

ABIGAIL ROSE DRUMM

formerly Abigail Rose Lindner

✉ ardrumm@wpi.edu 👤 abigaillindner.com 📞 0009-0009-3070-2373

Education

Worcester Polytechnic Institute

Ph.D. in Mathematics

- Advisor: Dr. Francesca Bernardi (WPI)
- Thesis: *Mathematical Modeling for Membrane Microfiltration Phenomena*
- Comprehensive exams completed Aug 2023
- Preliminary exam completed Feb 2025
- Dissertation proposal completed Oct 2025

Expected May 2027

Worcester, MA

Worcester Polytechnic Institute

M.S. in Applied Mathematics

Regent University

B.S. in Mathematics

Awarded May 2024

Worcester, MA

Awarded Dec 2021

Virginia Beach, VA

Research Focuses

Modeling multiphysics systems in fluid mechanics and microfluidics

Designing numerical simulations for filtration systems

Applying mathematics for exploring and solving social issues

U.S. adoption and foster care systems

Academic Research Experience

Monte Carlo Simulations to Model Flux Decline in Microfiltration

Worcester Polytechnic Institute

- Develop a numerical model in MATLAB for fouling of membrane filters with varying fluid, particle, and process parameters
- Perform sensitivity analyses and implement optimization algorithms to identify and fit relevant parameters for simulation of real-world experimental results

Jan 2024 – present

Worcester, MA

Mathematical Models for Deformable Bacteria

Worcester Polytechnic Institute

- Build an elementary model for bacterial passage through membranes with cylindrical micropores
- Study the mathematics underpinning bacterial biofilm research, with a focus on biofilms in municipal and biopharmaceutical contexts

Jan 2023 – present

Worcester, MA

Agricultural Productivity, Economic Growth & Human Development

Rose-Hulman Institute of Technology

- Employed Python and R to collect and analyze data and create a regression model measuring the impact of agricultural development on economic growth and human development in Sub-Saharan Africa
- Collaborated with Azaria Wagner under the guidance of Dr. Wayne Tarrant
- Final write-up available at Rose-Hulman REU archives

Summer 2020

Terre Haute, IN

Other Research Experience

Adoptees' Perception of Stigma

Summer 2025

National Council For Adoption

Alexandria, MA

- Collaborated with Ryan Hanlon and Nicole Davi

Adoption By the Numbers

Jul 2021/2024 - Feb 2022/2025

National Council For Adoption

Alexandria, VA

- Collaborated with Drs. Laura Daughtery and Eun Koh (2021-2022) and Nicole Davi (2024-2025)
- Expanded on previous data collection efforts to assemble an updated profile of U.S. adoptions in 2021/2022
- Collected state data on domestic adoptions for analysis in a profile of U.S. adoptions in 2019/2020

U.S. Foster Care and Adoption Reviews

May 2021 – Aug 2023

National Council For Adoption

Alexandria, VA

- Collaborated with Ryan Hanlon, Ph.D., MSW
- Headed a systematic review on children and youth who have been involved with the child welfare system
- Assessed studies for risk of bias using the ROBINS-I tool as part of overarching research projects
- Distilled research on adoption legislation and outcomes into approximately 3,000-word articles for a publication aimed at adoption professionals

Political Science Research Assistant

Mar 2020 - Jul 2022

Regent University

Virginia Beach, VA

- Supervised by Dr. Eric Patterson
- Gathered and inspected materials related to current projects and maintained comprehensive databases to record document relevance and review progress
- Created a Python web scraping tool to obtain content of interest from public databases with 100,000+ records

Teaching Experience

Instructor of Record

May 2024 – Aug 2024

Worcester Polytechnic Institute, Department of Mathematical Sciences

Worcester, MA

- Developed original, multimedia materials for a five-week-long, asynchronous multi-variable calculus course

Teaching Assistant

Aug 2022 – present

Worcester Polytechnic Institute, Department of Mathematical Sciences

Worcester, MA

- Prepare for and lead discussions for 2+ sections of undergraduate math courses each 7-week term
- Tutor students in Calculus, Linear Algebra, ODEs, and other undergraduate mathematics courses
- Sample notes available at <https://abigaillindner.com/teaching/>

Experience:

MA 1021 Calculus I: Differential Calculus

MA 1022 Calculus II: Integral Calculus

MA 1024 Calculus IV: Multivariable Calculus

MA 2051 Ordinary Differential Equations

MA 2071 Matrices & Linear Algebra I

MA 2210 Math Modeling for Decision Making (with Python)

MA 2431 Mathematical Modeling with ODEs (with MATLAB)

MA 2611 Applied Statistics I (with R)

MA 2621 Probability for Applications

MA 3471 Advanced ODEs (with MATLAB)

Teaching Assistant

Fall 2021, Spring 2020

Regent University, Science & Mathematics Department

Worcester, MA

- Formatted handwritten notes to LaTeX/Overleaf files for a Probability & Statistics class
- Graded homework assignments for an undergraduate Differential Equations class

Academic Writing

Published Scholarship: Mathematics

Drumm, A.R. & Bernardi, F. (in press). Monte Carlo simulations of 2D flat-sheet membrane filters for constant-pressure water purification. *Physical Review E*, accepted Oct 2025. Preprint available at arXiv:2508.18262.

