Volume 1, Issue 3 Fall 2014

# Math & Computer Science

UNIVERSITY OF LETHBRIDGE

CONTENTS



## DEPARTMENT NEWSLETTER

### *Members of the Department continue to be productive!*

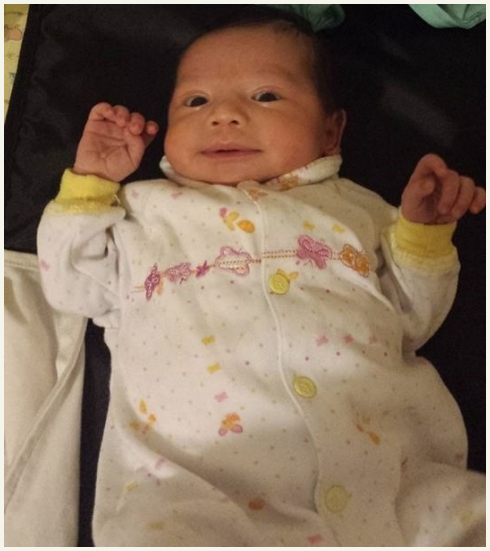
***Audrey Bennett***

***Born December 10, 2014***

***To Joel and Janna Bennett***

***6 lbs 8 oz.***

***Hua Li and wife are proud parents of a new baby boy , born latter part of 2014, also.***



***Amanda Cheng***

***Born December 24, 2014***

***To Howard and Laura Cheng***

***5 lbs 12 oz.***

# Omnia Optima Facite Ubique

The concept of optimization is often attributed to the science of determining the best solution to problems which are frequently models of physical reality. Optimization problems arise in diverse areas of society and life. Scheduling of surgeons, scheduling of radiotherapy machines are examples of optimization problems in Healthcare sector. In oil reservoir simulation, improved accuracy of estimated parameters is critical from economic and environmental perspectives. Other real-life examples of optimization problems include alignment of biological sequences for pathogen identification, assignment of frequencies in wireless cellular networks, and energy optimization in Oil Sands operations.

The Optimization Research Group (ORG) conducts research in optimization algorithms spanning applications in wireless networks, facility location, bioinformatics, parameter and sensitivity estimation problems in e.g., weather and atmospheric modelling, and high-performance computing. The current members of the Optimization Research Group are listed below.

Faculty:
- Dr. Robert Benkoczi
- Dr. Daya R. Gaur
- Dr. Shahadat Hossain

MSc Students:
- Umair M. Arif
- Kawsar Jahan
- Soma F. Khan
- Rumana Quashem
- Nasrin Hakim Mithila
- Mahmudun Nabi
- Anik Saha
- Marzia Sultana
- Ashraful Huq Suny

PhD Students:
- Ram Dahal
- Mark Thom

Since its inception, the ORG has supervised 14 MSc theses and over 10 undergraduate research assistants. The faculty members of the group together have been awarded close to CAD 700,000 as PIs and CAD 150,000 as Co-PIs (researchers from Canadian and international academic institutions and research labs) by granting agencies such as NSERC DG, NSERC CRD, MITACS. The members of the group together have published some 33 refereed journal articles, 4 chapters in refereed books and research monographs, 58 papers in refereed conference proceedings, and over 46 conference presentations most of which are by invitation. More than 20 of the refereed publications are joint with the students of ORG. The members of the group have strong and active international research collaborations; the group currently collaborates with over 15 eminent scientists and researchers based in more than 7 different countries. Members of the group have access to a 16-core Dell Server, ad hoc GPU cards, and an Xserve G5 Server.

The group is continuously looking for motivated students to work on research projects at undergraduate and graduate levels.

[contributed by Drs. Benkoczi, Gaur, Hossain]

# ADJÖ OCH LYCKA TILL

HE CAME, HE ATE EGGS WITH MUSTARD AND MAYO, HE LEFT.

**Adam Tyler Felix** joined the department as a post-doc in January 2012, and left us at the end of the year for a colder and darker climate in Sweden. What legacy does Adam leave? Lights out! Eggs rolled in mustard and mayo. His beautiful photography.

As so clearly stated in the heading above, goodbye and good luck!

# GRADUATE STUDENTS—INCOMING

It's always a pleasure to welcome new graduate students to the department, and this semester, we are fortunate to welcome four:

ARNAB BOSE

MSc (Math)

With Amir Akbary

MAHMUDUN NABI

MSc (CS)

With Robert Benkoczi

MARZIA SULTANA

MSc (CS)

With Shahadat Hossain

MOIN TANVEE

MSc (CS)

With Yllias Chali

# GRADUATE STUDENTS—OUTGOING

Fall 2014 was a busy time for several graduate students, as they each successfully defended their theses. A few have already moved on, while some remain to finish up or work on additional research with their supervisor. Please join in congratulating the following:

**MOHAMMAD AKBARI**, MSc 2014 (computer science)
Defended: December 11, 2014
"claVision: Visual Automatic Piano Music Transcription"
Supervisor: Howard Cheng

