Sarah J. Plosker

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Research Interests

Quantum information theory, operator algebras, operator theory, linear algebra, and matrix analysis, with current focus on private quantum channels (quantum cryptography), quantum fidelity (probability of state transfer), positive operator valued measures (POVMs), applications of majorization, and measures of entanglement and coherence.

Academic Positions

- Associate Professor, Department of Mathematics & Computer Science, Brandon University, January 2016 – present

- Assistant Professor, Department of Mathematics & Computer Science, Brandon University, August 2013 – January 2016

- Adjunct Professor, Department of Mathematics & Statistics, University of Guelph, January 2016 – present

- Adjunct Professor, Department of Mathematics, University of Manitoba, September 2014 – present

- Adjunct Professor, Department of Mathematics & Statistics, University of Regina, September 2014 – present

- Member, Winnipeg Institute for Theoretical Physics, August 2013 – present

Education

- Ph.D. Applied Mathematics, University of Guelph, Guelph, ON, Advisor: David Kribs, July 2013

- M.Sc. Mathematics, University of Regina, Regina, SK, Advisor: Remus Floricel, August 2010

- B.Sc. Combined Mathematics and Statistics, University of Regina, Regina, SK, April 2008

Training of Highly Qualified Personnel

Undergraduate Student Supervision

9. Darian McLaren, "Quantum probability measures", advanced topics in mathematics research supervisor, Fall 2017

8. Darian McLaren, "Quantum state transfer: a linear algebraic approach", Natural Sciences and Engineering Research Council of Canada Undergraduate Student Research Award (NSERC USRA), Summer 2017

7. Farrah Huntinghawk, "Fun math events at the Indigenous People's Centre", series of 10 events on campus funded by the Brandon University Students' Union Work Study Program, Fall 2016–Winter 2017 (sudoku tournament, logic puzzles, Buffon's needle and other π-day activities, etc.)

6. Rebecca Storey, "On the probability of quantum state transfer", NSERC USRA, Summer 2016

5. Bailey Kacsmar, "Topics in cryptography", advanced topics in mathematics research supervisor, Fall 2015

4. Ryan Bergen, "Quantum probability measures", NSERC USRA, Summer 2015

3. Whitney Gordon, "The geometric measure of entanglement", NSERC USRA, Summer 2015

2. Jin Li, "Quantum fidelity", advanced topics in mathematics research supervisor, Fall 2014

1. Jarrad Perron, "Connections between geometric measures and orders of entanglement", supported by the Brandon University Research Committee (BURC) Research Award, Summer 2014

Graduate Student Supervision

3. Xiaohong Zhang, PhD co-advisor (with Steve Kirkland), University of Manitoba, Fall 2014 – present

2. Ryan Tessier, PhD advisory committee member, University of Regina, Fall 2015 – present

1. Kyler Johnson, "Limiting operations for quantum random variables and a quantum martingale convergence theorem", external thesis examiner, University of Regina, Summer 2014

Post Doctoral Fellow Supervision

1. Chris Ramsey, Brandon University, Fall 2017 – present

Publications

Peer-Reviewed Journal Articles[1]

17. N. Johnston, C.-K. Li, and S. Plosker. *The modified trace distance of coherence is constant on most pure states*, submitted.

16. S. Kirkland, D. Mclaren*, R. Pereira, S. Plosker, and X. Zhang*. *Perfect quantum state transfer in weighted paths with potentials (loops) using orthogonal polynomials*, submitted.

15. N. Johnston, S. Kirkland, S. Plosker, R. Storey*, and X. Zhang*. *Perfect quantum state transfer using Hadamard diagonalizable weighted graphs.* Linear Algebra and its Applications, **531**, pp. 375–398, 2017.

14. J. Chen, S. Grogan, N. Johnston, C.-K. Li, and S. Plosker. *Quantifying the coherence of pure quantum states.* Physical Review A, **94**, 042313, 2016.

13. W. Gordon*, S. Kirkland, C.-K. Li, S. Plosker, and X. Zhang*. *Bounds on probability of state transfer with respect to readout time and edge weight.* Physical Review A **93**, 022309, 2016.

