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

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 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. *Département de mathématiques, Université de Sherbrooke* 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).