LAURA R M BROLEY | CURRICULUM VITAE

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Citizenship: Canadian
Languages: English and French (fluent)

ACADEMIC POSITIONS

July 2021 – July 2022
Postdoctoral Fellow in the Department of Mathematics and Statistics
Brock University (St. Catharines, Canada)
Supervisor: Chantal Buteau

Collaborator in a SSHRC-Funded Research Project: *Educating for the 21st Century: Post-secondary students learning 'progmatics' (computer programming for mathematical investigation, simulation, and real-world modeling).*

September 2020 – March 2021
Postdoctoral Fellow in the Department of Mathematics and Statistics
Brock University (St. Catharines, Canada)
Supervisor: Chantal Buteau

Lead Researcher in a Project funded by a Ministry of Education: *A literature review and curricular scan concerning the teaching the learning of computer programming and computer science in schools.*

FORMAL EDUCATION

September 2015 – August 2020
Doctorate in Mathematics (**Ph.D.**)
Concordia University (Montréal, Canada)
Supervisors: Nadia Hardy and Ildiko Pelczer
Thesis: *The development of (non-)mathematical practices through paths of activities and students' positioning: The case of Real Analysis*.
SSHRC-funded: Vanier Canada Graduate Scholarship ($150,000)
Cumulative Grade Point Average: 4.25 / 4.3

September 2013 – August 2015
Master's in Mathematics (**M.Sc**.)
Université de Montréal (Montréal, Canada)
Supervisors: France Caron and Yvan Saint-Aubin
Thesis: *La programmation informatique dans la recherche et la formation en mathématiques au niveau universitaire*.
SSHRC-funded: Joseph-Armand Bombardier Graduate Scholarship ($17,500)
Cumulative Grade Point Average: 4.25 / 4.3

September 2009 – April 2013
Bachelor's in Mathematics (**B.Sc.**) Integrated with Computers and Applications, Concentration in Mathematics Education, Minor in French
Brock University (St. Catharines, Canada)
Honours Project: *E-Brock Bugs: The design, implementation, and analysis of an epistemic mathematics computer game*.
Supervisor: Chantal Buteau
Cumulative Grade Point Average: 99 / 100

Summer 2012 (5 weeks) Intensive French language program at Université Laval (Québec, Canada)

RESEARCH THEMES

Creation and use of computer tools to teach, learn, and do mathematics; teaching and learning of mathematics at the (post-)secondary level; practices learned by students in mathematics courses; professional mathematical practices; how practices are conditioned and constrained by institutional contexts; students' positioning (e.g., studenting vs. learning); teacher education; professional development of mathematics graduate teaching assistants and instructors; epistemic mathematics computer games.

DISSEMINATION *SSHRC Support; +Student-Researcher; ^Practitioner; ~International Scholar

Invited Author of Chapters in Edited Books

Broley, L., Buteau, C., ~Modeste, S., ~Rafalsaka, M., & ~Stephens, M. (Submitted). Computational thinking and mathematics. In B. Pepin, G. Gueudet, & J. Choppin (Eds.), *Handbook of Digital (Curriculum) Resources in Mathematics Education*. Springer.

***Broley,** L., & Hardy, N. (In Press). University students' development of (non-)mathematical practices: The case of a first Analysis course. In R. Biehler, G. Gueudet, M. Libendörfer, C. Rasmussen, & C. Winsløw (Eds.), *Practice-Oriented Research in Tertiary Mathematics Education: New Directions* (20 pages). Springer.

~Hochmuth, R., +**Broley**, L., & ~Nardi, E. (2021). Chapter 10: Transitions to, across and beyond university. In V. Durand-Guerrier, R. Hochmuth, E. Nardi, & C. Winsløw (Eds.), *Research and Development in University Mathematics Education. Overview Produced by the International Network for Research on Didactics of University Mathematics* (pp. 193–215). Routledge. I was invited as a promising early career researcher.

Articles in Peer Refereed Journals

***Broley**, L., Buteau, C., & +Sardella, J. (In Progress). When preservice and inservice teachers join forces: A collaborative way to support the enactment of new coding curricula in mathematics classrooms.

~*Gueudet, G., Buteau, C., **Broley**, L., Mgombelo, J., Muller, E., ~Sacristán, A.I., & ~Santacruz Rodriguez, M. (Submitted). Schemes and learning as peripheral participation in a community of practice: The case of programming for mathematical investigation.