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[1]**N. B.** For all journal articles, authors are listed in alphabetical order. This is the standard in mathematics. An asterisk is used to identify students who are co-authors and were under my supervision.

12. D. Farenick, M. J. Kozdron, and S. Plosker. *Spectra and variance of quantum random variables.* Journal of Mathematical Analysis and Applications **434**, pp. 1106-1122, 2016.

11. M. E. Carrington, G. Kunstatter, J. Perron*, and S. Plosker. *On the geometric measure of entanglement for pure states.* Journal of Physics A: Mathematical and Theoretical, **48**, 435302, 2015.

10. J. Li*, R. Pereira and S. Plosker. *Some geometric interpretations of quantum fidelity.* Linear Algebra and its Applications, **487**, pp. 158-171, 2015.

9. R. Pereira and S. Plosker. *Extending a characterization of majorization to infinite dimensions.* Linear Algebra and its Applications, **468**, pp. 80-86, 2015.

8. T. Jochym-O'Connor, D. W. Kribs, R. Laflamme, and S. Plosker. *Quantum subsystems: Exploring the complementarity of quantum privacy and error correction.* Physical Review A, **90**, 032305, 2014.

7. D. W. Kribs and S. Plosker. *Private quantum codes: introduction and connection with higher rank numerical ranges.* Linear and Multilinear Algebra, **62**, pp. 639-647, 2014.

6. T. Jochym-O'Connor, D. W. Kribs, R. Laflamme, and S. Plosker. *Private quantum subsystems.* Physical Review Letters, **111**, 030502, 2013.

5. R. Pereira and S. Plosker. *Dirichlet polynomials, majorization, and trumping.* Journal of Physics A: Mathematical and Theoretical, **46**, 225302, 2013.

4. D. Farenick, R. Floricel, and S. Plosker. *Approximately clean quantum probability measures.* Journal of Mathematical Physics, **54**, Issue 5, 052201, 2013.

3. D. W. Kribs, R. Pereira, and S. Plosker. *Trumping and power majorization.* Linear and Multilinear Algebra, **61**, pp. 1455-1463, 2013.

2. D. Farenick, S. Plosker, and J. Smith. *Classical and nonclassical randomness in quantum measurements.* Journal of Mathematical Physics, **52**, Issue 12, 122204, 2011.

1. A. Church, D. W. Kribs, R. Pereira, and S. Plosker. *Private quantum channels, conditional expectations, and trace vectors.* Quantum Information & Computation (QIC), **11**, no. 9 & 10, pp. 774 - 783, 2011.

Refereed Conference Proceedings[2]

1. B. Kacsmar*, S. Plosker, and R. Henry *Computing Low-Weight Discrete Logarithms*, the 24th Annual Conference on Selected Areas in Cryptography (SAC) Ottawa, ON, 2017

Theses

- Ph.D. Dissertation (2013): *Operator and matrix theory applications to quantum information*

- M.Sc. Thesis (2010): *Capacities of completely positive maps*

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[2]Note that for this one Computer Science conference paper, authors are listed with students first (in order from most contributions to the paper to least) followed by faculty (in order from most contributions to the paper to least). This is one of the standard methods of ordering authors in Computer Science, and the method that is typically adopted in this particular area of Computer Science.

Newsletter Articles

- *Quantum state transfer* (with X. Zhang*), Canadian Mathematical Society (CMS) Notes, vol. 28, no. 6, pp. 16-17.

- *Linear algebraic ties to quantum information theory*, IMAGE (the semiannual bulletin for the International Linear Algebra Society), Fall 2015, vol. 55, pp. 7-11.

- *What do trace vectors have to do with private quantum channels?*, Notes from the Margin (a semiannual publication by the Student Committee of the Canadian Mathematical Society (CMS)), Winter 2012, vol. III, pp. 6-7.

- Helped develop and oversee the total overhaul of *Notes from the Margin* (formerly *The Student Mathematical Newsletter*), Winter 2011, vol. I.