**MANOJ KUMAR,** MSc 2014 (mathematics)
Defended: November 21, 2014
"The Signs in An Elliptic Net"
Supervisors: Soroosh Yazdani, Amir Akbary

**SATHI ROY**, MSc 2014 (computer science, GIS)
Defended: December 18, 2014
"Spectral-Spatial Approaches for Hyperspectral Data Classification"
Supervisors: Howard Cheng, Karl Staenz

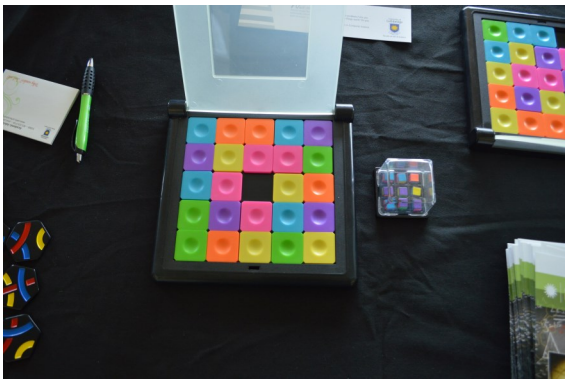
**MOLLAH SHORIF**, MSc 2014 (computer science)
Defended: December 19, 2014
"A Reconfigurable Secured Wireless Sensor Network with XBees and Arduino"
Supervisor: Hua Li

**MOHSIN UDDIN,** MSc 2014 (computer science)
Defended: November 19, 2014
"Multi-Document Summarization Based on Atomic Semantic Events and Their Temporal Relations"
Supervisor: Yllias Chali

**MD ZAMILUR RAHMAN**, MSc 2014 (computer science)
Defended: December 16, 2014
"Templates for Positive and Negative Control Toffoli Networks"
Supervisor: Jacqueline Rice

# ARTS & SCIENCE BOOTH FAIR 2014


Arie Bomhof, Ashif Khan, and Tom Arjannikov




Student, Jeff Bleaney, Alyssa Lumley, and Sean Fitzpatrick

# When 1 + 1 = 130


ARIE BOMOF
The big 6-0 on November 3, 2014

HADI KHARAGHANI
The big 7-0 on December 9, 2014

# COLLEGIATE PROGRAMMING CONTESTS 2014

**ALBERTA COLLEGIATE PROGRAMMING CONTEST** was held Saturday, *October 4*, in which five teams from the U of L competed online against teams from the U of C and the U of A.

The final results are posted on http://psc.cpsc.ucalgary.ca/acpc/2014/contest/scores.php The U of L team finished third in the contest, earning $300 for their efforts. Remaining Lethbridge teams placed 11th, 14th, 18th, and 22nd out of the 30 teams from the three universities.

Team members were:
Lethbridge 1—Kai Fender, Brandon Fuller, Camara Lerner
Lethbridge 2—Lindsay Ablonczy, Chris Thomas, Justin Werre
Lethbridge 3—Matt Basaraba, Lukas Grasse, Marko Ilievski
Lethbridge 4—Soraj Seyed Mahmoud, Zackery Shortt
Lethbridge 5—Alex Hochheiden, Lyle Snelgrove

**LETHBRIDGE COLLEGIATE PROGRAMMING CONTEST** was held Saturday, *October 18*. Our students competed against each other, as well as against guests from other Alberta universities and the Lethbridge College. The U of L winners are:

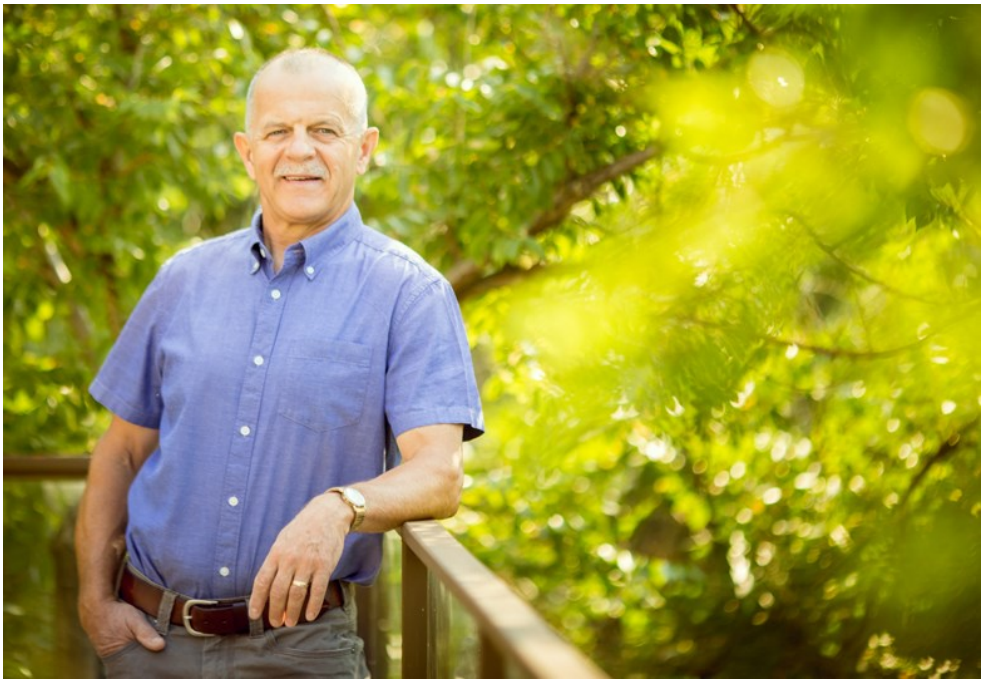
Division I:
- 1st: Chris Thomas
- 2nd: Brandon Fuller
- 3rd: Camara Lerner