*Buteau, C., **Broley**, L., +Dreise, K., & Muller, E. (2022). Students using programming for pure and applied mathematics investigations. *Épijournal de Didactique et Epistémologie des Mathématiques pour l'Enseignement Supérieur*. 28 pages. Available at https://hal.archives-ouvertes.fr/hal-03601988/document

***Broley**, L., & Hardy, N. (2022). The evolution of students' learning from Calculus to Analysis: What students learn when faced with Analysis tasks that look like Calculus tasks. *International Journal of Research in Undergraduate Mathematics Education*, 8, 269–292. Available at doi.org/10.1007/s40753-022-00171-2

*+**Broley**, L., Caron, F., & Saint-Aubin, Y. (2018). Levels of programming in mathematical research and university mathematics education. *International Journal of Research in Undergraduate Mathematics Education*, *4*(1), 38–55. Available at doi.org/10.1007/s40753-017-0066-1

[+]**Broley**, L., Buteau, C., & Muller, E. (2017). Struggles and growth in mathematics education: Reflections by three generations of mathematicians on the creation of the computer game E-Brock Bugs. *Journal of Humanistic Mathematics, 7*(1), 62–86. Available at scholarship.claremont.edu/jhm/vol7/iss1/6/

[+]**Broley**, L., Buteau, C., & Muller, E. (2015). E-Brock Bugs©, an epistemic mathematics computer game. *Journal of Humanistic Mathematics, 5*(2), 3–25. Available at scholarship.claremont.edu/jhm/vol5/iss2/3

Refereed Papers Presented at International Conferences

***Broley,** L., [+]Ablorh, E., Buteau, C., Mgombelo, J., & Muller, E. (In Press). Effective orchestration features of a project-based approach to learning programming for math investigation. In *Proceedings of INDRUM 2022 Fourth Conference of the International Network for Didactic Research in University Mathematics* (10 pages). Leibniz University Hannover and INDRUM.

***Broley**, L., [+]Ablorh, E, Buteau, C., Mgombelo, J., & Muller, E. (In Press). Effectiveness of a project-based approach to integrating computing in mathematics. In *Proceedings of the 24th Annual Conference on Research in Undergraduate Mathematics Education* (10 pages).

***Broley**, L., Buteau, C., ^Levay, D., ^Marshall, N., Muller, E., & [+]Sardella, J. (In Press). Students facing and handling challenges in programming-based mathematics inquiry projects. In *Proceedings of the 24th Annual Conference on Research in Undergraduate Mathematics Education* (9 pages).

***Broley**, L., Buteau, C, & Mgombelo, J. (In Press). University students learning programming-based practices for mathematics inquiry: Contributions of an institutional approach. In *Proceedings of CERME 12 the Twelfth Congress of the European Society for Research in Mathematics Education* (8 pages).

*~Gueudet, G., Buteau, C., **Broley**, L., Mgombelo, J., Muller, E., & ~Sacristán, A.I. (In Press). Understanding how students learn programming for mathematics inquiry at university: Schemes and social-individual dialectics. In *Proceedings of CERME 12 the Twelfth Congress of the European Society for Research in Mathematics Education* (8 pages).

*[+]**Broley**, L., & Hardy, N. (2018). A study of transitions in an undergraduate mathematics program. In V. Durand-Guerrier, R. Hochmuth, S. Goodchild, & N.M. Hogstad (Eds.), *Proceedings of INDRUM 2018 Second Conference of the International Network for Didactic Research in University Mathematics* (pp. 487–496). University of Agder and INDRUM. Available at hal.archives-ouvertes.fr/INDRUM2018/hal-01849950

[+]**Broley**, L., Buteau, C., & Muller, E. (2017). (Legitimate peripheral) computational thinking in mathematics. In T. Dooley, & G. Gueudet (Eds.), *Proceedings of CERME 10 the Tenth Congress of the European Society for Research in Mathematics Education* (pp. 2515–2522). DCU Institute of Education and ERME. Available at hal.archives-ouvertes.fr/CERME10-TWG16/hal-01946353v1

*[+]**Broley**, L. (2016). The place of computer programming in (undergraduate) mathematics practices. In E. Nardi, C. Winsløw, & T. Hausberger (Eds.), *Proceedings of INDRUM 2016 First Conference of the International Network for Didactic Research in University Mathematics* (pp. 360–369). University of Montpellier and INDRUM. Available at hal.archives-ouvertes.fr/INDRUM2016/hal-01337901

*[+]**Broley**, L. (2016). *Undergraduate math students' interactions with programming: Developing instruments in institutions*. Refereed paper presented at ICME 13 the 13th International Congress on Mathematical Education, Hamburg, Germany, July 24-31.

Buteau, C., [+]**Broley**, L. & Muller, E. (2014). E-Brock Bugs©: An epistemic math computer game. In P. Liljedahl, C. Nicol, S. Oesterle, & D. Allan (Eds.), *Proceedings of PME 38 / PME-NA 36 the 38th Conference of the International Group for the Psychology of Mathematics Education and the 36th Conference of the North American Chapter of the Psychology of Mathematics Education* (Vol. 6, pp. 31). Vancouver, Canada: PME. Available at www.pmena.org/pmenaproceedings/PMENA%2036%20PME%2038%202014%20Proceedings%20Vol%206.pdf

Refereed Poster Presentations at International Conferences

*__Broley,__ L., Buteau, C., & Muller, E. (In Press). Coding in math learning: A 'triple instrumental genesis' approach to support the transition from university learner to school teacher. In *Proceedings of INDRUM 2022 Fourth Conference of the International Network for Didactic Research in University Mathematics* (2 pages). Leibniz University Hannover and INDRUM.