- *Upcoming CMS Meeting*, The Student Mathematical Newsletter (former semiannual publication by the Student Committee of the Canadian Mathematical Society (CMS)), Fall 2010, vol. 13, p. 15.

- *Student event sponsorship*, The Student Mathematical Newsletter, Fall 2010, vol. 13, p. 10.

- *Math in Moscow program*, The Student Mathematical Newsletter, Winter 2010, vol. 12, p. 2.

Awards, Grants & Honours

At BU:

- Tier 2 Canada Research Chair (CRC) in Quantum Information Theory, Summer 2017 – Summer 2022

- "Quantum Information Theory", the Canada Foundation for Innovation (CFI) John R. Evans Leaders Fund (JELF), funding for a Quantum Computing Lab at Brandon University, Spring 2017, $66,295

- CFI Infrastructure Operating Fund (IOF) allocation, for the ongoing operating and maintenance costs of the infrastructure of the Quantum Computing Lab, Spring 2017 – Spring 2022, up to $19,889

- "Operator theory with applications to quantum information theory", NSERC Discovery Grant & Early Career Researcher Supplement, Spring 2014 – Spring 2019, $75,000

- "Connections between geometric measures and orders of entanglement", Brandon University Research Committee (BURC) Research Award, Spring/Summer 2014, $7,500

During Ph.D.:[3]

- **Governor General's Gold Medal**, University of Guelph, May 2014, $0

- Natural Sciences and Engineering Research Council of Canada Postgraduate Scholarship (NSERC PGS D), Sept. 2010 – Aug. 2013, $63,000

- Herbert Armstrong Memorial Book Prize, University of Guelph, 2012-13, $120

- Ontario Graduate Scholarship (OGS), Sept. 2010 – Aug. 2011, Award Declined, $15,000

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[3]**N. B.** Scholarships for graduate studies at the University of Guelph are given out as entrance scholarships. For the year that I was applying, the university suspended all major awards due to budget constraints.

- Dean's Scholarship, Department of Mathematics and Statistics, University of Guelph, Fall 2012, Fall 2011, Fall 2010, $3,350 each

- Graduate Research Assistantship (GRA), Department of Mathematics and Statistics, University of Guelph, Winter & Summer semesters, 2011-2013, $30,000

- College Growth Graduate Research Assistantship (GRA), Department of Mathematics and Statistics, University of Guelph, Fall 2010 – Summer 2013, $18,000

During M.Sc.:

- Natural Sciences and Engineering Research Council of Canada Alexander Graham Bell Canada Graduate Scholarship (NSERC CGS M), Sept. 2009 – Aug. 2010, $17,500

- NSERC/SSHRC Enhancement Award, Fall 2009, $5,000

- University of Regina Teaching Assistants Bursary, Fall 2009, $500

- Faculty of Graduate Studies and Research Graduate Teaching Fellowship, Spring/Summer 2009, $6,350

- Graduate Centennial Merit Scholarship, Winter 2009, $5,000

- Faculty of Graduate Studies and Research Graduate Teaching Assistantship, Winter 2009, $2,350

- Faculty of Graduate Studies and Research Recruitment Scholarship, Fall 2008, $5,000

- Academic Gold Scholarship (**awarded to top 1% of full-time Faculty of Science Students**), Fall 2008, $2,500

During B.Sc.:

- Natural Sciences and Engineering Research Council of Canada Undergraduate Student Research Award (NSERC USRA), Spring/Summer 2008, $6,000

- University Prize in Science (**awarded to the top student in the Faculty** graduating with their first degree), June 2008 Convocation, $0

- Academic Gold Scholarship, Fall 2007, Fall 2006, Winter 2005, $2,500 each

- Coca-Cola Student Award (based on Faculty and community involvement), Fall 2007, $500

- Luther College Faculty Scholarship, Fall 2007, Fall 2006, Winter 2006, $1,000 each

- Liefeld-Taube Science Scholarship, Fall 2007, $800

- SaskEnergy Scholarship (provincial award), Fall 2007, Fall 2006, $2,500 each

- Kornelius G. Toews Award, Fall 2007, $2,000

- Academic Silver Scholarship, Winter 2007, Winter 2006, $1,250 each

- William & Erna Stan Memorial Scholarship, Fall 2006, $500

- Centennial Merit Plus Scholarship, Fall 2004, $3,000

Invited Lectures

- *Achieving perfect state transfer using Hadamard diagonalizable graphs*, Matrix Analysis and its Applications Special Session, 3rd Pacific Rim Mathematical Association (PRIMA2017) Congress, Oaxaca, Mexico, Aug. 14–18, 2017.