Division II:
- 1st: Lukas Grasse
- 2nd: Marko Ilievski
- 3rd: Soraj Seyed Mahmoud

The complete standings (including our guests), problem sets, etc., can be found at http://www.cs.uleth.ca/~cheng/LCPC/

**THE ROCKY MOUNTAIN REGIONAL CONTEST** took place *November 8*. As coach Howard Cheng reports, "Our teams did well overall, although we won't be advancing to the World Finals this year." Of the 53 teams competing, the U of L teams placed:
Team 1: 3rd
Team 2: 15th
Team 3: 19th
Team 4: 36th
The 1st place team comes from the U of C and the 2nd place team comes from the U of A.

# IN THE CLASSROOM... AND BEYOND



To his students, he's "Arie" – not Mr. Bomhof, or professor, or sir. He likes to keep things informal and friendly when he teaches, and the approach seems to go over very well. Look him up on any of the many "rate my teacher" websites these days, and you'll see student comments like, "Arie is absolutely fantastic," "A genuinely helpful person who always has a smile on his face," and "Best tutorial teacher I've ever had, hands down."

Bomhof worked as a high school math teacher for more than 10 years before heading back to university (the University of Lethbridge, actually) in 1991 to earn a degree in computer science. He accepted a contract position on campus after graduation, assisting with a computer systems project, but returned to teaching in 1999 when an instructor's position became available in the U of L Department of Math and Computer Science. He's been there for 15 years now, and says he still looks forward to coming to work every day.

"I've been teaching some of the same courses here since day one, and I can honestly say that I never get tired of it," says Bomhof. "I love teaching and the dynamics of the classroom. Nothing makes me happier than helping students succeed." Bomhof's commitment to student success extends beyond the boundaries of the classroom. He's been contributing to the Supporting Our Students (SOS) fund for years, and his donations are just one more way he can help students succeed.

"I know from experience that if a student misses one class, it's likely that student will start to miss more," Bomhof explains. "It's a slippery slope. They start to miss classes, their motivation declines, their grades suffer, they might even drop the course. If I can prevent a student from missing classes because of money-related challenges, having to take part-time work or working late, then my contribution has made a big difference."

Bomhof has three children of his own, and each of them earned a university degree with the help of various scholarships along the way – another factor that Bomhof cites when considering his reasons for participating in SOS. "I really appreciated the assistance my kids got when they went to school," he says. "It made a difference to them and to me as well. Giving to SOS is a way to pay it forward."

In Bomhof's mind, education is both a right and privilege – something he says we as a society have a responsibility to foster and promote, and he believes that educational professionals have to lead the way. "Our professional obligation as instructors is to help students learn," he says. "That obligation takes a lot of different shapes, and SOS is one of them."

*[taken from www.uleth.ca/unews—December 2014]*

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

# DEPARTMENT SEMINARS, COLLOQUIA, CONFERENCES

**Lethbridge Number Theory & Combinatorics Seminar Series** (Mondays, noon):

- September 8—Open Problem Session
- September 15—Joy Morris: Colour-permuting automorphisms of Cayley graphs
- September 22—Farzad Aryan (grad student): On binary and quadratic divisor problem
- September 29—Adam Tyler Felix: Common divisors of the index and order of $a$ and modulo $p$
- October 6—Nathan Ng: Inclusive prime number races
- October 20—Sean Fitzpatrick: Characters of induced representations
- October 27—Kevin Henriot (U of British Columbia): Linear equations in dense subsets of the squares
- November 3—Amir Akbary: Heuristics for some conjectural constants
- November 10—James Parks: Averages of the number of points on elliptic curves
- November 17—Manoj Kumar (grad student): The signs in an elliptic net
- November 21—Soroosh Yazdani (Google): Belyi maps and Diophantine equations
- December 1—Dave Morris: Introduction to arithmetic groups

**Optimization Seminar Series** (as scheduled):

- October 24– Mozart Menezes (U of C): The Impact of Social Network Influences on the Cost of Capacity Reservation
- November 10—Zachary Friggstad (U of A): Regret-Bounded Vehicle Routing

**Other**:

- September 17—claVision Team reported on their win for Canada in the Microsoft Imagine Cup Innovation Competition
- November 26—Summer research jobs and graduate studies opportunities in the department