[+]**Broley**, L., [+]Mathieu-Soucy, S., [+]Gibara, R., & Hardy, N. (2018). Reflections on a peer-led mentorship program for graduate teaching assistants. In A. Weinberg, C. Rasmussen, J. Rabin, M. Wawro, & S. Brown (Eds.), *Proceedings of RUME 21 the 21st Annual Conference on Research in Undergraduate Mathematics Education* (pp. 1621–1622). Abstract available at sigmaa.maa.org/rume/RUME21.pdf

*[+]**Broley**, L. (2016). Mathematics students' experiences with programming. In M.B. Wood, E.E. Turner, M. Civil, & J.A. Eli (Eds.), *Proceedings of PMENA-38 the 38th Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education* (pp. 1550). University of Arizona. Abstract available at www.pmena.org/pmenaproceedings/PMENA%2038%202016%20Proceedings.pdf

*[+]**Broley**, L. (2015). Exploring the enduring gap between undergraduate math and professional practice: The case of computer programming. In T.G. Bartell, K.N. Bieda, R.T. Putnam, K. Bradfield, & H. Dominguez (Eds.), *Proceedings of PMENA-37 the 37th Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education* (pp. 1250). Michigan State University. Abstract available at www.pmena.org/pmenaproceedings/PMENA%2037%202015%20Proceedings.pdf

Invited Presentations at Scholarly Meetings

*__Broley__, L. (2021). *Pratiques, parcours, et positions : Un cadre pour penser à des connexions pertinentes dans la didactique des mathématiques.* At the congrès de l'Association mathématique du Québec (AMQ), Montréal, Canada, October 15–21.

*__Broley__, L. (2021). *The development of (non-)mathematical practices through paths of activities and students' positioning: The case of Real Analysis.* New PhD presentation at the annual meeting of the Canadian Mathematics Education Study Group (CMESG), online, June 11–13. Paper in proceedings (pp. 109–116) available at https://www.cmesg.org/wp-content/uploads/2022/05/CMESG-2021.pdf

*__Broley__, L. (2021). *A positioning framework for thinking about the practices students develop: The case of Real Analysis.* Plenary presentation at the Fields Mathematics Education Forum, Toronto, Canada, January 30.

*[+]**Broley**, L. (2014). *Computer programming and the ideal undergraduate mathematics program: Some mathematicians' perspectives.* At the Canadian Mathematical Society (CMS) winter meeting, Hamilton, Canada, December 5–8.

[+]**Broley**, L. (2014). *The computation and exploration of the unstable manifolds of halo orbits*. In the Complex Dynamical Systems Working Group at the annual meeting of the Canadian Mathematics Education Study Group (CMESG), Edmonton, Canada, May 30 – June 3.

[+]**Broley**, L., Buteau, C., & Muller, E. (2013). *E-Brock Bugs: A new free online math computer game for the development of mathematical thinking – Integrating probability concepts in MDM4U*. At the Fields Mathematics Education Forum, Toronto, Canada, November 30. Slides available at www.fields.utoronto.ca/programs/mathed/meetings/minutes/13-14/13.11.30.html

Working Group Reports

[+]**Broley**, L., & Hooper, J. (2020). Problem-based learning in post-secondary mathematics / Apprentissage par problèmes en mathématiques au niveau postsecondaire. In J. Holm, & S. Mathieu-Soucy (Eds.), *Proceedings of the 2019 Annual Meeting of the Canadian Mathematics Education Study Group* (pp. 15–39). CMESG. Available at http://www.cmesg.org/wp-content/uploads/2020/06/CMESG-2019-online.pdf

[+]**Broley**, L., on behalf of the group. (2019). Theme: "What should we teach?" WG2: Teaching objectives. In *Working Group Reports (Saturday) of the conference First-Year University Mathematics in Canada: Time to Rethink our Curriculum?* (pp. 4–7). Available at https://firstyearmath.ca/wp-content/uploads/2019/06/EdmontonWG_whattoteach.pdf

Freiman, V., with [+]**Broley**, L., Buteau, C., & [+]Vasylieva, N. (2018). Report from working group focussed on research-based understandings of the interplay between the affordances of computational thinking and mathematics. In *Online Proceedings of the Computational Thinking in Mathematics Education Symposium.* Available at ctmath.ca/wp-content/uploads/2018/10/Symposium_Working-Report_-Frieman-Et-al.pdf

Other Presentations at Local, Provincial, and National Scholarly Events

*[+]Ablorh, E., **Broley**, L., Buteau, C., Mgombelo, J., & Muller, E. (2022). Integrating coding in mathematics: Effectiveness of a project-based approach. Poster presentation at the Fields MathEd Forum Research Day, online, January 29.

