# Bailee R. Zacovic

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## Education

**University of Notre Dame** *Aug 2019 - May 2023*
B.A. in Honors Mathematics and Philosophy (concentration in Science & Mathematics)
Minors in Business Economics and Glynn Family Honors Program
*Summa Cum Laude*

**Universität Bonn** *Aug 2023 - Aug 2024*
Coursework toward M.Sc. in Mathematics (left early for Ph.D.)

**University of Michigan, Ann Arbor** *Aug 2024 - May 2029*
Ph.D. in Mathematics
Advisor: Thomas Lam

## Research Visits

**Max Planck Institute for Mathematics in the Sciences (MPI-MiS)** *June 2025 - July 2025*
Nonlinear algebra group
Research topic: Positive Geometry

## Publications

(Authors listed in alphabetical order)

5. Bruce, J., Bucciarelli, J., Zacovic, B. "Explorations of Matroid Complexes." (In Progress)

4. Betti, B., Borovik, V., Finkel, B., Sturmfels, B., Zacovic, B. "Graphical Scattering Equations." `https://arxiv.org/abs/2511.07316` (Submitted)

3. Koefler, J., Oktem, U., Paranjape, S., Trnka, J., Zacovic, B. "Uniqueness of MHV Gravity Amplitudes." *Le Matematiche*, Vol. 80 No. 1 (2025) `https://lematematiche.dmi.unict.it/index.php/lematematiche/article/view/2743`

2. Cho, M., Dochtermann, A., Inagaki, R., Oh, S., Snustad, D., Zacovic, B. (2025). "Chip-Firing and Critical Groups of Signed Graphs." *SIAM Journal on Discrete Mathematics*, Vol. 39, Iss. 2 (2025) `https://epubs.siam.org/doi/abs/10.1137/24M1655287?journalCode=sjdmec`.

1. Galvin, D., Wesley, G., Zacovic, B. "Enumerating Threshold Graphs and Some Related Graph Classes." *Journal of Integer Sequences*, Vol. 25. (2022) `https://cs.uwaterloo.ca/journals/JIS/VOL25/Galvin/galvin2.pdf`.

## Awards & Recognitions

- National Science Foundation Graduate Research Fellowship Program (NSF GRFP)

- Bonn International Graduate School of Mathematics (BIGS Mathematics) Scholarship

- German Academic Exchange Service (DAAD) Study Scholarship - Master Studies for All Academic Disciplines (declined)

- Phi Beta Kappa Early Inductee

- The G.E. Prize for Excellence in Mathematics (General Electric Foundation)

- Glenna R. Joyce Full-Ride Scholarship to the University of Notre Dame (Notre Dame Scholars' Program)

- Notre Dame Glynn Family Honors Program

- Sorin Fellowship (de Nicola Center for Ethics and Culture)

- Global Engagement Certificate (The Center for the Study of Language and Culture)

- "Judges Pick" award (Texas State Rapid Fire Research presentation competition)

- Second Place award (Texas State CoSE Summer Research Symposium poster competition)

- *Ohio Seal of Biliteracy* (German)

## Selected Conferences & Seminar Talks

- Joint Mathematics Meetings (JMM), Boston, MA, January 4-7, 2023, *Chip-Firing on Signed Graphs* (poster).

- Graduate Student Combinatorics Conference (GSCC) 2023, Washington University in St. Louis, March 17-19, 2023, *Chip-Firing on Signed Graphs* (contributing talk).

- 2023 Schubert Summer School @ UIUC, June 13-21, 2023 (participant).

- Graduate Seminar on Probability Theory - Probabilistic Combinatorics, Universität Bonn, Oct 20, 2023, *Graphs & the Probabilistic Method* (contributing talk).

- Graduate Online Combinatorics Colloquium (GOCC), Nov 1, 2023, *The Matroid Complex and its Homology* (contributing talk).

- A Panorama of Moduli Spaces, Goethe University Frankfurt am Main, Feb 26-March 1, 2024, *Homology of the Matroid Complex* (lightning talk).

- 5th Graduate Student Meeting in Applied Algebra and Combinatorics (GSMAAC24), Freie Universität Berlin (FU Berlin), April 10-12, 2024, *The Matroid Complex and its Homology* (contributing talk).

- Graduate Seminar on Representation Theory - The Symmetric Group, Universität Bonn, April 29, 2024, *The Hook-Length Formula and Standard Young Tableaux* (contributing talk).

