

ABIGAIL ROSE DRUMM

formerly Abigail Rose Lindner

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Education

Worcester Polytechnic Institute

Ph.D. in Mathematics

- Advisor: Dr. Francesca Bernardi
- Comprehensive exams completed Aug 2023
- Preliminary exam completed Feb 2025

Aug 2022 – present

Worcester, MA

Worcester Polytechnic Institute

M.S. in Applied Mathematics

Awarded May 2024

Worcester, MA

Regent University

Bachelor of Science in Mathematics

Awarded Dec 2021

Virginia Beach, VA

Research Interests

Modeling multiphysics systems in fluid mechanics and microfluidics

Designing numerical simulations for fluid systems

Applying mathematics for exploring and solving social issues

U.S. adoption and foster care systems

Academic Research Experience

Graduate Student Researcher

Worcester Polytechnic Institute

Jan 2024 – present

Worcester, MA

- Supervised by Dr. Francesca Bernardi
- **Project:** “Mathematical Models for Biofilms and Squishy Bacteria”
 - * Build an elementary model for bacterial passage and fouling in cylindrical micropores
 - * Study the mathematics underpinning bacterial biofilm research, with a focus on biofilms in municipal and biopharmaceutical contexts
- **Project:** “Monte Carlo Simulations of 2D Flat-Sheet Membrane Filters for Water Purification”
 - * Run simulations in MATLAB for fouling of membrane filters with varying fluid, particle, and process parameters
 - * Perform sensitivity analyses to identify relevant parameters for simulation of real-world experimental results

Student Researcher

Rose-Hulman Institute of Technology

Summer 2020

Terre Haute, IN

- **Project:** “Agricultural Productivity, Economic Growth & Human Development in Sub-Saharan Africa: A Least Squares Dummy Variables (LSDV) Approach”
- 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
- Collaborated with Azaria Wagner under the guidance of Dr. Wayne Tarrant

Other Research Experience

Contract Researcher

National Council For Adoption

Summers 2023, 2024

Alexandria, VA

- Expand on previous data collection efforts to assemble a profile of U.S. adoptions in 2021 and 2022
- 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

Research Intern / Contract Researcher

National Council For Adoption

May 2021 – Oct 2022

Alexandria, VA

- Headed a systematic review of literature on children and youth who have been involved with the foster care system
- Collected and organized state data on non-international adoptions for analysis in an adoption fact book

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 web scraping tool in Python 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 summer 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, Differential Equations, 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 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

University Service

President

Aug 2024 – present

Association for Women in Mathematics, WPI Chapter

Worcester, MA

- Foster collaboration with other student organizations to diversify events and forge extra-departmental connections
- Coordinate with multiple university offices to organize social events, professional workshops, and seminars
- Read more about the work of WPI's AWM at: <https://mywpi.wpi.edu/awm/home/>

Seminar Coordinator

Oct 2023 – present

WPI Faculty Lunch Talks

Worcester, MA

- Informal, biquarterly seminar that provides an opportunity for students to learn about research conducted in the department and math career trajectories
- Additional information available at: <https://tinyurl.com/WPI-Math-FLT>
- Co-led with Hammed Olayinka during the 2023–2024 school year

Event Co-Organizer

Dec 2023 – Feb 2024

WPI Day of Scholastic Excellence 2024

Worcester, MA

- Organized lightning talk and poster sessions for students from across the Arts & Sciences departments to present on their research projects
- Co-led with Jezabel Aleyda Aponte Figueroa

PR Chair

Aug 2023 – Aug 2024

Association for Women in Mathematics, WPI Chapter

Worcester, MA

- Designed promotional flyers in Canva to market chapter-led events and social gatherings
- Maintained the organization's Facebook and Instagram accounts

Graduate Representative

Aug 2023 – present

WPI Arts & Sciences Graduate Student Advisory Council

Worcester, MA

- Advise the Dean of Arts & Sciences on initiatives that directly impact students
- Represent the mathematics department in meetings and events
- Learn more about the council at: <https://www.wpi.edu/academics/arts-sciences/about/student-councils>