*[+]Sardella, J., **Broley**, L., Buteau, C., ^Levay, D., ^Marshall, N., & Muller, E. (2022). Programming-based mathematics inquiry: The biggest challenges faced by students during course projects, and how they handle them. Poster presentation at the Fields MathEd Forum Research Day, online, January 29.

***Broley**, L., & Buteau, C. (2021). *L'orchestration instrumentale de la programmation pour l'investigation mathématique*. Seminar session at the Séminaire de didactique des mathématiques à l'Université de Québec à Montréal, Canada, October 18.

Broley, L. (2021). *Computer programming in mathematics education: Some results from a literature review and an international scan*. Presentation in the Brock MathEd Seminar Series, Brock University, St. Catharines, Canada, March 4.

***Broley**, L. (2021). *What students learn in Calculus and Analysis courses, through the lens of a positioning framework*. Presentation in the Brock Department of Mathematics and Statistics Colloquium, Brock University, St. Catharines, Canada, January 27.

Broley, L., Mathieu-Soucy, S., Gibara, R., & Hardy, N. (2018). *How can we design activities that actually engage mathematics graduate student TAs in "talking teaching"?* Poster presentation at the annual meeting of the Canadian Mathematics Education Study Group (CMESG), Squamish, Canada, June 1–5.

[+]Mathieu-Soucy, S., [+]**Broley**, L., [+]Gibara, R., & Hardy, N. (2018). *Réflexions sur un programme de mentorat par les pairs pour les étudiants gradués impliqués dans l'enseignement des cours de mathématique de base à l'université*. Presentation at the annual meeting of the Groupe de didactique des mathématiques du Québec (GDM), Drummondville, Canada, May 23–25.

Buteau, C., [+]**Broley**, L., & Muller, E. (2018). *Coding mathematics as mathematicians do (or legitimate peripheral computational thinking in mathematics).* Poster presentation at the Fields MathEd Forum Annual Research Day Symposium, Fields Institute for Research in Mathematical Sciences, Toronto, Canada, January 27.

[+]**Broley**, L. (2017). *"Computational" and "mathematical" thinking: Exploring difference and interdependence.* Poster presentation at the Computational Thinking in Mathematics Education Symposium, Oshawa, Canada, October 13–15. Poster available at ctmath.ca/wp-content/uploads/2018/04/CT-in-Math-Ed-Symposium-Poster-Laura-Broley.pdf

[+]Héroux, S., [+]Mathieu-Soucy, S., & [+]**Broley**, L. (2017). *De jeunes chercheurs à la rencontre de la philosophie des mathématiques.* Poster presentation and proceedings (pp. 275) at the annual meeting of the Canadian Mathematics Education Study Group (CMESG), Montréal, Canada, June 2–6. Abstract available at www.cmesg.org/wp-content/uploads/2018/06/CMESG-2017.pdf

[+]**Broley**, L., Buteau, C., & Muller, E. (2017). *Legitimate peripheral computational thinking in mathematics.* Poster presentation at the annual meeting of the Canadian Mathematics Education Study Group (CMESG), Montréal, Canada, June 2–6.

*[+]**Broley**, L. (2015). *Computer programming in "doing mathematics": Mathematical research vs. undergraduate mathematics education.* Presentation at the Canadian Mathematical Society (CMS) winter meeting, Montréal, Canada, December 4–7.

[+]**Broley**, L. (2013). *E-Brock Bugs: The design, implementation, and analysis of an epistemic mathematics computer game.* Poster presentation and proceedings (pp. 239–240) at the annual meeting of the Canadian Mathematics Education Study Group (CMESG), St. Catharines, Canada, May 24–28. Abstract available at www.cmesg.org/wp-content/uploads/2015/01/CMESG2013.pdf

[+]**Broley**, L. (2012). *Gearing up for grade 9: A learning object.* Poster presentation and proceedings (pp. 269) at the annual meeting of the Canadian Mathematics Education Study Group (CMESG), Québec, Canada, May 25–29. Abstract available at www.cmesg.org/wp-content/uploads/2015/01/CMESG-2012.pdf

Newsletter Publications

*[+]Sardella, J., **Broley**, L., & Buteau, C. (In Progress). Code mountain: Climbing it collaboratively.

