Samuel Leblanc

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Education

Queen's University   **2025 - 2027**
M.Sc. in Mathematics
Research project: Cluster characters, cluster categories, and representation theory
Supervisors: Ivan Dimitrov, Charles Paquette, and David Wehlau

Université de Sherbrooke   **2022 - 2025**
B.Sc. in Mathematics
Mention of Excellence – Faculty Dean's List, Winter 2025

Research Interests

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

Papers

1. Brüstle, T., Desrochers, J., Leblanc S., *Generalized Rank via Minimal Subposet.* arXiv:2510.10837 ↗ (2025)

2. Armenta, M., Leblanc, S., *Batalin-Vilkovisky structure on Hochschild cohomology with coefficients in the dual algebra.* arXiv:1810.13023 ↗ (2025)

3. Leblanc, S., Rasolomanana, A., Armenta, M., *Hidden Activations Are Not Enough: A General Approach to Neural Network Predictions.* arXiv:2409.13163 ↗ (2024)

Student Papers

1. Baril, L., Leblanc, S., *Multiplicité de la représentation indicatrice.* Submitted to: Cahiers mathématiques de l'Université de Sherbrooke ↗ (2025)
   Supervisor: Thomas Brüstle

2. Leblanc, S., *Dégénérations des représentations de carquois de type $\mathbb{A}_3$ à deux puits.* To appear in: Cahiers mathématiques de l'Université de Sherbrooke ↗ (2024)
   Supervisors: Emily Cliff and Shiping Liu

3. 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

1. 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.

2. 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)

Teaching

Teaching Assistant

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

Algebraic Structures (MTHE 217)   **Fall 2025**
Smith Engineering, Queen's University

Calculus I (APSC 171)   **Fall 2025**
Smith Engineering, Queen's University

Differential and Integral Calculus (MATH 121)   **Fall 2025**
Department of Mathematics and Statistics, Queen's University

Mathématiques discrètes (MAT120)   **Fall 2024**
Département de mathématiques, Université de Sherbrooke

Tutor

Mathematics, 10th grade   **2023 - 2024**
Volunteering with [Le Diplôme avant la Médaille](#) ↗

Algèbre linéaire et géométrie vectorielle (MAT902)   **Summer 2023**
Université de Sherbrooke

Biomécanique humaine (KIN325)   **Winter 2023**
Université de Sherbrooke

Software

knowledgematrix   ⌀ GitHub

- A Python library for implementing neural networks and computing their associated *knowledge matrices* (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](#) ↗
- Tools: Python

upperhalfplane   ⌀ GitHub

- Visualize the action of $PSL(2, \mathbb{R})$ 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 $PSL(2, \mathbb{C})$, i.e., Möbius transformations, and $PSP(4, \mathbb{R})$ 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. *Generalized Rank in Generalized Linear Algebra* (November 12, 2025)
   Grad Seminar, Department of Mathematics and Statistics, Queen's University

2. *Analyse topologique de données* (February 13, 2025)
   Club mathématiques de l'Université de Sherbrooke

3. *La propagation avant en tant que matrice* (November 14, 2024) 📄
   Club mathématiques de l'Université de Sherbrooke

4. *Visualisation de transformations sur la sphère de Riemann* (March 21, 2024) 📄
   Club mathématiques de l'Université de Sherbrooke

5. *Théorie des représentations des réseaux de neurones* (October 5, 2023)
   Club mathématiques de l'Université de Sherbrooke

Academic Activities

35th RTA Meeting	**Fall 2025**
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.	
Route 81 Conference	**Fall 2025**
Attended the Route 81 Conference at Queen's University (Kingston, ON). September 27, 2025.	
Canadian Mathematical Society (CMS) Meeting	**Summer 2025**
Attended the 2025 CMS Summer Meeting at the Université Laval (Québec, QC). June 7 to 9, 2025.	
34th RTA Meeting	**Fall 2024**
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.	
Research School	**Summer 2024**
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.	
Introduction to Research (MAT523): Topological Data Analysis	**Winter 2024**
Optional course. *Département de mathématiques, Université de Sherbrooke* Supervisor: Thomas Brüstle	
Reading group in category theory	**Winter 2024**
Participated in weekly meeting with graduate students as well as undergraduates students. Gave several talks about the week's readings.	
BIRS Workshop	**Winter 2024**
Assisted (online) to the BIRS Workshop: Representation Theory and Topological Data Analysis. April 8 to 11, 2024.	
Research internship: Representation Theory of Quivers	**Summer 2023**
Département de mathématiques, Université de Sherbrooke Supervisors: Emily Cliff and Shiping Liu	
Experimental Mathematics Lab (MAT001): Projective Geometry	**Winter 2023**
Course taken beyond B.Sc. requirements. *Département de mathématiques, Université de Sherbrooke* Supervisor: Jean-Philippe Burelle	

Languages

French (native), English (advanced).