

# THIAGO HOLLEBEN

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## EDUCATION

### Dalhousie University, Canada

PhD in Mathematics  
Advisor: Sara Faridi

September 2022 - current

### Universidade Federal do Rio de Janeiro, Brazil

Master's degree in Mathematics  
Dissertation title: [The log-concavity of chromatic polynomials.](#)  
Advisor: Seyed Hamid Hassanzadeh

August 2019 - December 2021

### Universidade Federal do Rio de Janeiro, Brazil

Bachelor in Applied Mathematics

### Universidade Federal do Rio de Janeiro, Brazil

Major in Mathematics

July 2017 - 2020

March 2016 - July 2017 (interrupted)

## PAPERS ACCEPTED/PUBLISHED

1. *Realizing resolutions of powers of extremal ideals.* Combinatorial Theory, to appear. With Trung Chau, Art Duval, Sara Faridi, Susan Morey, Liana Ţega. [arxiv:2502.09585](https://arxiv.org/abs/2502.09585) (2025)
2. *Spheres and balls as independence complexes.* Illinois Journal of Mathematics, to appear. [arXiv:2503.18490](https://arxiv.org/abs/2503.18490). With Susan M. Cooper, Sara Faridi, Lisa Nicklasson, Adam Van Tuyl. (2025)
3. *Lefschetz properties of squarefree monomial ideals via Rees algebras.* Journal of Algebra 668, 572-599. [doi.org/10.1016/j.jalgebra.2024.12.030](https://doi.org/10.1016/j.jalgebra.2024.12.030) [arxiv:2404.12471](https://arxiv.org/abs/2404.12471). (2025)
4. *The weak Lefschetz property and mixed multiplicities of monomial ideals.* J Algebr Comb 60, 295–317. [doi.org/10.1007/s10801-024-01337-8](https://doi.org/10.1007/s10801-024-01337-8). [arxiv:2306.13274](https://arxiv.org/abs/2306.13274). (2024)
5. *The weak Lefschetz property of whiskered graphs.* Lefschetz Properties. SLP-WLP 2022. Springer INdAM Series, vol 59. Springer, Singapore. [doi.org/10.1007/978-981-97-3886-1\\_5](https://doi.org/10.1007/978-981-97-3886-1_5). With Susan M. Cooper, Sara Faridi, Lisa Nicklasson, Adam Van Tuyl. [arxiv:2306.04393](https://arxiv.org/abs/2306.04393) (2023)

## PREPRINTS

1. *Symbolic powers and integral closures via extremal ideals.* With Trung Chau, Art Duval, Sara Faridi, Susan Morey, Liana Ţega. [arXiv:2602.05076](https://arxiv.org/abs/2602.05076) (Submitted) 2026
2. *From points to complexes: a concept of unexpectedness for simplicial complexes.* [arXiv:2510.10884](https://arxiv.org/abs/2510.10884) (Submitted) 2025
3. *Planar ternary graphs, flag spheres and Delannoy numbers.* With Margaret Bayer, Rick Danner, Marie Kramer, Yirong Yang. [arXiv:2509.21705](https://arxiv.org/abs/2509.21705) (Submitted) 2025
4. *When are Morse resolutions polyhedral?.* With Louis Bu, Sara Faridi, Iresha Madduwe Hewalage, Hasan Mahmood, Dharm Veer, Kyle Wang and Scott Wesley. [arXiv:2505.08580](https://arxiv.org/abs/2505.08580) (Submitted) 2025
5. *Roller Coaster Gorenstein algebras and Koszul Gorenstein algebras failing the weak Lefschetz property.* With Lisa Nicklasson [arxiv:2502.00155](https://arxiv.org/abs/2502.00155) (Submitted) 2025

6. *A probabilistic parking process and labeled IDLA.* With Pamela E. Harris, J. Carlos Martínez Mori, Amanda Priestley, Keith Sullivan and Per Wagenius [arxiv:2501.11718](https://arxiv.org/abs/2501.11718) (Submitted) 2025
7. *Coinvariant stresses, Lefschetz properties and random complexes.* [arxiv:2501.12108](https://arxiv.org/abs/2501.12108) (Submitted) 2025
8. *Spherical complexes.* With Sara Faridi. [arXiv:2311.07727](https://arxiv.org/abs/2311.07727) (Submitted) 2025

## ACADEMIC ACHIEVEMENTS

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### **Science Atlantic, Graduate Research Award 2025. Second place**

Award winners are selected based on the best presentations at Science Atlantic

### **Glendon McCormick Scholarship (2024)**

Dalhousie University scholarship aimed at general graduate students

### **AARMS Graduate Scholarship (2024,2025)**

Scholarship winners are selected on the basis of academic excellence, research potential, and regional representation within Atlantic Canada.

### **Jane Street Graduate Research Fellowship Award Honorable mention (2024)**

### **Professor Michael Edelstein Memorial Graduate Prize (2023)**

Annual prize awarded to a graduate student in shows great promise in the mathematical sciences.