- *Clean quantum measurements via operator systems*, Workshop on Operator Systems in Quantum Information, Guelph, ON, Aug. 14–17, 2017

- *Quantum state transfer via Hadamard diagonalizable graphs*, Invited Minisymposium: Linear Algebra and Quantum Information Science, 21st Meeting of the International Linear Algebra Society (ILAS) Ames, IA, USA, July 24–28, 2017

- *Hadamard diagonalizability and cubelike graphs*, Special Western Canada Linear Algebra Meeting, Banff International Research Station for Mathematical Innovation and Discovery (BIRS), Banff, AB, July 7–9, 2017

- *Hadamard diagonalizable graphs with perfect state transfer*, Prairie Discrete Math Workshop, Lumsden, SK, June 2–5, 2017.

- *Optimal bounds on fidelity of quantum state transfer with respect to errors*, Optimization Techniques in Quantum Information Theory Session, CMS Winter Meeting, Niagara Falls, ON, Dec. 2–5, 2016.

- *Applications of matrix theory to quantum coherence*, 2016 Workshop on Matrices and Operators (MAO), Jeju Island, South Korea, July 3–6, 2016.

- *The probability of quantum state transfer: a matrix analysis approach*, The Thirteenth Workshop on Numerical Ranges and Numerical Radii, Taipei, Taiwan, June 28–30, 2016.

- *Some matrix theory questions arising from quantum coherence*, Special Session on Matrix and Operator Theory, AMS Sectional Meeting, Fargo, ND, USA, April 16–17, 2016.

- *Some matrix theory questions arising from quantum coherence*, Math Colloquium, University of Manitoba, Mar. 11, 2016.

- *The probability of quantum state transfer: a matrix analysis approach*, 5th International Conference on Matrix Analysis and Applications (ICMAA), Fort Lauderdale, FL, USA, Dec 17–20, 2015.

- *Spectra and variance of quantum random variables*, Workshop on Quantum Marginals and Numerical Ranges, Guelph, ON, Aug. 17–21, 2015.

- *Spectra and variance of quantum random variables*, Workshop on Matrices and Operators (MAO), Shaanxi Normal University, Xian, China Jul. 19–21, 2015.

- *Some geometric interpretations of quantum fidelity*, Summer Research Workshop on Quantum Information Science, Sanya, Hainan, China Jul. 13–17, 2015.

- *Quantum fidelity*, three part lecture series, University of Regina, June 29–Jul. 3, 2015.

- *Private quantum subsystems and error correction*, Operator Algebra Seminar Series, University of Regina, Sept. 26, 2014.

- *The majorization and trumping orders in quantum information*, Math Colloquium, University of Regina, Sept. 26, 2014.

- *On the problem of entanglement transformations: characterizing trumping*, Invited Minisymposium on Quantum Information and Computing, 19th Conference of the International Linear Algebra Society (ILAS), Seoul, South Korea, Aug. 6–9, 2014.

- *Quantum expectations: a matricial range perspective*, The Twelveth Workshop on Numerical Ranges and Numerical Radii, Sanya, Hainan, China, Jul. 28 – Aug. 1, 2014.

- *Using vector spaces of matrices to study quantum measurements*, Workshop on Matrices and Operators, Haikou, Hainan, China, Jul. 24–27, 2014.

- *On majorization and trumping*, Winnipeg Institute for Theoretical Physics (WITP), University of Manitoba, Mar. 20, 2014.

- *Trumping and power majorization*, Minisymposium on Linear Algebra Problems in Quantum Computation, 18th Conference of the International Linear Algebra Society (ILAS), Providence, RI, USA, June 3–7, 2013.

