

# Andrew DeBardeleben Droll

November 2014

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**Executive Summary:** I am a beginning mathematician, specializing in analytic number theory, with a love for teaching, advanced computer skills including extensive experience with e-learning technologies, and a varied background in cutting-edge mathematics and physics research. Currently I am most enthusiastic academically about positions emphasizing undergraduate teaching. I am always excited to to engage with fellow instructors and researchers, and with students at all levels.

## Education

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<b>Ph.D.</b> Queen's University, Mathematics (Number theory) Dissertation: "Variations of Li's criterion for an extension of the Selberg class." Advisor: M. Ram Murty	November 2012 (degree conferred)
<b>M.Sc.</b> Queen's University, Mathematics (Number theory) Thesis: "Properties of Ramanujan Graphs" Advisor: M. Ram Murty	December 2008
<b>B.Sc.</b> Carleton University, Mathematics and Physics Graduated with Highest Honours Double honours degree	June 2007

## Related Employment

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<b>Laboratory T.A.</b> Carleton University, Physics. Supervisor: Etienne Rollin	2013 January-April
<b>Research Assistant</b> Queen's University, Mathematics. Supervisor: M. Ram Murty	2012 May-August
<b>Teaching Assistant</b> Queen's University, Mathematics. T.A. coordinator: Alan Ableson	2007-2012 September-April, annually
<b>NSERC USRA undergraduate researcher</b> Carleton University, Mathematics and Physics Supervisors: Paul Mezo, Heather Logan	2006, 2007 May-August, annually
<b>Teaching Assistant</b> Carleton University, Mathematics and Physics Supervisors: Ben Steinberg, Elena Devdariani, David LeBlanc, Penka Matanska	2006,2007 January-April, annually
<b>Other work experience:</b> Computer and technical consultant (part-time) for van Walraven Appraisals, Inc., Ottawa, Canada. (2003-present)	

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### Teaching

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- Supervised laboratory sections and provided teaching support for the Carleton University physics department (Jan-May 2012). Laboratory responsibilities included supervising and guiding laboratory sections of 50-60 undergraduates, grading laboratory reports, running three-hour tutorial sections, proctoring for quizzes and tests. One of two employees in charge of the physics drop-in centre (6 hours/week), designed to provide supplemental reinforcement and help for undergraduate physics students at all levels. Presented detailed solutions to problems and resolving theoretical questions on a dynamic basis for small groups of students.
  - Teaching Assistant in mathematics and statistics at Queen's University (2007-2012). My participation included:
    - Preparing and administering weekly hour-long tutorials for the following courses:
      - Second-year advanced calculus (honours, 1 term)
      - First-year linear algebra (honours, 2 terms)
      - First-year differential and integral calculus (1 term)
      - First-year calculus for biochemistry and biology students (3 terms)
    - Grading tests, exams, and assignments, including for several graduate-level courses.
    - Participating in the Queen's Math Help Centre (approx. 100 hours). The (quite popular) help centre provided a valuable setting for me to refine my teaching and tutoring abilities on a broad and unpredictable range of topics.
  - Undergraduate Teaching Assistant in mathematics and physics at Carleton University (2006-2007). Responsibilities included hour-long tutorials, preparing assignment solutions, grading, and supervising laboratory sections.
    - Tutorials/Laboratory sessions run for the following courses:
      - First-year linear algebra (honours, 1 term)
      - First-year linear algebra for engineers (1 term)
      - First-year physics - electromagnetism (2 terms)
  - Tutor in mathematics and physics (2003-present). Currently involved in providing tailored individual help to 8+ students at the undergraduate level.
  - Ran frequent course review sessions for peers during my undergraduate studies, in both mathematics and physics.
  - Approximately 200 hours of Volunteer experience supervising and teaching groups of 20-40 peers during my high school years (Virtual Ventures Summer Camp, Carleton University).
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### Research

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**Primary research interests:** analytic number theory, Li's criterion, zeta function zeros, sums over zeros, graph theory.