Published Scholarship: Social Science

Hanlon, R., **Lindner, A.** & Garcia-Rosales, K.V. (2024). Examining the impact of participation in a foster parent support program on child welfare outcomes in Georgia. *Journal of Public Child Welfare*. doi:10.1080/15548732.2024.2372728

Lindner, A.R. & Hanlon, R. (2024). Outcomes of youth with foster care experiences based on permanency outcomes - adoption, aging out, long-term foster care, and reunification: a systematic review. *Children and Youth Services Review*. doi:10.1016/j.childyouth.2023.107366

Lindner, A.R. & Hanlon, R. (2023). Systematic review on the impact of ASFA on outcomes of children and birth families involved in the foster care system. *Adoption Quarterly*. doi:10.1080/10926755.2023.2286554

Scholarship in Progress

Davi, N., Font, S., Hanlon, R. & **Drumm, A.R.** “Adoptee experiences of adoption stigma.” Submitted and under review as of Sep 2025.

General Audience Writing (partial list)

Drumm, A.R. (2025). Why you should attend department seminars as a student (even if you have no idea what they are talking about). *AWM Newsletter*, Sep/Oct 2025.

Drumm, A.R., Davi, N. & Hanlon, R. (2025). *Adoption by the Number 2021 & 2022*. National Council For Adoption.

Lindner, A. (2023). Book Review: *Managing Your Mental Health During Your PhD: A Survival Guide*. *OR/MS Tomorrow*, Spring/Summer 2023.

Lindner, A. (2023). Operations research for social good: what to expect when working outside of industry and academia. *OR/MS Today*, February 2023.

See full list of General Audience Writing at <https://abigaillindner.com/publications/>

Invited Presentations

Sep 2025	<u>WIMIN 2025</u> Northampton, MA, USA	Graduate School Panel
Oct 2023	INFORMS Annual Conference Phoenix, AZ, USA	Student Participation in DEI (<i>panel</i>)

Contributed Presentations

Sep 2025	<u>WIMIN 2025</u> Northampton, MA, USA	Modeling Deformable Bacteria in Flow (<i>talk</i>)
Jul 2025	<u>SIAM Annual Meeting</u> Montréal, Québec, Canada	Monte Carlo Simulations to Model Flux Decline in Dead-End Microfiltration Operations (<i>poster</i>)
Mar 2025	<u>WPI DOSE 2025</u> Worcester, MA, USA	Monte Carlo Simulations of Flat-Sheet Membrane Filtration: Capturing Flux Decline Trends (<i>talk & poster</i>)

Seminar Presentations

Aug 2025	Ph.D. Student Seminar, WPI	Modeling Deformable Bacteria in Flow
Nov 2024	Ph.D. Student Seminar, WPI	Random Walks and the Diffusion Equation
Oct 2024	Ph.D. Student Seminar, WPI	Monte Carlo Simulations of 2D Flat-Sheet Membrane Filters
Jan 2024	Ph.D. Student Seminar, WPI	Some Models of Bacterial Fouling of Filtration Membranes
Feb 2023	AWM Seminar Series, WPI	Graduate School Panel: From Application to Dissertation

Other Presentations

Jul 2024	Girls Talk Math, WPI	The SIR Model: History & Theory (<i>lecture</i>)
Jul 2023	Girls Talk Math, WPI	A Brief Introduction to SIR Models in Mathematical Epidemiology (<i>lecture</i>)

Funding

AWM Workshop and Poster Session at AN 2025

July 2025

Association for Women in Mathematics, originally through NSF DMS-2113506

- Awarded Dec 2024; terminated May 2025. Auxiliary funding provided by AWM.
- Travel funding for the Third Joint SIAM/CAIMS Annual Meetings (AN25) to attend the AWM Workshop and present a poster at the AWM Minisymposium
- Originally \$2,300 (through NSF), updated to \$2,000 (through AWM)

Awards & Honors

Teaching Assistant of the Year

May 2024

Worcester Polytechnic Institute, Department of Mathematical Sciences

Worcester, MA

Founder's Scholarship

2018 – 2022

Regent University

Virginia Beach, VA

Honors Program

2018 – 2021

Regent University

Virginia Beach, VA

Service to the Department

- *Aug 2025 – present.* Initiated and led the **AWM Book Club**, WPI.

Every two to three weeks, the AWM Book Club, associated with WPI's Association for Women in Mathematics (AWM) student chapter, meets to discuss a selected article, essay, or book that pertains to developments and topics in mathematics, the culture of mathematics, and/or the work of women in mathematics. As lead for the book club, I organized WPI's AWM community library and prepared discussion questions for each meeting.

- *Oct 2023 – present.* Coordinated the math department **Faculty Lunch Talks**, WPI.