- *Private quantum codes*, Operator Theory and Operator Algebras Session, CMS Winter Meeting, Montreal, PQ, Dec. 7–10, 2012.

- *On complementarity in quantum error correction and quantum cryptography*, Operator Algebra Seminar Series, University of Regina, Regina, SK, Apr. 18, 2012.

- *Private quantum channels, conditional expectations, and trace vectors*, Nipissing University, North Bay, ON, June 30, 2011.

- *Private quantum channels, conditional expectations, and trace vectors*, 8th Canadian Student Conference on Quantum Information, Jouvence, PQ, June 16–17, 2011.

- *A mathematics graduate student aims to contribute to quantum information theory*, video interview and teaching featured on the Faculty of Science, University of Regina website.

- *My experience in the Math and Statistics Department*, Department of Math & Statistics showcase event, audience of ~ 100 honour-roll undergraduate students, University of Regina, SK, Mar. 25, 2009.

Contributed Lectures

- *The role of majorization and trumping in quantum information theory*, 2014 Program for Women and Mathematics: Random Matrix Theory, Institute for Advanced Study and Princeton University, Princeton, New Jersey, May 12–23, 2014

- *Using vector spaces of matrices to study quantum measurements*, 12th Western Canada Linear Algebra Meeting, University of Regina, Regina, SK, May 10–11, 2014.

- *Quantum information theory and the additivity conjecture*, Fourth Annual Meeting of the Prairie Network for Research in Mathematical Sciences, University of Manitoba, Winnipeg, MB, May 1, 2010.

- *Quantum information theory: the future of communication*, Creating Community Consciousness: Putting Theory into Practice, University of Regina, Regina, SK, Mar. 13, 2010.

- *Checksum algorithms and your credit card*, Graduate/Undergrad Student Seminars, University of Regina, Regina, SK, Feb. 2, 2009.

Poster Presentations

- *Trumping and power majorization*, CMS Student Poster Session, CMS Winter Meeting, Montreal, PQ, Dec. 7–10, 2012.

- *Classical and nonclassical randomness in quantum measurements* (co-presented with J. Smith), CMS Student Poster Session, CMS Summer Meeting, University of Regina, Regina, SK, June 2–4, 2012.

- *Quantum capacities and the additivity conjecture*, CMS Student Poster Session, CMS Summer Meeting, University of New Brunswick, Fredericton, NB, June 4–6, 2010.

- *Capacities of completely positive maps*, Connecting Women in Mathematics Across Canada (CWiMAC 2008), University of Ottawa, Ottawa, ON, Dec. 4–5, 2008.

Other Research Experience

- *Summer school student*, invited to participate in the 2014 Program for Women and Mathematics: Random Matrix Theory, Institute for Advanced Study and Princeton University, Princeton, New Jersey, May 12–23, 2014

- *Summer school student*, 11th Canadian Summer School on Quantum Information (wrote and passed final examination), Université de Sherbrooke, Jouvence, PQ, Jun. 6–15, 2011.

- *Workshop participant*, 11th PIMS Graduate Industrial Mathematics Modelling Camp and 12th PIMS Industrial Problem Solving Workshop, University of Regina, Regina, SK, June 9–21, 2008.

- *NSERC Undergraduate Student Research Award*, Department of Math & Statistics, University of Regina, Regina, SK, Spring/Summer 2008

    - Advisor: Dr. D. Stanley
    - Project: Commutative differential graded algebras having Poincaré duality

- *Student Research Assistant*, Centre for Management Development, Faculty of Business Administration, University of Regina, Regina, SK, Winter 2010 – Spring 2010

    - Worked on the University of Regina Students' Union (URSU) Transit Study project
    - Tested online questionnaire and gave feedback
    - Performed interviews
    - Took meeting minutes for focus groups

- *Student Methodologist*, Statistics Canada, Ottawa, ON, Spring/Summer 2007

    - Worked on improvements to the International Travel Survey within the Household Survey Methods Division
    - Investigated challenges of the analysis of survey data
    - Designed and tested solutions based on statistical theory, historical data, and clients' needs
    - Programmed in SAS and exported tables into Excel
    - Met with clients on a weekly basis to present results

