

# Kimberly A. Roth

## Curriculum Vitae

Department of Statistics  
The Pennsylvania State University  
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Citizenship: United States  
<https://karothe.github.io>

### Education

**PhD., Mathematics, Pennsylvania State University, August 2002**

**Masters of Applied Statistics, Pennsylvania State University, World Campus, December 2016**

**Budapest Semesters in Mathematics, Fall 1996-Spring 1997**

**B.A., Mathematics with a minor in Computer Science, Oberlin College, May 1996**

### Professional Experience

**Teaching Professor**, Department of Statistics, The Pennsylvania State University, Fall 2025- present

Will teach courses in statistics and data science. Teaching Probability (STAT/MATH 318).

**Professor of Statistics and Mathematics, since Fall 2016**, Juniata College, Fall 2006-Summer 2025 Taught classes in statistics, data science, and mathematics at the lower and upper levels. Co-developed Juniata's program in Data Science both undergraduate and masters and currently Director of the Masters Program. Developed asynchronous online masters course in data science including developing 4 courses. Advised students, co-advised the math club and knitting club, and served on many committees most recently Graduate Studies Committee and Personal Evaluation Committee. Past director of James K. Lakso Center for Teaching and Learning.

**Assistant Professor**, Wheeling Jesuit University, Fall 2002 - Spring 2006

Taught primarily mathematics courses at all levels and also Freshman Year Seminar and Sophomore Honors Seminar. Advised students, mentored senior theses, and did service within my department and in the university.

### Awards

**Beachley Award for Distinguished Service** for exemplary service to Juniata College, May 2023.

**Dex Whittinghill Award** for best talk in SIGMAA Statistics and Data Science Education session at Mathfest 2022.

**Distinguished Faculty Mentor of Undergraduate Mathematics Students Award-** For mentoring undergraduate students in research. From the Allegheny Mountain Section of the Mathematical Association of America, April 2022.

**Robert V. Hogg Award for Excellence in Teaching Introductory Statistics-**national award from the Special Interest Group of the Mathematical Association of America (SIGMAA) on Statistics Education. January 2019.

**Service Award-** for service to the Allegheny Mountain Section of the Mathematical Association of America, April 2017.

**Project NExT Fellow**, NExT, which stands for New Experiences in Teaching, is a national year long program of the MAA for new math faculty, Summer 2002 through Summer 2003.

### Recent Grants

**Multi-omics integration to model the differential metabolic activities of *Candida glabrata* and bacteria in humans with *C. difficile* infection**, NIH R16 SURE, PI Regina Lamendella, 5R16AI182344-02, November 2024.

**SoTL grant from Juniata College** for "Calculus Corequisite Assessment and Closing the Loop" with Kristin Camenga, Summer 2024.

**SoTL grant from Juniata College** for "Calculus Corequisite" with John Bukowski, Kristin Camenga, and Henry Escudro, Summer 2023.

**Juniata College's Rural Community Solutions to Address Tickborne Diseases: A One Health Initiative** part of team doing research and community engagement on tickborne illnesses at Juniata. PI Regina Lamendella. November 2022.

**SoTL grant from Juniata College** on best practices for math outreach related to the Mathemalchemy exhibit. Summer 2022.

**Innovative Educational Initiative Grant from Juniata College** For installing, exhibiting, and providing busing funds for local schools to Mathemalchemy at the Juniata College Museum of Art. Spring 2022.

**SoTL grant from Juniata College** for research on student engagement with the common reading program. Summer 2019 and 2020.

**Math and the Microbiome Innovation Award** for Organization of Inter-kingdom microbial communities from the Mathematical Biosciences Institute at Ohio State with Matt Anderson, Rick Ballweg, Chiranjit Mukherjee, Denise Russi Rodrigues, Christine Sun, and Yan Zhang. Fall 2018.

**SoTL grant from Juniata College** for "What is the most effective format for practice and feedback for Calculus I students at Juniata" with Kristin Camenga, Summer 2018.

**SoTL grant from Juniata College** for Calculus precalculus review project with Henry Escudro, Summer 2015 and 2016.

**HHMI Summer Research Grant** with Gina Lamendella, "What Are the Comparative Effects of Metronidazole, Vancomycin and Fidaxomicin on Host Associated Gut Microbial Communities?" Summer 2016.

## **Publications and Exhibition**

"Unmasking Fungal Contributions to *Clostridioides difficile* Infection: Insights from Multi-Omics and Predictive Modeling", Manali Misra, Oscar Tuten, Sierra Rossman, Justin Wright, Kim Roth, Regina Lamendella, in preperation

"Finding Further Fibonacci in the Hyperbolic Plane", with Miriam Sack, submitted to Mathematics Magazine.

"Calculus Corequisite Model at a Small Liberal Arts College", John Bukowski, Kristin Camenga, Henry Escudro, Jerry Kruse, Kim Roth, chapter for Mathematical Association of America Notes volume on co-requisite models, in final revisions.

