows:

University of Lethbridge master's students win Innovation category at Microsoft's Imagine Cup Canada

[by Trevor Kenney, U of L News and Information Manager]

Unique software program converts video of hands playing a piano into sheet music

A team of University of Lethbridge master's students is one step closer to winning \$50,000 and a meeting with Bill Gates after claiming the Innovation category of the Imagine Cup Canada competition organized by Microsoft.

Students **Mohammad Akbari** (computer science) and Hossein Naseri (physics), along with mentor, **Dr. Howard Cheng** of the Department of Mathematics and Computer Science, make up team claVision. Their project has created a new way to solve an old problem – how to transcribe piano music.

"Incredible, world-changing software innovations often come from students," says Microsoft. "Social networks, music services, digital photography apps, gadgets and robotics – the list goes on. In the Innovation category we are looking for the next big thing." That thing just might be a software program (Visual Automatic Music Transcription of Piano) developed by claVision that utilizes a video camera mounted on a piano that captures a person's hands as they play the instrument. It then converts the notes being played into sheet music.

"Mohammad has been working on this project as part of his master's thesis project under my supervision," says Cheng. "The big difference between this work and existing products is that this program can be used on any standard piano or electronic keyboard. The music is detected by 'watching' the pianist during the performance using video analysis algorithms. Other products require the use of a special electronic keyboard that transmits the keys pressed to a computer." The University of Lethbridge team is one of three winners from the first round of competition in Imagine Cup Canada, and will now challenge winners from the Games category (University of Calgary) and World Citizenship category (Marianopolis College) for the right to represent Canada at the 2014 Imagine Cup World Finals in Seattle, Wash. in July 2014. There, teams will compete for the coveted Imagine Cup trophy, up to \$50,000 USD and the opportunity to meet Microsoft founder Bill Gates. "The team now has a chance to improve upon their software, as well as submit a project proposal and video presentation to further impress the judges," says Cheng. "The project will be graded on technical merits as well as other criteria such as innovation and marketability. It's almost like going into a Dragon's Den presentation!" Microsoft Imagine Cup is in its 12th year and is a competition that invites students to use technology to do amazing things. To view a video demonstration of claVision's program, follow this link: <https://onedrive.live.com/?cid=3bfaa75d57938417&id=3BFAA75D57938417!113&ithint=video,.mp4&authkey=!A10YBI6bXDo1fBo>

*Mohammad
Akbari*



*Howard Cheng
"The Coach"*



ACM PROGRAMMING CONTEST

As one of the 21 North American universities advancing to the ACM International Collegiate Programming Contest World Finals in Russia this summer, our university was invited to compete at the North American Invitational Programming Contest in Chicago, March 28-30. The team consisted of Farshad Barahimi (MSc graduate student), Camara Lerner, and Chris Martin.

There was also a parallel online contest open to anyone, and Darcy Best (MSc 2013) competed from Australia in the online contest. He will join the U of L team at the World Finals in Russia this summer.

The results of the Chicago contest saw our team ranked 19 out of 21 teams. With a bit of hard work, Coach Howard feels the team will improve its standing.

LUMACS

The department's outreach program has proven immensely popular with parents and young children alike. Each year, LUMACS (Life U Mathematics and Computer Science) offers events throughout the year in which the community may participate. Jackie Rice and Nicole Wilson are very involved with LUMACS. Two such events were held this semester:

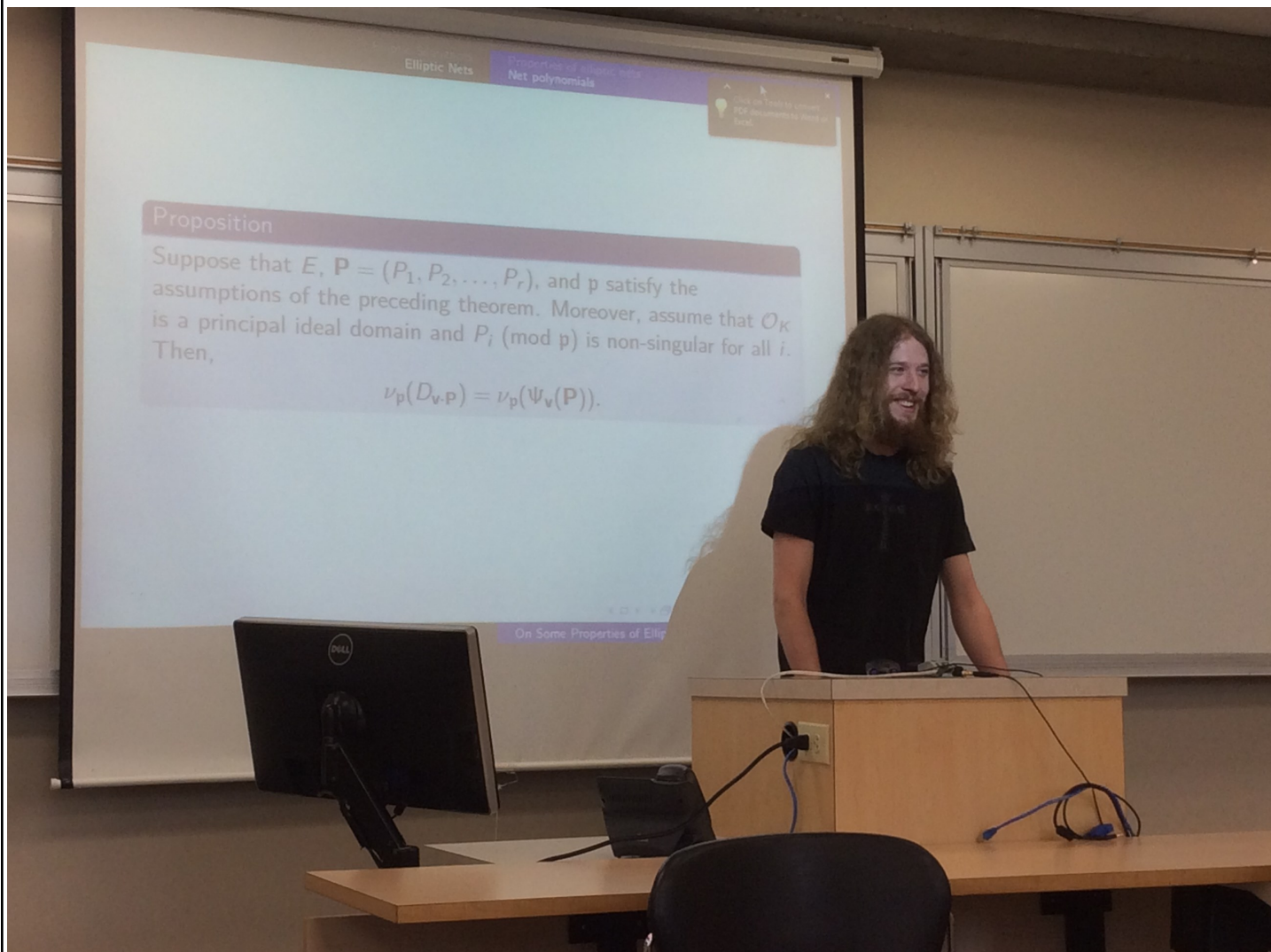
PLAY DAY (February) - Families from the local area were part of a fun day in which the children programmed their parents to maneuver through a maze. The purpose was to teach the children how to program using free software.

OPERATION MINERVA (April)—This is geared for children in Grades 6 to 9. It was a round-table interview in which the girls interviewed Jana Archibald and Nicole Wilson. The object was to introduce the girls to women in STEM occupations (Science Technology Engineering Mathematics).



For information on LUMACS, see www.uleth.ca/artsci/math-computer-science/lumacs

GRADUATE STUDENTS



Jeff Bleaney, MSc 2014 (Mathematics)

Jeff successfully defended his Master's thesis on April 16, 2014, to a very appreciative audience and supervisory committee. After completing his undergrad BSc in 2012, he decided to pursue his Master's at the university, in the field of number theory.

Jeff's thesis presentation was entitled, "On Some Properties of Elliptic Nets."

His supervisory committee was composed of Soroosh Yazdani and Amir Akbary-Majdabadno (co-supervisors), with Nathan Ng and Peter Dibble as supervisory committee members. Hadi Kharaghani was exam committee Chair.

Now that he has completed this phase of his education, Jeff is planning to make the trek to Europe. After that? Possibly back to school for a PhD. With that very infectious smile, he gently whispers, "That's the dream."