Teaching Experience

Teaching Experience: Course Instructor

- Brandon University

  - 62:171 Introduction to Statistics, Winter 2017, Winter 2016, Winter 2015, Winter 2014
  - 62:181 Calculus I, Winter 2016, Winter 2015, Winter 2014
  - 62:261 Introduction to Set Theory and Logic, Fall 2016, Fall 2015, Fall 2014, Fall 2013
  - 62:252 Applied Linear Algebra, Winter 2017, Winter 2016, Winter 2015, Winter 2014
  - 62:272 Applied Statistics, Winter 2017
  - 62:292 Linear Algebra II, Winter 2018
  - 62:486 Topology, Fall 2013
  - 62:498 Advanced Topics in Mathematics, Fall 2017, Fall 2015, Fall 2014

- University of Guelph

  - Math 2000 - Set Theory, Fall 2012

- University of Regina

  - Math 111 - Calculus II, Spring/Summer 2009

Summer School Mentor/Lecturer

- *Modelling a quantum spin network* (problem proposal and group mentoring during the week while students worked on a solution), [Graduate Math Modelling in Industry Workshop (GMMIW 2017)](), Winnipeg, MB, July 30 – August 5, 2017

- *The majorization and trumping orders in quantum information* (co-presenter Rajesh Pereira, three lectures), [14th Canadian Summer School on Quantum Information](), Guelph, ON, Jun. 16–20, 2014.

Course Material Development

- University of Guelph

  - Math 3160 - Linear Algebra II, Winter 2012 – Summer 2013 (the supplemental notes I developed were sold to students at cost from 2013 –2016, when the textbook officially used for the course went out of print)

Guest Lecturer

- University of Guelph

  - Nano 3700 - Introduction to Quantum Computing, Winter 2013 (three lectures)
  - Math 3160 - Linear Algebra II, Winter 2013, Winter 2012 (11 lectures each semester)

- University of Regina

  - Math 111 - Calculus II, Fall 2009 (three lectures)

Lab Instructor

- University of Guelph

  - Math 2000 - Set Theory, Fall 2011
  - Math 2130 - Numerical Methods, Winter 2011

- University of Regina

  - Math 110 - Calculus I, Fall 2009
  - Math 111 - Calculus II, Winter 2009, Fall 2008, Fall 2007, Winter 2007, Fall 2006

Professional Development

- Participant, *Teaching Enhancement Conference: Hands-on Theory*, Centre for Teaching, Learning, & Technology, Brandon University, Aug. 31, 2017

- Completion of Accessibility Training, three modules on the Accessibility for Manitobans Act (AMA) and the Customer Service Standard, Brandon University, Winter 2017

- Participant, *Teaching Enhancement Conference*, Centre for Teaching, Learning, & Technology, Brandon University, Sept. 3, 2015

- Letter of Participation, *Making a Difference: Inspiring Confidence in the Classroom*, Graduate Student University Teaching Conference, Centre for Open Learning and Educational Support, University of Guelph, Aug. 30, 2012

- UNIV 6800 - *University Teaching, Theory, and Practice (UTTP)* (full semester course, for credit), Centre for Open Learning and Educational Support, University of Guelph, Fall 2011

- Letter of Participation, *Teaching: It's Your Discipline*, Graduate Student University Teaching Conference, Centre for Open Learning and Educational Support, University of Guelph, Sept. 2, 2011

- Participant, *Taking Stock: Research on Teaching & Learning in Higher Education*, Teaching Support Services Special Event, University of Guelph, Feb. 14, 2011

- *Passport of Participation*, *Graduate Student Teaching Development Program*, Teaching Support Services, University of Guelph, Fall 2010 - Winter 2011

- Participant, *TAACtics: Graduate Student Pedagogy Discussion Group*, Teaching Assistant Advisory Committee (TAAC), University of Guelph, Fall 2010 - Winter 2011

- Completion of Accessible Service Provision eLearning course, Accessibility for Ontarians with Disability Act (AODA) Training, University of Guelph, Fall 2010