### **Honours undergraduate research project (2018)**

Award for best undergraduate research project on the algebraic and combinatorial properties of Edge Ideals. Advisor: Seyed Hamid Hassanzadeh

## INVITED TALKS

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*Algebraic properties of extremal ideals: one squarefree monomial ideal to rule them all.* JMM, Washington D.C. January 2026

*From points to complexes: a concept of unexpectedness for simplicial complexes.* AMS Sectional meeting, New Orleans. October 2025

*Lefschetz properties and coinvariant stresses.* Mathematical Congress of the Americas Special session: Influences of Combinatorics and Topology in Commutative Algebra. Miami. July 2025

*Coinvariant stresses, Lefschetz properties and random complexes.* Oberseminar Algebra/diskr. Mathematik und angew. Algebra/Datenanalyse 2025, Osnabrück University. April 2025

*Positivity via commutative algebra.* Working ALgebra Knowledge Seminar (WALKS), Syracuse University. February 2025 (online)

*Simplicial complexes arising from integer programs.* Graduate Online Combinatorics Colloquium. October 2024. (online)

*Roller-Coaster, graphs and Perazzo forms.* Joint AMS-UMI meeting, Palermo. July 2024

*Lefschetz properties of monomial ideals via Rees algebras.* AMS Sectional meeting, San Francisco. May 2024

*Lefschetz properties of monomial ideals via Rees algebras.* COMA/NAG Graduate seminar, MSRI/SLMath. May 2024

*Rees algebras and Lefschetz properties of squarefree monomial ideals.* Commutative Algebra section: Canadian Mathematics Society winter meeting, Montreal. December 2023

*Rees algebras and Lefschetz properties of squarefree monomial ideals.* Stockholm Commutative Algebra seminar. October 2023 (online)

## CONTRIBUTED TALKS

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*From points to complexes: a concept of unexpectedness for simplicial complexes.* First Brazilian North-eastern Meeting on Commutative Algebra and Algebraic Geometry, Recife. November 2025

*Playing dominos in the correct dimension.* Science Atlantic - Mathematics, Statistics, and Computer Science Conference 2025. Cape Breton. October 2025

*Coinvariant stresses, Lefschetz properties and random complexes.* Workshop on weak and strong Lefschetz properties across mathematics. Sophus Lie Conference Center, Nordfjordeid, Norway. June 2025

*Coinvariant stresses, Lefschetz properties and random complexes.* Combinatorial Algebra meets Algebraic Combinatorics, Toronto. January 2025

*Lefschetz properties and analytic spread.* Combinatorics and Geometry in Ioannina. September 2024

*Lefschetz properties of squarefree monomial ideals via Rees algebras.* Lefschetz properties in Algebra, Geometry, Topology and Combinatorics, Poland. June 2024

*Powers of a simplex: Resolutions meet Partitions.* Combinatorial Algebra meets Algebraic Combinatorics, Montreal. January 2024

*The weak Lefschetz property and mixed multiplicities of monomial ideals.* Workshop on Lefschetz Properties in Algebra, Geometry, Topology and Combinatorics, Fields institute. May 2023

*The weak Lefschetz property and mixed multiplicities of squarefree monomial ideals.* International Centre for Theoretical Physics summer school, Italy. May 2023

*Homological invariants of ternary graphs.* Banff International Research Station workshop: Interactions Between Topological Combinatorics and Combinatorial Commutative Algebra. April 2023

*Homological invariants of ternary graphs.* Southern Regional Algebra Conference, Tulane university. March 2023 (online)

*A brief dictionary between Algebra and Combinatorics.* Semana de Integração Acadêmica da Universidade Federal do Rio de Janeiro, Brazil 2018 (in portuguese)

## TEACHING POSITIONS

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**Instructor of record:** Differential and Integral Calculus II (online) - Summer 2024/2025

**Instructor of record:** Engineering Mathematics II - Summer 2023/2024

**Lectures for algebraic topology class** - Fall 2024

Lectured, prepared assignments and marked assignments for the last month of the algebraic topology course for graduate and undergraduate students while the instructor was on leave.

**Teaching assistant:** Applied Graph Theory - Fall 2025/2026

**Teaching assistant:** Matrix Theory and Linear Algebra I - Fall 2025/2026, Fall 2024/2025, Winter 2023/2024, Fall 2023/2024

**Teaching assistant:** Calculus for the Life and Social Sciences - Fall 2023/2024, Winter 2022/2023

### At Federal University of Rio de Janeiro

**Teaching assistant:** Algebra III (Galois Theory) - Second semester of 2019

**Teaching assistant:** Real analysis I - Second semester of 2019

**Teaching assistant:** Scientific computing I (Numerical Calculus I) - Second semester of 2018

**Teaching assistant:** Algebra II (Group and ring theory) - First semester of 2019

**Teaching assistant:** Algebra I (Modular arithmetic) - Second semester 2019

**Teaching assistant:** Calculus I - First semester of 2019

## ORGANIZATION OF CONFERENCES AND SEMINARS

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Co-organizer (with T. Chau, S. Faridi, L. Sega and D. Veer) of BIRS Workshop: Intersection of Commutative Algebra, Combinatorial Topology, and Discrete Geometry (2027, Chennai Mathematical Institute)

Co-founder (with D. Teixeira) of online directed reading program for portuguese speaking students: [Projeto Irerê](#) (2026)

Co-organizer (with D. Teixeira) of Dalhousie's Math and Stats graduate career day (2026)

Co-organizer (with T. Chau) of special session at JMM 2026: Combinatorial Aspects in Commutative Algebra (2026)

Co-organizer (with A. Dochtermann and S. Grate) of special session at 2025 Fall Southeastern AMS sectional meeting: Algebraic combinatorics and combinatorial commutative algebra (2025)

Co-organizer (with L. Carmona, B. Farah, C. Herkenhoff, G. Miranda, R. Peregrino, G. Radke, F. Sinnecker) of Week of Applied Mathematics and Mathematical Engineering (SEM<sup>2</sup>Ap) (2020, online) More info on: [Youtube](#), [Instagram](#)