*[+]**Broley**, L. (2017). Mon mémoire en mille mots : La programmation informatique dans la recherche et la formation en mathématiques au niveau universitaire. *Bulletin de l'Association mathématique du Québec (AMQ)*, *57*(2), 65–67. Available at www.amq.math.ca/wp-content/uploads/bulletin/vol57/no2/10-maitre-1000-mots-programmation.pdf

Buteau, C., Muller, E., & [+]**Broley**, L. (2017). Computational thinking: In our undergraduate mathematics programs? *Notes of the Canadian Mathematical Society (CMS)*, *49*(6), 10–11. Available at ctuniversitymath.files.wordpress.com/2017/12/cms-notes-dec-2017.pdf

[+]**Broley**, L, Buteau, C., & Muller, E. (2015). The E-Brock Bugs computer game: What if becoming a (better) mathematician was a fun-filled adventure? *Ontario Mathematics Gazette, 53*(3), 27–32. Available at brocku.ca/mathematics-science/mathematics/wp-content/uploads/sites/107/OAME2015-EBROCK-BUGS.pdf

[+]**Broley**, L., Buteau, C., & Muller, E. (2013). E-Brock Bugs©: A new free online math computer game for the development of mathematical thinking. *CMESG Newsletter, 30*(1), 4.

Resources and Workshops for Teachers

Broley, L., & [+]Sardella, J. (2022). *Implementing coding in Gr. 1–9 math classrooms: A collaborative approach involving pre- and in-service teachers, numeracy consultants, and university faculty*. Facilitation guide accompanying a professional development workshop. Available at http://mkn-rcm.ca/wp-content/uploads/2022/06/MKN-Facilitation-Guide-Collaborative-Coding-Implementation.pdf

^Cronshaw, L., ^Martin, J., Buteau, C., & **Broley**, L. (2022). *Implementing coding in Gr. 1–9 math classrooms: A collaborative approach involving pre- and in-service teachers, numeracy consultants, and university faculty*. Professional development workshop, online, June 16. Synthesized in video at https://www.dropbox.com/s/tdyldwjzpzx9lsy/MKN%20Collaboration%20to%20Implement%20Coding%20in%20Mathematics%20Classrooms.mp4?dl=0

Buteau, C., & **Broley**, L. (2013). *Assessment in the digital era*. Workshop at Ontario Association for Mathematics Education (OAME) annual meeting, Toronto, Canada, May 10–12.

Buteau, C., & **Broley**, L. (2013). *Grade 12 math computer games (MDM4U– MCV4U)*. Workshop at Ontario Association for Mathematics Education (OAME) annual meeting, Toronto, Canada, May 10–12.

Creation of a Free Online Mathematics Computer Game

Broley, L., with Buteau, C., & Muller, E. (2013). *E-Brock Bugs©, a computer game for learning basic probability concepts*. Available at brocku.ca/mathematics-science/mathematics/brock-bugs-computer-game/

Broley, L., Buteau, C., & Muller, E. (2013). *E-Brock Bugs© mathematics computer game teacher document*. Available at brocku.ca/webfm_send/32032

TEACHING-RELATED EXPERIENCE

Supervisor

Eunice Ablorh – Master's Project, Co-Supervised with C. Buteau (Summer – Fall 2021, Brock University, Canada)

Title: Student learning and teacher support in programming-based mathematics investigation projects. Framed using the instrumental approach (instrumental genesis and orchestration), operational and predicative knowledge, project-based learning, and constructionism. Involved the analysis of questionnaire data using quantitative and qualitative methods, the writing of two international conference proposals, and the writing of a thesis where the two proposals are introduced and discussed.

Chantal Lof – Undergraduate Honour's Project, Co-Supervised with C. Buteau (Summer – Fall 2021, Brock University, Canada)

Title: Programming in the mathematics classroom: Experience (as a student), reflection (as a future teacher), and contextualization (in the literature). Involved the completion of several programming-based mathematics projects, reflections on the learning and engagement in such projects (using the notions of computational practices and schemes) and how it was supported by teaching, the reading and synthesis of literature on the teaching of programming, and the development of recommendations for teachers.

Designer of Teaching Activities

MATH 3P41 – Visual and Interactive Mathematics (Fall 2021 – Winter 2022, Brock University, Canada)

With C. Buteau, redesigned the course objectives and activities (lectures, labs, assignments) to better prepare the students (future mathematics teachers) for teaching mathematics with programming (in light of the 2020-21 revisions to the Ontario mathematics school curriculum). Included creating new lab sessions, modifying the reflection components of the programming-based mathematics projects, updating the projects to be completed in the Python programming language, and enhancing the final project (where students collaborate with in-service teachers to teach programming-based mathematics activities in school classrooms).

MAT 1000 – Analyse 1 [Analysis I] (Summer 2020, Université de Montréal, Canada)

With Y. Saint-Aubin, assisted in the design of three kinds of exercises for students: comprehension questions (multiple choice, true/false), written questions (with complete solutions), and exam-like questions (without solutions).

Mentor to TAs (Fall 2016 – Winter 2019, Concordia University, Montréal, Canada)

Selected by the Department of Mathematics and Statistics to initiate a peer-mentorship program, where two "Mentors to TAs" provide support to graduate students in teaching-related jobs (marking, tutoring, and instructing). Organized and ran orientation sessions each semester, created training documents and activities, conducted over 100 observations graduate students as they gave tutorials or lectures and guided constructive follow-up sessions with feedback for improvement, was available on a regular basis to respond to any inquiries, and assisted in training two new mentors.

