

# THIAGO HOLLEBEN

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## EDUCATION

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**Universidade Federal do Rio de Janeiro, Brazil**

*March 2016 - July 2017 (interrupted)*

Major in Mathematics

**Universidade Federal do Rio de Janeiro, Brazil**

*July 2017 - 2020*

Bachelor in Applied Mathematics

**Universidade Federal do Rio de Janeiro, Brazil**

*August 2019 - December 2021*

Master's degree in Mathematics

Dissertation title: [The log-concavity of chromatic polynomials](#).

Advisor: Seyed Hamid Hassanzadeh

**Dalhousie University, Canada**

*September 2022 - current*

PhD in Mathematics

Advisor: Sara Faridi

## ACADEMIC ACHIEVEMENTS

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**Glendon McCormick Scholarship (2024)**

**AARMS Graduate Scholarship (2024)**

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

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

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

**Honours undergraduate research project (2018)**

Received an award for best undergraduate research project on the algebraic and combinatorial properties of Edge Ideals.

Advisor: Seyed Hamid Hassanzadeh

## PAPERS ACCEPTED/PUBLISHED

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1. *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). (2023) With Susan M. Cooper, Sara Faridi, Lisa Nicklasson, Adam Van Tuyl. [arxiv:2306.04393](https://arxiv.org/abs/2306.04393)
2. *The weak Lefschetz property and mixed multiplicities of monomial ideals*. J Algebr Comb 60, 295–317 (2024). [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).
3. *Lefschetz properties of squarefree monomial ideals via Rees algebras*. Journal of Algebra 668, 572-599. (2025) [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).

## PREPRINTS

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1. *Spherical complexes*. (2023) With Sara Faridi. (Submitted) [arXiv:2311.07727](https://arxiv.org/abs/2311.07727)
2. *Coinvariant stresses, Lefschetz properties and random complexes*. (2025) (Submitted) [arxiv:2501.12108](https://arxiv.org/abs/2501.12108)
3. *A probabilistic parking process and labeled IDLA*. (2025) (Submitted) With Pamela E. Harris, J. Carlos Martínez Mori, Amanda Priestley, Keith Sullivan and Per Wagenius [arxiv:2501.11718](https://arxiv.org/abs/2501.11718)

4. *Roller Coaster Gorenstein algebras and Koszul Gorenstein algebras failing the weak Lefschetz property.* (2025) (Submitted) With Lisa Nicklasson [arxiv:2502.00155](https://arxiv.org/abs/2502.00155)
5. *Realizing resolutions of powers of extremal ideals.* (2025) (Submitted) With Trung Chau, Art Duval, Sara Faridi, Susan Morey, Liana Şega. [arxiv:2502.09585](https://arxiv.org/abs/2502.09585)

## PREPRINTS AT FINAL STAGE

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1. *Spheres and balls as independence complexes.* With Susan M. Cooper, Sara Faridi, Lisa Nicklasson, Adam Van Tuyl.

## PRESENTATIONS

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1. *Coinvariant stresses, Lefschetz properties and random complexes.* Computational Interactions between Algebra, Combinatorics, and Discrete Geometry, IPAM-UCLA. February 2025 (poster)
2. *Positivity via commutative algebra.* Working ALgebra Knowledge Seminar (WALKS), Syracuse University. February 2025 (online invited talk)
3. *Coinvariant stresses, Lefschetz properties and random complexes.* Combinatorial Algebra meets Algebraic Combinatorics, Toronto. January 2025 (talk)
4. *When PDEs meet (Combinatorial) Commutative Algebra II.* Dalhousie Commutative Algebra seminar. November 2024.
5. *When PDEs meet (Combinatorial) Commutative Algebra I.* Dalhousie Commutative Algebra seminar. October 2024.
6. *Simplicial complexes arising from integer programs.* Graduate Online Combinatorics Colloquium. October 2024. (online invited talk)
7. *Inverse PDE problems in Geometry.* Dalhousie graduate student seminar. September 2024. (talk)
8. *Inverse PDE problems in Combinatorics.* Dalhousie honours student seminar. September 2024. (talk)
9. *Lefschetz properties and analytic spread.* Combinatorics and Geometry in Ioannina. September 2024 (talk)
10. *Roller-Coaster, graphs and Perazzo forms.* Uweifest, Notre Dame university. August 2024 (poster)
11. *Roller-Coaster, graphs and Perazzo forms.* Joint AMS-UMI meeting, Palermo. July 2024 (invited talk)
12. *Lefschetz properties of squarefree monomial ideals via Rees algebras.* Lefschetz properties in Algebra, Geometry, Topology and Combinatorics, Poland. June 2024 (talk)
13. *Lefschetz properties of monomial ideals via Rees algebras.* AMS Sectional meeting, San Francisco. May 2024 (invited talk)
14. *Lefschetz properties of monomial ideals via Rees algebras.* COMA/NAG Graduate seminar, MSRI/SLMath. May 2024 (invited talk)
15. *Lefschetz properties and mixed multiplicities.* Recent developments in Commutative Algebra, MSRI/SLMath. April 2024 (poster)
16. *Powers of a simplex: Resolutions meet Partitions.* Combinatorial Algebra meets Algebraic Combinatorics, Montreal. January 2024 (talk)
17. *Positivity through analytic spread.* Connections workshop, MSRI/SLMath. January 2024 (poster)