GRADUATE STUDENTS



Tom Arjannikov, MSc 2014 (Computer Science)

Tom successfully defended his Master's thesis on April 28, 2014. His thesis presentation was entitled, "Verifying Tag Annotation and Performing Genre Classification in Music Data Via Association Analysis." His supervisory committee was comprised of John Zhang (supervisor), with Yllias Chali and Gongbing Shan. Howard Cheng was the exam committee Chair.

Tom also completed his undergrad BAsC in Computer Science and Philosophy in 2011 here at the U of L. As a U of L co-op student during his final undergrad year, we were fortunate to utilize Tom's vast expertise with computers, while he assisted Trent in running the department's network of computer systems. He was a true team member!

Now that this step in his education is complete, Tom hopes to pursue a PhD in the near future, after taking a short break from studies while gaining further experience through the U of L co-op program.

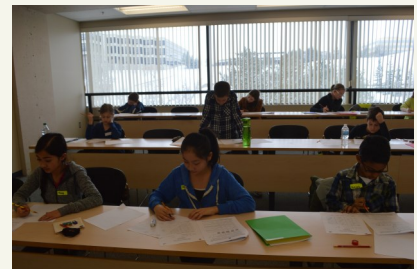
KANGAROO 2014



This national competition is held yearly in various cities throughout Canada, and in its first appearance in Lethbridge this year, it was our privilege to provide the facility for the event. Students from Grades 1 to 12 were invited to attend, with the aim that they would not only have fun and be challenged by math questions, but also be encouraged to further their interest and advancement in the subject. There were 32 students from the local area, from various grades, who met on March 23, 2014, to experience this event. Parents brave enough to try were also given an exam—they worked even harder than their children! Several department volunteers, including graduate students, pitched in to make this and the Day of Math complete successes.

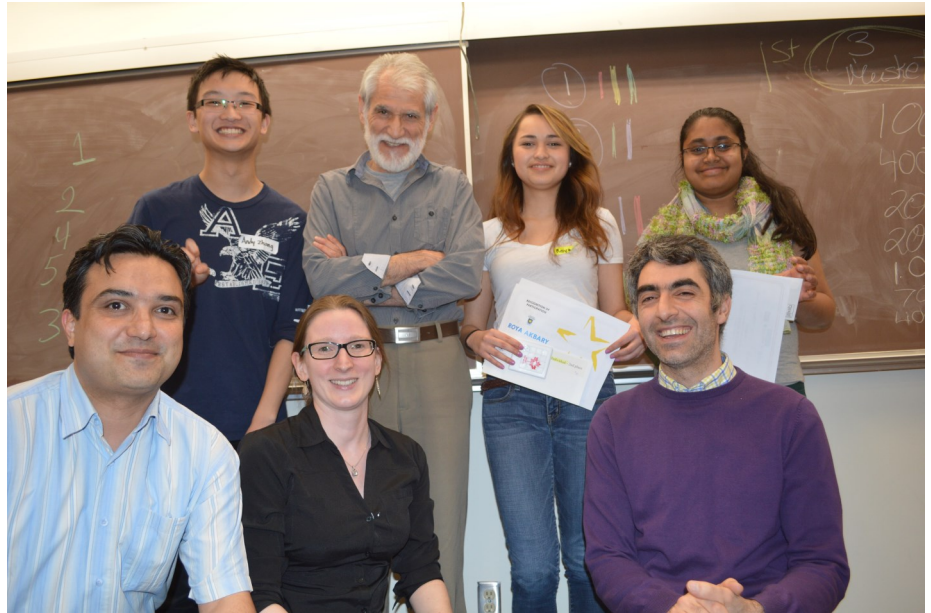


Of the 3300 students who participated in Kangaroo this year, one student from Lethbridge placed in the top 10% and another in the top 25%!



2ND ANNUAL PIMS DAY OF MATH

March 23, 2014—a very busy day for the department. We hosted the second annual PIMS Day of Math for high school students, from the Southern Alberta region. There were four team competitions and some individual entries as well. They competed in Bernoulli trails, team contests, and jeopardy. The lucky winners took home cash prizes, but everyone enjoyed pizza and good times.