Instructor

MATH 1P97 – Calculus with Applications (Winter 2022, Brock University, St. Catharines, Canada)

Prepared and gave 36 1-hour asynchronous online lectures (3 lectures per week) in a section of about 180 students, interacted with students via email and in weekly online office hours, and participated in the creation and overseeing of evaluations in collaboration with another instructor and the course coordinator (included creating assignments and proposing questions for tests and the final exam).

MATH 203 – Differential & Integral Calculus I (Summer 2018, Concordia University, Montréal, Canada)

Prepared and gave 13 2.5-hour face-to-face lectures, interacted with students via email and in weekly office hours, and created and marked midterms and final exams in a course with 79 students (final enrolment: 70).

Online Course Tutor

MATH 201 – Elementary Functions (Fall 2017; Winter 2019, Concordia University, Montréal, Canada)

MATH 200 – Fundamental Concepts in Algebra (Fall 2017; Winter 2018, Concordia University, Montréal, Canada)

Responded to students' questions via email and on a discussion board, participated in running live online review sessions, and marked final exams for over 200 students.

Course Tutor

MATH 203 – Differential & Integral Calculus I (Winter 2016, Concordia University, Montréal, Canada)

Prepared and led weekly 75-minute problem-solving sessions with groups of 10-30 students.

Help Centre Tutor (Fall 2015, Concordia University, Montréal, Canada)

Provided one-on-one guidance to students from various pre-calculus, calculus, and linear algebra courses (named MATH 200 – 209 at Concordia).

Personal Tutor (January 2009 – August 2012, Barrie, Canada, surrounding communities, and Brock University, St. Catharines, Canada)

Guided students at various grade levels (grade 5 to second year university) in their development of certain mathematics and life skills. Created and implemented individualized plans involving goal setting, habit reflections, lessons, exercises, and assessments.

Volunteer Teacher and Classroom Assistant (March 2012 – June 2012, Denis Morris High School, St. Catharines, Canada, and Innisdale Secondary School, Barrie, Canada)

Assisted teachers and students within a variety of mathematics classrooms (Gr. 9 applied, Gr. 9 academic, Gr. 10 applied, Gr. 11 university) and a Gr. 9 French class. Interacted with students on a one-on-one basis, taught several lessons, and organized a study skills seminar.

Camp Coordinator, Growing Up Through Sports Summer Hockey Camp (2011, 2012, Ballhockey.com, Barrie, Canada)

Designed, promoted, and ran the first ever Not-for-Profit GUTS Summer Hockey Camp. Worked with children aged 5-12 of various skill levels to develop hockey skills and life skills related to teamwork, discipline, health, and attitude.

Supply Teacher (January – June 2009, Simcoe County District School Board, Barrie, Canada)

Was available each day to replace elementary or secondary school teachers, when needed.

SERVICE & ADMINISTRATION

Elected or Appointed Positions on Associations

2021 – 2022 Co-opted Member of the Executive. *Canadian Mathematics Education Study Group (CMESG).*

2018 – 2020 Mathematics Student Representative. *Conseil d'administration [Advisory Board] of Association mathématique du Québec (AMQ).*

2016 – 2017 Vice President – Activities. *Concordia Mathematics and Statistics Graduate Student Association.*

2012 – 2013 President. *Brock Leaders Citizenship Society.*

2011 – 2012 Vice-President. *Brock Leaders Citizenship Society.*

2010 – 2011 Member at Large. *Brock Leaders Citizenship Society.*

Organization of Scholarly Conferences

2022 Lead organizer, chair of the local organizing committee, and member of the scientific program committee. *Coding, Computational Modeling, and Equity in Mathematics Education Symposium and PD Day*, Brock University, St. Catharines, Canada, April 26–29, 2022.

2022 Member of the scientific program committee. *Canadian Mathematics Education Study Group (CMESG) 2022 Annual Meeting*, online, Canada, May 27–29.

2017 Member of the local organizing committee. *Canadian Mathematics Education Study Group (CMESG) 2017 Annual Meeting*, McGill University, Montréal, Canada, June 2–6.

2013 Member of the local organizing committee. *Canadian Mathematics Education Study Group (CMESG) 2013 Annual Meeting*, Brock University, St. Catharines, Canada, May 24–28.

Invited Working Group Leaderships

2019 Co-leader with J. Hooper. *Problem-based learning in post-secondary mathematics / Apprentissage par problèmes en mathématiques au niveau postsecondaire.* 9-hour 3-day working group at the annual meeting of the Canadian Mathematics Education Study Group (CMESG), Antigonish, Canada, May 31 – June 4.