18. *Rees algebras and Lefschetz properties of squarefree monomial ideals*. Commutative Algebra section: Canadian Mathematics Society winter meeting, Montreal. December 2023 (invited talk)
19. *Rees algebras and Lefschetz properties of squarefree monomial ideals*. Stockholm Commutative Algebra seminar. October 2023 (online talk)
20. *Lefschetz properties of squarefree monomial ideals*. 10th Heidelberg Laureate Forum, Heidelberg University, Germany. September 2023 (poster, lightning talk)
21. *Algebraic geometry in the wild*. Dalhousie graduate student seminar. October 2023 (talk)
22. *Unimodality and log-concavity in Mathematics*. Dalhousie honours student seminar. October 2023 (talk)
23. *Lefschetz properties of squarefree monomial ideals*. BrianFest, University of Lincoln-Nebraska. August 2023 (poster)
24. *Homological Invariants of ternary graphs*. 34o Colóquio Brasileiro de Matemática, Instituto de Matemática Pura e Aplicada, Brazil. July 2023 (poster)
25. *The weak Lefschetz property and mixed multiplicities of monomial ideals*. MSRI/SLMath Summer School: Commutative Algebra and its Interaction with Algebraic Geometry, Notre Dame university. May 2023 (poster)
26. *Degree of the inverse of a birational monomial map*. MSRI/SLMath Summer School: Commutative Algebra and its Interaction with Algebraic Geometry, Notre Dame university. May 2023 (lightning talk)
27. *The weak Lefschetz property and mixed multiplicities of monomial ideals*. Workshop on Lefschetz Properties in Algebra, Geometry, Topology and Combinatorics, Fields institute. May 2023 (talk)
28. *Lefschetz properties and mixed multiplicities via hyperplane arrangements*. International Centre for Theoretical Physics workshop, Italy. May 2023 (poster)
29. *The weak Lefschetz property and mixed multiplicities of squarefree monomial ideals*. International Centre for Theoretical Physics summer school, Italy. May 2023 (talk)
30. *Homological invariants of ternary graphs*. Banff International Research Station workshop: Interactions Between Topological Combinatorics and Combinatorial Commutative Algebra. April 2023 (talk)
31. *Homological invariants of ternary graphs*. Southern Regional Algebra Conference, Tulane university. March 2023 (online talk)
32. *Homological invariants of ternary graphs*. Combinatorial Algebra meets Algebraic Combinatorics, Waterloo University. January 2023 (poster)
33. *The log-concavity of chromatic polynomials*. Universidade Federal do Rio de Janeiro, Brazil. July 2022 (talk, in portuguese)
34. *Exploring examples with Macaulay2*. Universidade Federal do Rio de Janeiro, Brazil. July 2022 (talk, in portuguese)
35. *Hilbert functions in Combinatorics*. Universidade Federal do Rio de Janeiro, Brazil. July 2022 (talk, in portuguese)
36. *A combinatorial interpretation of the primary decomposition of edge ideals*. Universidade Federal do Rio de Janeiro undergraduate student seminar, Brazil. 2019 (talk, in portuguese)

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

## TEACHING POSITIONS

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**Instructor: Engineering Mathematics II at Dalhousie Univeristy**

Summer of 2023

**Teaching assistant at Dalhousie university**

Fall of 2022 - current

**Teaching assistant at Universidade Federal do Rio de Janeiro**

First semester of 2019

**Teaching assistant at Universidade Federal do Rio de Janeiro**

First and second semester of 2018

## LEADERSHIP POSITIONS

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**Organizer of Week of Applied Mathematics and Mathematical Engineering (SEM<sup>2</sup>Ap)**

Organized virtual Week of Applied Mathematics and Mathematical Engineering (SEM<sup>2</sup>Ap) in 2020

More info on: [Webpage](#), [Youtube](#), [Instagram](#)

**Organizer of weekly student seminar at Universidade Federal do Rio de Janeiro**

Organized weekly seminars at Universidade Federal do Rio de Janeiro during the second semester of 2019.

## SKILLS

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**Programming:** Macaulay2, Sage, Python, Javascript, Julia