- Letter of Participation, *Empowering Future Educators & Leaders*, Graduate Student University Teaching Conference, Teaching Support Services, University of Guelph, Sept. 25, 2010

- Participant, *Practice Your Presentation Skills! Workshop*, Mathematics of Information Technology and Complex Systems (MITACS), University of Regina, Mar. 22, 2010

- Certificate, *Teaching Development Days for Teaching Assistants*, Teaching Development Centre, University of Regina, Fall 2009

Academic Service and Contributions

University Service

- *Success1 Coach*, personal coach for "at-risk" first-year students (one per year), Brandon University, 2016–18

- *Member*, Hiring Committee, Department of Mathematics and Computer Science, Brandon University, 2017

- *Member*, NSERC USRA Oversight Committee, Brandon University, 2014–17

- *Science Representative*, Brandon University Faculty Association (BUFA), 2016–17

- *Faculty Advisor*, Math Student Club, Brandon University, 2015–17 (secured club room space and funding to send five club members to a regional conference, acted as mentor and advisor for social and educational events)

- *Presenter*, Preparing your Dossier for Tenure/Promotion/Reclassification Spring Workshop, May 11, 2016

- *Science Scooper*, Survival Ice Cream Parlour, Brandon University, Brandon, MB, Sept. 9, 2016, Sept. 6, 2013

- *Science Faculty Representative*, Scholarship Committee, Brandon University, 2014–16

- *Member*, Bylaws Revision Committee, Brandon University, 2014–16

- *Senator*, Senate, Brandon University, 2014–16

- *Member*, Faculty of Science Graduate Studies Committee, Brandon University, 2014–16

- *Member*, Hiring Committee, Department of Math & Computer Science, Brandon University, Winter 2015, Summer 2014

- *Pie Your Profs*, Brandon University Biological Society on Campus, funds donated to BUSU Food Bank and Relay for Life, Spring 2014

- *Department Representative*, Declare Fair, Brandon University, Mar. 25, 2014

- *Hiring Consultant*, Department of Psychology, Brandon University, Mar. 2014

- *Volunteer*, Science Booth at Brandon Career Symposium, Keystone Centre, Brandon, MB, Mar. 3–5, 2014

- *Math Contest Coach* (together with C.K. Li and D. Pickering), coaching & preparing a team of students to compete at the Mathematical Association of America (MAA) North Central Section, 2013–14

- *Senator*, Senate, University of Guelph, 2012–13

- *Member*, Board of Graduate Studies, University of Guelph, 2012–13

- *Member*, Committee on Student Petitions, University of Guelph, 2012–13

- *Member*, Senate Priorities and Planning Committee, University of Guelph, 2012-13

- *Member*, Student Senate Caucus (SSC), University of Guelph, 2012–13

- *Co-Organizer and Discussion Facilitator*, Matrix Analysis and its Applications to Quantum Information Theory Learning Seminar Series, Dept. Math & Statistics, University of Guelph, Guelph, ON, Summer 2012.

- *Adjudicator*, Student Life Recognition Awards Committee, University of Guelph, 2011–12

- *General Director, Math & Statistics*, Graduate Students' Association (GSA), University of Guelph, 2011–12

- *Volunteer*, Math & Statistics booth at various student recruitment events, University of Guelph, Guelph, ON, 2010–11

- *Conference Volunteer*, Creating Community Consciousness: Putting Theory into Practice, University of Regina, Regina, SK, Mar. 12–13, 2010

- *Co-Founder, Organizer, and Host*, The Math, Actuarial Science, and Statistics Students' Society π-Day (Rounded Up), University of Regina, Mar. 15, 2010.
    - included remarks from department head and three 14 minute talks
    - Over 500 pieces of free pie were given away
    - Became an annual event

- *Organizer and Host*, Graduate Students' Association Educational Seminars, University of Regina, Fall 2009 – Winter 2010.

- *Organizer and co-Host*, Graduate Students' Association Coffee Socials, University of Regina, Fall 2009 – Winter 2010.