2019 Captain. *Theme: What should we teach? Working group focus: Teaching objectives.* 90-minute working group at the conference First-Year University Mathematics in Canada: Time to Rethink our Curriculum? Edmonton, Canada, May 3-5.

Refereeing Duties

Book chapters

2021 A chapter in R. Biehler, G. Gueudet, M. Libendörfer, C. Rasmussen, & C. Winsløw (Eds.), *Practice-Oriented Research in Tertiary Mathematics Education: New Directions*. Springer

Journal papers

2021 Canadian Journal of Science, Mathematics, and Technology Education (CSMT) (1 article)

2019 – 2022 International Journal of Research in Undergraduate Mathematics Education (IJRUME) (5 articles)

Conference paper proposals

International Network for Didactic Research in University Mathematics (INDRUM) 2016, 2018, 2022
Congress of the European Society for Research in Mathematics Education (CERME) 2017, 2022
International Congress on Mathematical Education (ICME) 2016

Contributions to Departmental Committees

2016 – 2019 Member as Mentor to TAs. *Departmental Committee on the Teaching of MATH 200-level Courses,* Concordia University, Department of Mathematics and Statistics. Committee met monthly to discuss issues related to the administration of the courses: e.g., the training of grad student TAs and instructors and the administration of assignments through WeBWorK.

2012 Invited student member. *Departmental Committee for Future Mathematics Teachers*, Brock University, Department of Mathematics and Statistics. Committee aimed to identify issues with and propose changes to curriculum, classroom practices, and resource systems available for future mathematics teachers.

Invited Participation in University Outreach Events

2021 Speaker, Post-Doctoral Fellow, representing the Department of Mathematics and Statistics. *The 2nd Annual Women in Science Event.* Short talks and small group discussions to celebrate, showcase, and encourage women in to persist in science, Brock University, St. Catharines, Canada, February 11.

2019 Panelist, Mathematics. *STEM after CÉGEP: Paths and possibilities.* Presentations and interactive panel discussion about career opportunities in the fields of STEM, Dawson College, Montréal, Canada, February 18.

Organization of Extracurricular Mathematics Events (Walks, Exhibits, Camp Sessions)

2018 Co-organizer with A. Stancu. *Maths en perspective: Anamorphoses [Mathematics in perspective: Anamorphosis].* 3-hour camp session at camp de l'Association mathématique du Québec (AMQ) for college mathematics students, Université de Montréal, Canada, May 28.

2018 Organizer. *Making magic with the Fibonacci numbers / Faire de la magie avec les nombres de Fibonacci; Monty Hall problem / Problème de Monty Hall.* 2-day exhibit, representing the Department of Mathematics and Statistics at Concordia's annual Exposcience event for local children and families, Stewart Hall, Pointe-Claire, Canada, November 10-11.

2017 Co-organizer with H. Brandes. *Fractals; Math Hatter logic problem / Problème de logique du Chapelier Mathoqué; If 100 kids give each other high fives … / Si 100 enfants se donnent tous un high five….* 2-day exhibit, representing the Department of Mathematics and Statistics at Concordia's annual Exposcience event for local children and families, Stewart Hall, Pointe-Claire, Canada, November 11-12.

2016 Co-organizer with H. Brandes. *The magical Möbius strip / La bande de Möbius magique; Anamorphic Art / Art Anamorphose.* 2-day exhibit, representing the Department of Mathematics and Statistics at Concordia's annual Exposcience event for local children and families, Stewart Hall, Pointe-Claire, Canada, November 12-13.

2015 Coordinator of a group of doctoral students taking the same course (Popularization of Mathematics). *How to get from Dawson to Concordia in six easy steps.* 90-minute Math Trail in downtown Montréal designed for college-level mathematics students, November 11.

Organization of Charitable Events and Volunteering

2013 Planning committee member and Brock liaison officer. *Annual Walk for Memories for the Alzheimer Society of Niagara Region*. Raised $68,000, the largest one-day amount for the Society, Brock University, St. Catharines, Canada, January 26.

2010 – 2013 Founder and head organizer. *Annual Flora Broley Memorial (now Play for Memories) Ball Hockey Tournament.* Continues to serve as an initiation for first-year members of the Brock Leaders Citizenship Society and, over 10 years of existence, has donated over $52,000 to the Alzheimer Society of Niagara Region, St. Catharines, Canada.

2009 – 2013 Volunteer. *Various Events, including Shinerama, Brock Preview Days, Trick or Eat, Brock Cares Day of Service, the Ontario Universities' Fair, and the OAME Golden Section 2013 Spring Conference.* Dedicated over a hundred hours a year to volunteering at various events taking place at Brock University and within surrounding communities.

Invited Participation in a SSHRC Panel

2012 Student participant. *Social Science and Humanities Research Council (SSHRC) Panel Meeting: Imagining Canada`s Future: The Culture of Innovation: A Southern Ontario Perspective.* Day-long discussion among various stakeholders to identify and synthesize key issues underlying future opportunities and challenges in Canada and the role of SSHRC in addressing those challenges, Niagara-on-the-Lake, Canada, September 21.