Front row: Abbas Momeni, Jana Archibald, Soroosh Yazdani (organizing committee)

Back row: Andy Zhang, Dr. Hadi Kharaghani (Chair), Roya Akbary, Nisali Kamburugamuwa (individual student winners)



The purpose of the annual Day of Math is to welcome high school students to the U of L campus, to have a fun but challenging time with math. With the increase in turnout this year, the students are learning it is a worthwhile endeavor—to meet U of L math faculty, feel the thrill of competition, and perhaps, just maybe... make the U of L their post-secondary school of choice!

PI DAY 2014

Pi Day is an annual American celebration commemorating the mathematical constant π (pi). It is observed on March 14 (or 3/14 in the *month/day* date format), since 3, 1, and 4 are the first three significant digits of π in decimal form).

In addition to enjoying a variety of pies, faculty and students alike were treated to some challenging Pi-related activities, some weird online video, and constant photo-posing.



A new feature of Pi Day this year was the awarding of a \$500 scholarship to a student chosen from the Fall 2013 Dean's Honour List for mathematics, as selected by the department's scholarship committee. Students on the list were invited to apply for the scholarship, by submitting their current transcript as well as indicating financial need, and by writing a brief essay on why they should be chosen.

The scholarship was generously donated by LYRYX LEARNING, INC., of Calgary, an online tools concept developed in 1997 by Claude Laflamme and Keith Nicholson, Professors in the Department of Mathematics and Statistics at the University of Calgary. Students have access to online textbooks and receive feedback on their work, providing quick and effective assessment of their work.

The symbolic scholarship cheque was awarded to **Brayden Wirzba**, a current University of Lethbridge undergrad student, to a resounding and envious applause by other students who were present. Brayden said he and his wife are planning to start a family soon, and the windfall will certainly come in very handy!



Brayden Wirzba and Hadi Kharaghani (department Chair)

DEPARTMENT SEMINARS, COLLOQUIA, CONFERENCES

Number Theory and Combinatorics Seminar Series [Mondays, 12:00 pm]

- Jan 20 Eric Naslund, Princeton University: A density increment approach to Roth's theorem in the primes
- Jan 27 Mohammadreza Jooyandey, Australian National University: Recursive algorithms for generation of planar graphs
- Feb 3 David Roe, University of Calgary: Numerical methods in p -adic linear algebra
- Feb 10 Joy Morris, University of Lethbridge: Automorphisms of Cayley graphs that respect partitions
- Mar 3 Daniel Fiorilli, University of Michigan:
1) Nuclear physics and number theory
2) A conditional determination of the average rank of elliptic curves
- Mar 10 Amir Akbary, University of Lethbridge: Introduction to the ABC conjecture
- Mar 17 Hadi Kharaghani, University of Lethbridge: Difference matrices and applications
- Mar 24 Ted Dobson, Mississippi State University: On Cayley numbers
- Mar 31 Allysa Lumley, University of Lethbridge (grad student): New bounds for $\sum_{d|n} \mu(d) \tau(d)$ ($x; q, a$)
- Apr 7 James Parks, University of Lethbridge (post-doc): Amicable pairs and aliquot cycles on average
- Apr 14 Soroosh Yazdani, University of Lethbridge: Modular curves and moduli problems

Optimization Seminars

- Feb 5 Mark Thom, University of Lethbridge (grad student): On a class of covering problems with variable capacities in wireless networks
- Apr 11 Dr. Tiberius O. Bonates, Federal University of Ceara Fortaleza, Brazil: A scalable implementation of logical analysis of data in WEKA

PIMS Colloquia

- Olivier Ramaré, CNRS/Université de Lille 1):
- Feb 24 1) Bilinear forms on prime numbers
2) A practical example of using a bilinear decomposition on the Moebius functions
- Feb 25 Large values of Dirichlet polynomials: an introduction
- Feb 28 Extremal problems of large primes in small intervals
- Mar 4 1) Log-free zero-density estimates (1/2)
2) Log-free zero-density estimates (2/2)
- Mar 6 A comparison of Perron's formula and smoothing
- Apr 11 Brendan Pass, University of Alberta: Multi-marginal optimal transport

Alberta Number Theory Days VI (BIRS), Banff, Alberta—April 19 and 20, 2014

Attended by department faculty and graduate students with an interest in number theory.