

# Samuel Leblanc

📍 Kingston, ON   ✉ samuel.leblanc@queensu.ca   🔗 samueleblanc.com

## Education

Queen's University	2025 - 2027
<i>M.Sc. in Mathematics</i>	
Research project: Cluster characters, cluster categories, and representation theory	
Supervisors: <a href="#">Ivan Dimitrov</a> , <a href="#">Charles Paquette</a> , and <a href="#">David Wehlau</a>	
Université de Sherbrooke	2022 - 2025
<i>B.Sc. in Mathematics</i>	

## 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 in: [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 in: [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

<b>Méthodes quantitatives en communication marketing (MQG301)</b> <i>École de gestion, Université de Sherbrooke</i>	Winter 2025
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<b>Calcul vectoriel (MAT298)</b> <i>Département de mathématiques, Université de Sherbrooke</i>	Fall 2024
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<b>Statistique appliquée à la gestion (MQG222)</b> <i>École de gestion, Université de Sherbrooke</i>	Summer 2024
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## Grader

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

## Tutor

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

## Software

<b>knowledgematrix</b>	 GitHub
○ A Python library for implementing neural networks and computing their associated <i>knowledge matrices</i> (i.e., $N_V$ (Lemma 7.4) in <a href="#">this paper</a> and $M(W, f)(x)$ in <a href="#">this paper</a> ).	
○ Tools: Python	
<b>simple_adversarial_detection</b>	 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. <a href="#">arXiv:2409.13163</a>	
○ Tools: Python	
<b>upperhalfplane</b>	 GitHub
○ Visualize the action of $\text{PSL}(2, \mathbb{R})$ on the upper half plane (Poincaré half plane model) interactively. <a href="#">samueleblanc.com/software/upperhalfplane</a>	
○ Tools: CindyJS, JavaScript, HTML, CSS	
<b>riemannsphere</b>	 GitHub
○ Visualize the action of $\text{PSL}(2, \mathbb{C})$ , i.e., Möbius transformations, and $\text{PSP}(4, \mathbb{R})$ on the Riemann sphere interactively. <a href="#">samueleblanc.com/software/riemannsphere</a>	
○ Supervisor: <a href="#">Jean-Philippe Burelle</a> .	
○ Tools: CindyJS, JavaScript, HTML, CSS	
<b>MatTalX</b>	 GitHub
○ Chrome Extension and Firefox Add-on that allow the user to convert LaTeX commands into plain text, enabling them to write symbols anywhere. <a href="https://mattalx.org">https://mattalx.org</a>	
○ Tools: JavaScript, HTML, CSS, Bash	

## Talks

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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

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### 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

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French (native), English (advanced).