

Samuel Leblanc

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Education

Queen's University <i>M.Sc. in Mathematics</i> Research project: Cluster characters, cluster categories, and representation theory Supervisors: Ivan Dimitrov , Charles Paquette , and David Wehlau	2025 - 2027
Université de Sherbrooke <i>B.Sc. in Mathematics</i> Mention of Excellence – Faculty Dean's List, Winter 2025	2022 - 2025

Research Interests

Representation theory, cluster algebras, homological algebra, topological data analysis, machine learning.

Papers

- Brüstle, T., Desrochers, J., Leblanc S., *Generalized Rank via Minimal Subposet*. [arXiv:2510.10837](#) (2025)
- Leblanc, S., Rasolomanana, A., Armenta, M., *Hidden Activations Are Not Enough: A General Approach to Neural Network Predictions*. [arXiv:2409.13163](#) (2024)
- Armenta, M., Leblanc, S., *Batalin-Vilkovisky structure on Hochschild cohomology with coefficients in the dual algebra*. [arXiv:1810.13023](#) (2018) (I joined as coauthor in 2025; revisions and extensions)


Student Papers

- Baril, L., Leblanc, S., *Multiplicité de la représentation indicatrice*. Submitted to: [Cahiers mathématiques de l'Université de Sherbrooke](#) (2025)
Supervisor: [Thomas Brüstle](#)
- Leblanc, S., *Dégénération des représentations de carquois de type A_3 à deux puits*. To appear in: [Cahiers mathématiques de l'Université de Sherbrooke](#) (2024)
Supervisors: [Emily Cliff](#) and [Shiping Liu](#)
- Leblanc, S., *Transformations de cercles orientés tangents sur la sphère de Riemann*. Submitted to: [Cahiers mathématiques de l'Université de Sherbrooke](#) (2023)
Supervisor: [Jean-Philippe Burelle](#)

Posters


- Leblanc, S., *Multiplicity of the Interval Module*. [AARMS-CMS Student Poster Session \(CMS Summer Meeting\)](#) (2025)
Collaborators: Laurianne Baril and Justin Desrochers. Supervisor: [Thomas Brüstle](#).
- Desrochers, J., Leblanc, S., *Kernel of the Rank Invariant*. [Summer Research School, Applications of Representation Theory in Topological Data Analysis and Geometric Invariant Theory](#) (2024)

Software

knowledgematrix	 GitHub
<ul style="list-style-type: none"> A Python library for implementing neural networks and computing their associated <i>knowledge matrices</i> (i.e., N_V (Lemma 7.4) in this paper and $M(W, f)(x)$ in this paper). Tools: Python 	


simple_adversarial_detection

 GitHub

- Very simple version of the code used for the experiments in the paper Hidden Activations Are Not Enough: A General Approach to Neural Networks Predictions. [arXiv:2409.13163](https://arxiv.org/abs/2409.13163) 
- Tools: Python


upperhalfplane

 GitHub

- Visualize the action of $\mathrm{PSL}(2, \mathbb{R})$ on the upper half plane (Poincaré half plane model) interactively. samueleblanc.com/software/upperhalfplane 
- Tools: CindyJS, JavaScript, HTML, CSS


riemannsphere

 GitHub



- Visualize the action of $\mathrm{PSL}(2, \mathbb{C})$, i.e., Möbius transformations, and $\mathrm{PSP}(4, \mathbb{R})$ on the Riemann sphere interactively. samueleblanc.com/software/riemannsphere 
Supervisor: [Jean-Philippe Burelle](#).
- Tools: CindyJS, JavaScript, HTML, CSS

MatTalX

 GitHub

- Chrome Extension and Firefox Add-on that allow the user to convert LaTeX commands into plain text, enabling them to write symbols anywhere. <https://mattalx.org> 
- Tools: JavaScript, HTML, CSS, Bash