Student Representative

Jan 6, 2023

Joint Mathematics Meeting - AMS Graduate Programs Fair

Boston, MA

- Provided a student perspective on Worcester Polytechnic Institute and the math Ph.D. program to prospective graduating juniors and seniors

Community Outreach

Volunteer Judge

Feb 2025 – present

AWM/MfA Essay Contest

- Evaluate student-written interview essays as part of the annual [AWM/Math for America Student Essay Contest](#)

Data Volunteer

Apr 2024 – May 2024

Association for Women in Mathematics

Worcester, MA

- Collected biographical data for use in [EvenQuads: Notable Women in Mathematics](#) playing card project

Activity Leader

Apr 6, 2024

AWM SK Day

Worcester, MA

- Led a team of five to plan and run a thirty-minute activity on different voting systems geared toward a middle school-aged audience

Graduate Student Volunteer

Oct 20, 2023

33rd Annual WPI Invitational Mathematics Meet

Worcester, MA

- Proctored and graded exams as part of a prestigious math competition for high school juniors and seniors from across New England

Curriculum Coordinator

May 2023 – Jul 2023

WPI Girls Talk Math

Worcester, MA

- Collaborated with camp lead to plan problem sets for a two-week-long [Girls Talk Math](#) camp aimed at introducing advanced mathematics ideas to high school girls

Activities Volunteer

Apr 15, 2023

AWM SK Day

Worcester, MA

- Assisted with a day-long program of talks and activities to encourage middle school girls in mathematics

Other Experience

Conference Assistant

Jun 2023

National Council For Adoption

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, introducing speakers and keeping sessions within allotted times

Editorial Staff Writer

Apr 2020 – July 2024

OR/MS Tomorrow

Remote

- Contributed 1,000-word articles and essays for an online, biannual student publication on scholarship in operations research and management science

Peer-Reviewed Publications

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. (2023). 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.chilyouth.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

General Audience Publications (partial list)

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

Lindner, A. (2023). College competition and the connection to rising student costs. *OR/MS Tomorrow*, Fall/Winter 2023.

Lindner, A. (2022). Food, food, everywhere, but no scrap of health in reach: food inequity in socioeconomically disadvantaged and majority-minority communities. *OR/MS Tomorrow*, Fall/Winter 2021.

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

Invited Presentations

Panel: Student Participation in DEI

INFORMS Annual Conference, Phoenix, Arizona, Oct 2023

Seminar Presentations

Random Walks and the Diffusion Equation

Ph.D. Student Seminar, WPI, Nov 2024

Monte Carlo Simulations of 2D Flat-Sheet Membrane Filters

Ph.D. Student Seminar, WPI, Oct 2024

Applications of Mathematical Optimization to Art

Ph.D. Student Seminar, WPI, Feb 2024

Some Models of Bacterial Fouling of Filtration Membranes

Ph.D. Student Seminar, WPI, Jan 2024

Did the Adoption and Safe Families Act Make a Difference?: Statistical Models to Answer the Question

Ph.D. Student Seminar, WPI, Sep 2023

Magic Squares

Ph.D. Student Seminar, WPI, Mar 2023

Graduate School Panel: From Application to Dissertation

AWM Personal and Professional Development Series, WPI, Feb 2023

Stability Analysis in Mathematical Ecology

Ph.D. Student Seminar, WPI, Nov 2022

Other Presentations

The SIR Model: History & Theory

Girls Talk Math, WPI, Jul 2024

A Brief Introduction to SIR Models in Mathematical Epidemiology

Girls Talk Math, WPI, Jul 2023

Awards & Honors

Teaching Assistant of the Year

Worcester Polytechnic Institute, Department of Mathematical Sciences

May 2024

Worcester, MA

Founder's Scholarship

Regent University

2018 – 2022

Virginia Beach, VA

Honors Program

Regent University

2018 – 2021

Virginia Beach, VA

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*

Professional Development

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

Nov – Dec 2022: Ph.D. Teaching Training Series, WPI