This informal, biquarterly seminar provides an opportunity for students to learn about math career trajectories and research conducted in the department. Co-organized with [Hammed Olayinka](#) (2023–24, 2024–25) and [Annah Naturinda](#) (2025–26).

- *Aug 2023 – present.* Board member of the Association for Women in Mathematics **WPI student chapter**.

Served as PR chair from Aug 2023 - Aug 2024. As of Aug 2024, serving as president. In this role, I foster collaboration with other student organizations to diversify events and forge extra-departmental connections and work with a core team of 4 to 5 to organize social events, professional workshops, and seminars. In addition, during the 2024–25 and 2025–26 academic years, I maintained the WordPress site for our chapter.

Service to the University

- *Spring 2024, 2025.* Co-organized the **Day of Scholarship & Excellence (DOSE)**, WPI.
Supported by the Office of the Dean of Arts & Sciences. Organized a mini conference featuring lighting talk and poster sessions for students across the Arts & Sciences departments to present on their research project. Co-led with [Jezabel Aleyda Aponte Figueroa \(2024\)](#) and [Fatemeh Farajzadeh \(2025\)](#).
- *Feb 2024, 2025.* Tour guide and student liaison for visiting prospective math Ph.D. students during the university-wide Annual Ph.D. Visitation Retreat.
- *Aug 2023 – May 2025.* Math representative on the **Arts & Sciences Graduate Student Advisory Council**, WPI.
Advised the Dean of Arts & Sciences on initiatives that directly impact students. Co-led the annual Day of Scholarship & Excellence (DOSE) in 2024 and 2025.
- *Feb 2023.* Volunteer guide at the Spring 2023 In-Person Career Fair, WPI.
- *Jan 2023.* WPI student representative at **AMS Graduate Programs Fair**, Joint Mathematics Meeting.
Provided a student perspective on Worcester Polytechnic Institute and the math Ph.D. program to prospective high school juniors and seniors.

Service to the Community

- *Oct 2025.* Co-organized a hands-on exhibit for **Family STEM Night**, Boys & Girls Club of Worcester, Worcester, MA.
Part of Mass STEM Week and WPI's fall 2025 Association for Women in Mathematics (AWM) student chapter outreach programming. Collaborated with the Bioinformatics and Computational Biology Club. The exhibit centered on the interplay between mathematics and biology, using "DNA bracelets" as the guiding activity. I spearheaded activity conceptualization and co-led day-of execution.
- *Apr 2023, 2024, 2025.* Activities volunteer and lead at annual **Sonia Kovalevsky Days**, WPI.
Assisted with a day-long program of talks and activities to encourage middle school girls in mathematics, organized by WPI's Association for Women in Mathematics student chapter. Organized and co-led thirty-minute activities on different voting systems (2024) and computer programming for statistical problems (2025).
- *Mar 2025.* General volunteer at **Women in STEM Day**, WPI.
Provided guidance to 7th-12th graders in an interactive activity on rehabilitative engineering led by Dr. Sarah Wodin-Schwartz (Mechanical & Materials Engineering).
- *Feb 2025.* Volunteer judge for the **AWM/MfA Essay Contest**.
- *Spring 2024, 2025.* Data volunteer for **EvenQuads: Notable Women in Mathematics**.
Collected biographical data for use in the EvenQuads playing card project. Drafted biographies of EvenQuads candidates for inclusion on the AWM website and the playing cards.
- *Oct 2023, 2025.* Grader for the Annual **Invitational Mathematics Meet**, WPI.
- *May – Jul 2023.* Curriculum coordinator for **Girls Talk Math**, WPI.
Collaborated with camp lead to plan problem sets for a two-week-long camp aimed at introducing advanced mathematics ideas to high school girls.

Other Service

- *Jun 2023.* Conference assistant at the **National Council For Adoption (NCFA) Annual Conference**, St. Louis, MO.
Coordinated with a team of about a dozen volunteers and staff to ensure smooth execution of the 2023 conference. Moderated panels over the course of three days.
- *Apr 2020 - Jul 2024.* Editorial staff writer for **OR/MS Tomorrow**, the student magazine of INFORMS.

Professional Development

- *Sep 2025*: NE-COMMIT Fall Conference (New England Community for Mathematics Inquiry in Teaching), College of the Holy Cross
- *Mar – May 2025*: Student Support Network Training, WPI
- *Sep 2024*: Teaching at Teaching Intensive Institutions, Worcester State University
- *Jan – Apr 2024*: Responsible Conduct of Research, WPI
- *June 2023*: Investing In Girls Alliance Benchmark Training, Worcester YWCA
Day-long training on supporting benchmarks in mental health and wellness, violence and safety, and economic empowerment for middle school girls.
- *Nov – Dec 2022*: Ph.D. Teaching Training Series, WPI

Academic & Professional Memberships

American Mathematical Society (AMS), *since 2022*

Association for Women in Mathematics (AWM), *since 2022*

Institute for Operations Research and the Management Sciences (INFORMS), *since 2020*

Mathematical Association of America, *since 2022*

Society for Industrial and Applied Mathematics (SIAM), *since 2022*