

Astrid Arena Olave Herrera

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EDUCATION

- Ph.D. in Mathematics** 2021 - Present
Michigan State University
 Advisor: Elizabeth Munch
- M.Sc. in Applied Mathematics** 2021
Universidad Nacional de Colombia
 Meritorious thesis : Revealing brain network dynamics during the emotional state of suspense using topological data analysis
 Advisor: José Perea. Coadvisor: Francisco Gomez
- B.Sc. with Honors in Mathematics** 2018
Universidad Nacional de Colombia
 Thesis: Persistent homology analysis of RNA secondary structures
 Advisor: Gustavo N. Rubiano

RESEARCH INTERESTS

- Topological data analysis:
Foundations and applications
- Algebraic topology
- Mathematical biology

PRESENTATIONS

6. *Bounding the interleaving distance on concrete categories using a loss function.* Talk in the Applied Algebraic Topology Research Network (AATRN). Online Seminar. Aug 2025
5. *Generalizing the interleaving distance using categorical flows.* Short video on the AATRN tutorial-a-thon Spring 2025. YouTube video. Feb 2025
4. *Revealing brain network dynamics during the emotional state of suspense using topological data analysis.* Oral contribution presented at GEOTOP-A International Conference: Applications of Geometry and Topology. Mérida, México. Jan 2024
3. *Finding interleaving distances on a poset using categories with flows.* Poster session presented at 2023 AWM Research Symposium. Atlanta, US. Oct 2023

2. *Revealing brain network dynamics during the emotional state of suspense using topological data analysis*. Short talk presented at II SIPAIM virtual Workshop. Online Seminar. May 2021
1. *Persistent homology analysis of RNA secondary structures*. Poster session presented at XXII Colombian Congress of Mathematics. Popayán, Colombia. Jun 2019

PAPERS

2. Olave, A. A., Perea, J. A., and Gómez, F., *Revealing brain network dynamics during the emotional state of suspense using topological data analysis*, bioRxiv (2024)
1. Georgiou, K., Jiang, A. J., Lee, E., Olave, A. A., Seong, I., and Upadhyaya, T., *Lift & project systems performing on the partial-vertex-cover polytope*, Theoretical Computer Science **820** (2020), 1–16

HONORS AND AWARDS

Mathematics Recruiting Fellowship <i>Michigan State University</i>	2021
Scholarship for complete tuition for M.Sc programs <i>Universidad Nacional de Colombia</i>	2019
Exemption from payment for best average <i>Universidad Nacional de Colombia</i>	2013-2018

TEACHING EXPERIENCE

College Algebra II (MTH 103B) <i>Michigan State University</i> Instructor for section 010	Spring 2025
College Algebra II (MTH 103B) <i>Michigan State University</i> Instructor for section 001	Fall 2024
Calculus III (MTH 234) <i>Michigan State University</i> Teaching assistant for sections 001, 015 and 018	Spring 2024
Matrix Algebra with Computational Applications (MTH 314)	Fall 2024

Michigan State University
Teaching assistant for section 004

**Matrix Algebra with
Computational Applications (MTH 314)** Summer 2023
Michigan State University
Instructor for section 101

Calculus II (MTH 133) Spring 2023
Michigan State University
Teaching assistant for sections 013,018 and 024

Calculus I (MTH 132) Fall 2022
Michigan State University
Teaching assistant for sections 019,021 and 024

Mathematics Learning Center Spring 2022
Michigan State University
Tutor

Survey of Calculus I (MTH 124) Fall 2021
Michigan State University
Teaching assistant for Lecture 1

Tutor of Círculos Matemáticos 2019 - II
Universidad Nacional de Colombia
Guided enthusiastic high school students about mathematics
into the experience of being a mathematician

Integral calculus 2018 - I
Universidad Nacional de Colombia

SERVICE

AMS Graduate Student Chapter at MSU 2024-2025
Treasurer

Council of Graduate Students 2023-2024
Representative of the mathematics department

EXTRACURRICULAR ACTIVITIES

Intramural soccer 2021-Present
Player and captain of the mathematics team

Sin Medida inter-university catholic community <i>Leadership team member</i>	2018-2021
Universidad Nacional women's soccer team <i>Goalkeeper</i>	2014-2021