Review of *The Future of Data Science: a collection of works by data designers, scientists, and artists* and *Our Environment: a collection of works by data designers, scientists, and artists*, Reviews. The American Mathematical Monthly(2024), 132(1), 100–104. <https://doi.org/10.1080/00029890.2024.2408204>

"Hiring a data scientist", Roth, K. A. (2024). Hiring a Data Scientist. Scatterplot(2024), 1(1). <https://doi.org/10.1080/29932955.2024.2423449>

"Mathemalchemy: Math+Art" with Kathryn Blake, Juniata Voices, volume 23. [https://www.juniata.edu/offices/juniata-voices/media/volume-23/KRoth\\_MathemalchemyArt\\_vol23\\_pgs\\_14\\_32.pdf](https://www.juniata.edu/offices/juniata-voices/media/volume-23/KRoth_MathemalchemyArt_vol23_pgs_14_32.pdf)

"Math and Democracy," with Erika Ward, Journal of Humanistic Mathematics, Volume 13 Issue 2 (July 2023), pages 86-101. <https://scholarship.claremont.edu/jhm/vol13/iss2/7>

"A Mathematician Knits an Afghan and Counts the Number of Possible Patterns", Journal of Mathematics and the Arts, Submission for Special Issue on Mathematics and Fiber Arts.

April 2023, DOI: [10.1080/17513472.2023.2197831](https://doi.org/10.1080/17513472.2023.2197831)

“Biological correlates with degree of introgressive hybridization between coyotes *Canis latrans* and wolves *Canis lupis* in Pennsylvania, USA” Erin Pfeffer, Kelsey Barth, Lucas Bitsko, Natalie Gibson, Kim Roth, Eric Butler, Uma Ramakrishnan. Vincent Patrick Buonaccorsi, American Midland Naturalist, October 2022.

“Geochemistry and multiomics data differentiate streams in Pennsylvania based on unconventional oil and gas activity." Maria Campa, Jeremy Chen See, Lavinia Unverdorben, Olivia Wright, Kimberly Roth, Jonathan Niles, Daniel Ressler, Ella Macatugal, Andrew Putt, Stephen Techtmann, Timothy Righetti, Terry Hazen, and Regina Lamendella. Microbiology Spectrum, vol. 10, n. 5, October 2022.

Mathemalchemy. a collaborative math and art exhibit with a 24 person team. Tour began at National Academy of Sciences Gallery, Washintgon DC in January 2022 and then to Juniata College in June 2022, currently at The Navajo Nation Museum in Window Rock, Arizona. Helped with open and Navajo Math Circles summer camp June 2025. <https://mathemalchemy.org/>

“Mathemalchemy: A Playful Pandemic Project” with Jessica Sklar, MAA FOCUS, October/November 2021.

“How to knit a Tortoise in  $n+1$  steps” for the Mathemalchemy blog. Sept. 2021.

<https://mathemalchemy.org/2021/09/27/knit-a-tortoise/>

“Hiring a Statistician in a Mathematics Department", MAA FOCUS, October/November 2019.

“The Grieving Mathematician and Mother", Journal of Humanistic Mathematics, Volume 8 Issue 2 (July 2018), pages 172-178. DOI: 10.5642/jhummath.201802.19 . Available at: <https://scholarship.claremont.edu/jhm/vol8/iss2/19>

“On Becoming a Statistician", MAA FOCUS, December 2017/January 2018.

“Bacterial Community Dynamics in Dichloromethane-Contaminated Groundwater Undergoing Natural Attenuation .", Wright Justin, Kirchner Veronica, Bernard William, Ulrich Nikea, McLimans Christopher, Campa Maria F., Hazen Terry, Macbeth Tamzen, Marabello David, McDermott Jacob, Mackelprang Rachel, Roth Kimberly, Lamendella Regina. Frontiers in Microbiology, Volume 8, 2017.

“The Only Woman in the Room", Juniata Magazine, Fall/Winter 2017.

“The Genomics Leadership Initiative at Juniata College." Buonaccorsi, V., Roney J., Keeney, J. , Roth, K., Juniata Voices, 2015.

Wrote content for exhibits at the Museum of Mathematics in New York City, NY. Fall 2012.

“Assessing clicker examples versus board examples in Calculus" , PRIMUS, Volume 22, Issue 5, 2012.

“Julia Sets that are Full of Holes", The Mathematical Intelligencer 30 (4), 51-56.

“Non-uniform Porosity for a Subset of Some Julia Sets.", Complex Dynamics: Twenty-five Years After the Appearance of the Mandelbrot Set : Proceedings of an AMS-IMS-SIAM Joint Summer Research Conference on Complex Dynamics–Twenty-five Years After the Appearance of the Mandelbrot Set, June 13-17, 2004, Snowbird, Utah Volume 396 of Contemporary mathematics - American Mathematical Society, 2006.

“Teaching outside my comfort zone", Cardinal Perspectives 2004-2005.

## Recent Talks:

August 2025, “Data Driven Art: Local Historical Weather Patterns”, invited talk, Illustrating Mathematics Reunion/Expansion workshop, Institute for Computational & Experimental Research in Mathematics(ICERM), Brown University.