- *Adjudicator*, Centre for Teaching and Learning (CTL) Graduate Teaching Awards Adjudication Committee, University of Regina, 2009–10

- *Member*, Strategic Research Planning Sub-Committee from the Council Committee on Research, University of Regina, 2009–10

- *Member*, Faculty Council of the Faculty of Graduate Studies and Research, University of Regina, 2009–10

- *Member*, Council Discipline Committee, University of Regina, 2009–10

- *VP Social and Educational Programming*, Graduate Students' Association (GSA), University of Regina, 2009–10

- *Grad Student Representative* (2009–10), *Vice President* (2008–09), *Math and Statistics Student Representative* (2007–08), Math, Actuarial Science, and Statistics Students' Society (MASS), University of Regina

- *Participant*, External Review of the Department of Mathematics and Statistics, University of Regina, Mar. 6, 2009

- *Organizer*, Graduate Students' Association Welcome BBQ ($\sim$ 150 attendees), University of Regina, Sept. 17, 2009.

- *Member*, University of Regina Women in Science and Engineering (URWISE), University of Regina, 2008–10

- *Math and Statistics Graduate Student Representative* (2008–10), *Math and Statistics Undergraduate Student Representative* (2007–08), Department of Math and Statistics, University of Regina

- *Organizer and Host*, Graduate/Undergrad Student Seminars (new series), Dept. Math & Statistics, University of Regina, Winter 2008.

Service to the Discipline

- *Organizing Committee Member*, Western Canada Linear Algebra Meeting (WClam), 2017–present

- *Reviewer*, American Mathematical Society MathSciNet Mathematical Reviews, 2014–present

- *Co-Organizer*, Optimization Techniques in Quantum Information Theory Scientific Session, Canadian Mathematical Society (CMS) Winter Meeting, Niagara Falls, ON, Dec. 2–5, 2016

- *Local Organizing Committee Member*, Western Canada Linear Algebra Meeting (WClam), University of Manitoba, May 15–16, 2016

- *Organizer*, Summer Symposium, Winnipeg Institute for Theoretical Physics (WITP), Brandon University, August 29, 2014

- *Journal referee* for the following journals: Electronic Journal of Linear Algebra, Journal of Mathematical Analysis and Applications, Journal of Physics A: Mathematical and Theoretical, Linear Algebra and its Applications, Linear and Multilinear Algebra, New Journal of Physics, Operators and Matrices, Quantum Information & Computation (QIC)

- *Co-Organizer*, Matrix Theory in Quantum Information Special Session, Canadian Mathematical Society (CMS) Winter Meeting, Ottawa, ON, Dec. 6–9, 2013

- *Co-Organizer*, Southwestern Ontario Graduate Mathematics Conference (SOGMC'13), University of Guelph, Guelph, ON, Jun. 4–5, 2013

- *Co-Organizer*, Student Poster Session, CMS Summer Meeting, 2012, *Organizer* 2011

- *Organizer and co-Host*, CMS Student Committee Student Social, CMS Summer Meeting, 2012, 2011, CMS Winter Meeting 2010

- *Co-Chair* (2010–12), *Western Provinces Representative* (2009–10), CMS Student Committee (StudC)

- *Judge*, CMS Student Poster Session, CMS Summer Meeting, 2012, 2011, CMS Winter Meeting, 2010

- *Organizer and Host*, The Hiring Process, CMS Student Committee Panel Discussion, CMS Winter Meeting, 2010, CMS Summer Meeting 2010

- *Registration Clerk*, 37th Canadian Operator Symposium, University of Regina, May 25, 2009

Community Service

- Profile/Bio featured on [NSERC Women in Science and Engineering—Prairies](), 2017–present

- Interview and profile featured on [Mathematics with a Human Face](), a resource page provided by Math Central primarily directed to elementary and high school students, teachers, and parents, 2016–present

- *Interactive research profile display*, International Day of the Girl, Manitoba Status of Women, Manitoba Legislative Building, Oct. 16, 2015

- *Volunteer*, Games Room, Mathematics Enrichment Camp, University of Regina, Sept. 26, 2009

- *Group Leader*, Mathematics Enrichment Camp, University of Regina, Sept. 27, 2008