- Combinatorial Algebraic Geometry from Physics Conference, MPI-MiS Leipzig, May 13-15, 2024 (participant).

- Summer School in Algebraic Combinatorics, MPI-MiS Leipzig, July 15-19, 2024 (participant).

- 36th International Conference on Formal Power Series and Algebraic Combinatorics, Ruhr-Universität Bochum, July 22-26, 2024 (participant).

- Combinatorics of Fundamental Physics Workshop, Institute for Advanced Study (IAS), Nov 18-22, 2024 (participant).

- Student Combinatorics Seminar, University of Michigan, Nov 25, 2024, *Graph Orientations and Euler Characteristics* (contributing talk).

- Graduate Student Combinatorics Conference (GSCC) 2025, Virtual, March 15-17, 2025, *MHV gravity amplitudes and their combinatorics* (contributing talk).

- SLMath Summer School: New perspectives on discriminants and their applications, MPI MiS Leipzig, June 23-July 4, 2025 (participant).

- Learning Seminar in Algebraic Combinatorics, University of Michigan, Sept 24, 2025, *Tropical hypersurfaces and the Fundamental Theorem of Tropical Algebraic Geometry* (contributing talk).

- Nonlinear Algebra Seminar, MPI-MiS Leipzig, Oct 9, 2025, *The Scattering Correspondence of a Graph* (contributing talk).
- Algebra, Geometry and Combinatorics Day (AlGeCom-XV), The Ohio State University, Nov 8, 2025, *Graphical Scattering Equations* (poster).

## Teaching

### University of Michigan        Aug 2024 - Present
· MATH 115 (Calculus I) – Fall 2024 (Instructor of Record)
· MATH 116 (Calculus II) – Spring 2025 (Instructor of Record)

## Employment

### Art of Problem Solving        July 2021 - Present
*Online School Grader*        *Virtual*

· Provide guidance, mentoring, and personalized feedback on written homework to students of rigorous math courses to sharpen proof-writing and stimulate deeper problem solving.
· Receive and implement specific releaser feedback, monitor available submissions, grade thoroughly yet efficiently and timely, interpret diverse student work, and attend to detail.

### Academic Services for Student Athletes        Jan 2020 - Jan 2022
*Course Tutor*        *Notre Dame, IN*

· Planned and implemented personalized instruction, strategy, and problem-solving sessions for 3-4 student athletes per semester (in Calculus, Finite Mathematics, Linear Algebra, and Principles of Microeconomics) to improve understanding and exam scores by multiple letter grades.
· Documented progress in concise session reports, completed extensive training in integrity, ethics, and NCAA compliance.

## Outreach

### Graduate Online Combinatorics Colloquium (GOCC) Organizer        Aug 2025 - Present
· Contact prospective speakers, host weekly seminar, maintain GOCC mailing list, manage and update the GOCC website.

### Combinatorics Online Moderator        Aug 2025 - Present
· Actively monitor the Combinatorics Discord server, communicate with the steering committee and other moderators effectively, resolve conflicts which arise within the server or with other members of the steering committee and/or moderator team.

### Association for Women in Mathematics (AWM)        Aug 2024 - Present
*University of Michigan Student Chapter*        *Ann Arbor, MI*

· Manage and update the chapter's website, organize social events and outreach to foster community and promote fuller participation and equal treatment of women in the mathematical sciences.

### Spelman-Morehouse Directed Reading Program        Feb 2025 - May 2025
*Spelman College and Morehouse College*        *Virtual*

· Mentored an undergraduate student from Spelman college one-on-one on the topic of symmetric functions and their associated combinatorics (text used: *An Introduction to Symmetric Functions and Their Combinatorics*, by Eric S. Egge), attended virtual mentor training/orientation, assisted in preparing a final student presentation.

**South Bend Math Circles Facilitator** <span style="float:right">Aug 2020 - Nov 2020</span>

*Riverbend Math Circles* <span style="float:right">*South Bend, IN*</span>

· Met weekly with elementary school students to engage advanced concepts in graph theory and topology through approachable low-threshold, high ceiling problems.

· Planned and facilitated activities, shared passion for mathematics, cultivated a collaborative, discovery-oriented environment, and trained critical thinking and persistence.

## Additional Skills

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| **Technical** | Python, Julia, Sage, Macaulay2, Java, LaTeX, Microsoft Suites |
| **Language** | German (heritage speaker) |