- Two articles in preparation, based on my dissertation research, titled "Variations of Li's criterion for the Selberg class" and "Li-type criteria for zero-free regions."
- Dissertation defended successfully April 19, 2012. My external examiner, Xian-Jin Li of Brigham Young University (and originator of Li's criterion), provided in his written report that the dissertation was "EXCELLENT." *Committee:* M. Ram Murty, Ivan Dimitrov, and Martin Duncan (Queen's University), and Xian-Jin Li (Brigham Young University).
- Dissertation proposal presented successfully, and comprehensive examination completed, October 2010. *Committee:* M. Ram Murty, Ivan Dimitrov, James Mingo (Queen's University).
- Master's thesis defended successfully, August 2008. Resulted in a short paper published in the *Electronic Journal of Combinatorics*, classifying all Ramanujan unitary Cayley graphs, cited below (with guidance from Professor David Gregory). *Committee:* M. Ram Murty, David Gregory, and Mike Roth (Queen's University).
- Numerous (15+) seminar talks given for faculty and students at Queen's University and at the Canadian Royal Military College in Kingston, Ontario. These have ranged in content from graph theory, to representation theory, to algebraic and analytic number theory.
- Awarded two nationally-funded competitive summer research fellowships during my undergraduate studies. The first was for research on Higgs boson physics in 2006, and the second for research on stable representations of  $GL(2, F_q)$  in 2007.
- Peer-reviewed, published researcher in high energy particle physics as well as pure mathematics.

### Publications

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Droll, A. (2012). *Variations on Li's criterion for an extension of the Selberg class*. Ph.D. thesis. Queen's University Library. <http://hdl.handle.net/1974/7352>

Droll, A. (2010). A classification of Ramanujan unitary Cayley graphs. *Electronic Journal of Combinatorics*, 17. Online publication (6 pages). (Master's work).

Droll, A. and Logan, H. (2007). Physics Impact of ILC Higgs coupling measurements: The effect of theory uncertainties. *Physical Review D*, 76. 015001 (17 pages). (NSERC USRA work).

**Remark:** Publication and writing/blog samples are available at my website, <http://andrewdroll.com>

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### Honours and Awards

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<b>R.S. McLaughlin Fellowship</b> (\$10000) Queen's University award for graduate studies.	2011-2012
<b>The Dorrance Family Award</b> (\$5000) Queen's University award for graduate studies.	2011-2012
<b>NSERC Postgraduate Scholarship (D)</b> (\$63000 over 3 years) National graduate scholarship for doctoral studies.	2008-2011
<b>NSERC Canada Graduate Scholarship (M)</b> (\$17500) National graduate scholarship for master's studies.	2007-2008
<b>Ontario Graduate Scholarship</b> (Declined, \$16000) Provincial scholarship for master's studies. Declined in favor of a national scholarship.	2007
<b>NSERC Undergraduate Student Research Awards</b> (approx. \$15000 total) Nationally funded summer undergraduate research awards in physics (2006) and mathematics (2007).	2006, 2007
<b>8 additional undergraduate academic awards</b> (approx. \$10000 total) Carleton University, mathematics and physics.	2003-2007

### Skills and Qualifications

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- **Research-specific tools:** Extensive knowledge of LaTeX and Maple. Experience with Python, R, and SPSS.
- **E-learning platforms:** Extensive experience with e-learning and online course organization platforms (Moodle, WebCT, etc.)
- **Programming experience:** Experience in Python, FORTRAN, C, C++, and Java.
- **Web design experience:** Front-end development expertise in HTML, CSS, PHP, and JavaScript.
- **Web publishing experience:** Experience with streaming internet content and online media platforms (for example, producing and publishing on YouTube, and live streaming content on platforms such as [www.justin.tv](http://www.justin.tv)), participating in online forum discussion, and maintaining blogs. Knowledge of all common social media interfaces.
- **Computer skills:** Experience with common operating systems (Windows, Linux, OSX), office software packages, web browsers and services, and communications software. Also completed the Cisco CCNA (Cisco Certified Network Associate) preparation program (2001-2002). Extensive experience with, and knowledge of, most aspects of modern computer networking, maintenance, and operation.
- **French:** Proficiency with written and oral communication in French. Completed 11 years in French immersion courses during grade school (1990-2001).