

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

5. *Bounding the interleaving distance on concrete categories using a loss function.* Talk in the Applied Algebraic Topology Research Network (AATRN). Online Seminar. Aug 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) <i>Michigan State University</i> | Fall 2024 |

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

2018-2021

Leadership team member

Universidad Nacional women's soccer team
Goalkeeper

2014-2021