Talks

1. *(Co)limit Computation and Its Application to Representation Theory* (January 26, 2026)
Algebra & Geometry Seminar, Queen's University
2. *Generalized Rank in Generalized Linear Algebra* (November 12, 2025)
Grad Seminar, Department of Mathematics and Statistics, Queen's University
3. *Analyse topologique de données* (February 13, 2025)
Club mathématiques de l'Université de Sherbrooke
4. *La propagation avant en tant que matrice* (November 14, 2024) 
Club mathématiques de l'Université de Sherbrooke
5. *Visualisation de transformations sur la sphère de Riemann* (March 21, 2024) 
Club mathématiques de l'Université de Sherbrooke
6. *Théorie des représentations des réseaux de neurones* (October 5, 2023)
Club mathématiques de l'Université de Sherbrooke

Teaching

Teaching Assistant

Differential and Integral Calculus (MATH 128)

Winter 2026

Department of Mathematics and Statistics, Queen's University

Méthodes quantitatives en communication marketing (MQG301)

Winter 2025

École de gestion, Université de Sherbrooke

Calcul vectoriel (MAT298)

Fall 2024

Département de mathématiques, Université de Sherbrooke

Statistique appliquée à la gestion (MQG222)

Summer 2024

École de gestion, Université de Sherbrooke

Statistique appliquée à la gestion (MQG222)


Winter 2024

École de gestion, Université de Sherbrooke

Grader

Differential and Integral Calculus (MATH 121B/128) <i>Department of Mathematics and Statistics, Queen's University</i>	Winter 2026
Real Analysis (MATH/MTHE 328) <i>Department of Mathematics and Statistics, Queen's University</i>	Winter 2026
Algebraic Structures (MTHE 217) <i>Smith Engineering, Queen's University</i>	Fall 2025
Calculus I (APSC 171) <i>Smith Engineering, Queen's University</i>	Fall 2025
Differential and Integral Calculus (MATH 121) <i>Department of Mathematics and Statistics, Queen's University</i>	Fall 2025
Mathématiques discrètes (MAT120) <i>Département de mathématiques, Université de Sherbrooke</i>	Fall 2024

Tutor

Mathematics, 10th grade <i>Volunteering with Le Diplôme avant la Médaille </i>	2023 - 2024
Algèbre linéaire et géométrie vectorielle (MAT902) <i>Université de Sherbrooke</i>	Summer 2023
Biomécanique humaine (KIN325) <i>Université de Sherbrooke</i>	Winter 2023

Academic Activities

35th RTA Meeting Attended the 35th Meeting on the Representation Theory of Algebras and Related Topics at the Université de Sherbrooke (Sherbrooke, QC). October 23 to 25, 2025.	Fall 2025
Route 81 Conference Attended the Route 81 Conference at Queen's University (Kingston, ON). September 27, 2025.	Fall 2025
Canadian Mathematical Society (CMS) Meeting Attended the 2025 CMS Summer Meeting at the Université Laval (Québec, QC). June 7 to 9, 2025.	Summer 2025
34th RTA Meeting Attended the 34th Meeting on the Representation Theory of Algebras and Related Topics at the Université de Sherbrooke (Sherbrooke, QC). October 4 and 5, 2024.	Fall 2024
Research School Attended the Summer Research School: Applications of Representation Theory in Topological Data Analysis and Geometric Invariant Theory, at the UQAM (Montréal, QC). June 3 to 7, 2024.	Summer 2024
Introduction to Research (MAT523): Topological Data Analysis Optional course. <i>Département de mathématiques, Université de Sherbrooke</i> Supervisor: Thomas Brüstle	Winter 2024
Reading group in category theory Participated in weekly meeting with graduate students as well as undergraduates students. Gave several talks about the week's readings.	Winter 2024
BIRS Workshop Assisted (online) to the BIRS Workshop: Representation Theory and Topological Data Analysis. April 8 to 11, 2024.	Winter 2024

Research internship: Representation Theory of Quivers

Département de mathématiques, Université de Sherbrooke

Supervisors: [Emily Cliff](#) and [Shiping Liu](#)

Summer 2023

Experimental Mathematics Lab (MAT001): Projective Geometry

Course taken beyond B.Sc. requirements. *Département de mathématiques, Université de Sherbrooke*

Supervisor: [Jean-Philippe Burelle](#)

Winter 2023

Languages

French (native), English (advanced).