SCHOLARSHIPS AND AWARDS (all monetary values are given in CAD)

2018 – 2019	**$5,000**	Accelerator Award, from Concordia University Department of Mathematics and Statistics
	$4,540	Bourse d'excellence, from Institut des sciences mathématiques
2015 – 2019	**$15,025**	Conference Grants, from various sources (Concordia University Graduate Student Association, School of Graduate Studies, Faculty of Arts and Sciences, and Department of Mathematics and Statistics; Institut des sciences mathématiques; Canadian Mathematics Education Study Group)
	$80,000	Doctoral Fellowship, from Social Sciences and Humanities Research Council of Canada (SSHRC) *[not accepted]*
2015 – 2018	**$150,000**	Vanier Canada Graduate Scholarship, from Social Sciences and Humanities Research Council of Canada (SSHRC)
2015 – 2016	**$10,000**	Merit Scholarship, from Centre for the Study of Learning and Performance at Concordia University
	$10,000	Special Entrance Scholarship, from Concordia University
2014 – 2015	**$8,000**	Bourse de fin d'études de maîtrise, from Université de Montréal
	$5,000	Bourse d'excellence, from Université de Montréal
2013 – 2014	**$4,000**	Bourse Georges-Baril
	$5,535	Bourse de maîtrise pour canadiens non-résidents du Québec, from Université de Montréal
	$17,500	Joseph-Armand Bombardier Canada Graduate Scholarship, from Social Sciences and Humanities Research Council of Canada (SSHRC)
	$15,000	Ontario Graduate Scholarship *[not accepted]*
2012 – 2013	**$1,495**	Margarette Pummell Scholarship

	$890	John W. Bean and Kathryn Bean Becker Scholarship in Mathematics and Science
	$753	Brock Alumni Honours Scholarship
2011 – 2013	**$4,574**	Art Bicknell Scholarship in Mathematics
2009 – 2013	**$14,000**	Brock Scholars Award
	$8,000	Brock Leaders Award
2011 – 2012	**$100**	Allanburg Women's Institute Book Prize
2010 – 2012	**$5,200**	Dr. Alan Earp Scholarship
2010 – 2011	**$1,000**	Alumni Scholarship, from Brock University Alumni Association
	$525	Birks Family Foundation Scholarship
2009 – 2010	**$1,800**	John and May Ella Houghton Scholarship
	$125	40th Anniversary Tribute Award

OTHER AWARDS & DISTINCTIONS

2018 **Concordia University Retired Faculty and Staff Graduate Award**, awarded by Concordia's Faculty of Arts and Sciences to two doctoral students who have demonstrated a commitment to disseminating research through conferences, publications, or exhibitions.

2017 **Prix Dieter-Lunkenbein**, awarded by Association mathématique du Québec (AMQ) to the person who completed the best master's thesis in mathematics education in the previous two years. Criteria considered: writing quality, contribution to the field of mathematics education, and consequences for the teaching of mathematics.

2016 **Invitation to the Golden Key International Honour Society – Concordia University Chapter**, offered to high achieving graduate students.

2013 **Governor General's Academic Medal**, a silver medal awarded for academic excellence to the undergraduate who achieves the highest academic standing in a bachelor degree program.

Board of Trustees Spirit of Brock Medal, a gold medal awarded by Brock University's Faculty deans to one graduating undergraduate student in each Faculty who best exemplifies the spirit of Sir Isaac Brock. Criteria considered: demonstration of one or more of the qualities of leadership, courage, innovation, inspiration, and community involvement.

Dean's Medal for Mathematics and Science (Honours), a gold medal awarded by Brock University to the graduating student in each Faculty with the highest cumulative overall average.

Distinguished Graduating Student Award – Mathematics, awarded with $100 to the most distinguished graduate for each department or program at Brock University.

John and Roslyn Reed Book Prize, awarded to one female and one male student graduating with first-class honours in mathematics at Brock University.

President's Surgite Award, awarded with $1,000 to students who make a difference at Brock University, whether in student government, academics, athletics, or service to the community.

Invitation to the Golden Key International Honour Society – Brock Chapter

2009 – 2013 **Dean's Honours List**, placement on which is awarded each time a student completes five undergraduate credits with an average of 80 per cent or more.

PERSONAL & PROFESSIONAL DEVELOPMENT

2013	*Personality Dimensions Workshop* (January 14)
	Portfolio Workshop (January 12)
2012	*Foundations in Leadership – Platinum*, Leadership Style (September – October)
	Student Leader Summit (November 10)
2011	*Foundations in Leadership – Gold*, Group Work (September – October)
2010	*Foundations in Leadership – Silver*, Problem Solving and Conflict Management (September – October)
2009	*Foundations in Leadership – Bronze*, Interpersonal Communication (September)