July 2025, "Make Data Art", invited talk as part of Opening Session, US Conference on Teaching Statistics, Iowa State University.

March 2025, "Mathemalchemy: Math + Art", Colloquium, Junia, French School of Science and Engineering, Lille, France. Part of faculty exchange.

September 2024, "Supporting all students in Calculus 1" with Kristin Camenga, SoTL brown bag, Juniata College.

August 2024, "Calculus Co-requisite Model", Contributed Paper Session on the Teaching and Learning of Calculus, Mathfest, Indianapolis, IN.

February 2024, "Supporting Students with Learning Gaps in MA 130 Calculus 1" with John Bukowski, Kristin Camenga, and Henry Escudro, SoTL brown bag, Juniata College.

April 2023, "Mathemalchemy: Math + Art", Allegheny Mountain Section of the Mathematical Association of America Section Meeting, Edinboro University.

January 2023, "Mathemalchemy Outreach", with Ásgerður Jóhannesdóttir, University of Iceland and Alice Petillo, Marymount University, SoTL brown bag, Juniata College.

January 2023 "Fractals of Mathemalchemy", AMS Special Session on the Math and Art of Mathemalchemy, Joint Mathematics Meetings, Boston, MA.

January 2023 "A Mathematician Knits an Afghan: How Many Hue Shifts", AMS Special Session on Mathematics and the Fiber Arts, Joint Mathematics Meetings, Boston, MA.

September 2022 "Mathemalchemy: Math + Art" with Kathryn Blake, Juniata College Book-end Talk Series, Huntingdon, PA.

August 2022 "Teaching the Census", Mathfest, Philadelphia, PA.

August 2022 "A Virtual Tour of Mathemlchemy" with Samantha Pezzimenti, Mathfest, Philadelphia, PA.

June 2022 "Mathemalchemy: math+art", Summer Research Seminar at Juniata College, Huntingdon, PA.

October 2021. "Engagement in Common Reading Programs: A Five-Year Study." with Jim Tuten and Hannah Bellwoar. Conference on the First Year Experience, virtual.

April 2021 Panel on Voting/Polling in the Classroom for Project New Experiences in Teaching of the Mathematical Association of America

March 2021 "Seeing the Forest for the Trees: Random Forests and Predicting Fracking" for the first Allegheny Mountain Colloquium for the Allegheny Mountain section of the Mathematical Association of America

## **Selected Recent Undergraduate Research Students**

**Jeremiah Burden**, Spring 2025, Influences of Juniata Athletes' Strength Growth. Presented at Juniata Liberal Arts Symposium

**Austin Clees and Venus Yan**, Spring 2025 Math Research Seminar, Tsuro Solitaire on a 2x2 board.

**Sierra Rossman**, Spring 2025, The Power of Prunes: Investigating Their Potential to Prevent and Reverse Osteoporosis. Presented at Juniata Liberal Arts Symposium.

**Miriam Sack**, Spring 2025, Exploring the Hyperbolic Plane. Paper submitted to Mathematics Magazine. Presented at at the spring meeting of the Allegheny Mountain Section of the Mathematical Association of America and the Juniata Liberal Arts Symposium. Received summer research funding from Day of Giving Funds for the Mathematics and Computer Science division at Juniata College.

**Jacob Wallman**, Fall 2024, with Phil Dunwoody, US and Mexico Anti-Democratic Attitudes. Presented to Mathematics Seminar.

**Lauren Fisher**, Fall 2023, with Melissa Innerst, Do You Enroll in Courses to be With Students More Like You?. Presented at a Math Department Colloquium.

**Heather Mitchell**, Spring 2023 What is a P-Value Anyway: Correcting Students' Misconceptions. Presented at the spring meeting of the Allegheny Mountain Section of the Mathematical Association of America and the Juniata Liberal Arts Symposium.

**Emily Sarro**, Spring 2023, The Diversity Discrepancy: A Statistical Approach to Understanding Diversity at Juniata. Presented at the spring meeting of the Allegheny Mountain Section of the Mathematical Association of America.

**Peter Kruse**, Spring 2021 and 2022. Neural networks and Generative Neural Networks applied to bacterial data. Joint work with Gina Lamendella. Spring 2021 work with William Daugherty-Miller. Presented at the Juniata Liberal Arts Symposium, the spring meeting of the Allegheny Mountain Section of the Mathematical Association of America. Allegheny Branch American Society for Microbiology Meeting winning first place for overall undergraduate presentations at the conference.

**Sydney Shearer**, Spring 2022. Applying and assessing various random forest techniques on admissions data. Joint work with Matt Powell. Presented at the Juniata Liberal Arts Symposium and the spring meeting of the Allegheny Mountain Section of the Mathematical Association of America.

## **Selected Professional Service**

Program reviewer for Monmouth University Math Department, Spring 2022, masters program reviewer DeSalles University, Spring 2024

Member of the Board of Scatterplot: The MAA Journal of Data Science. Associate Editor for the College Math Journal. Four year term began January 2024

Past member of MAA Committee on Contributed Paper Sessions. Term one 2018-2021. Term 2, 2021-2024. Co-organized and co-ran the Contributed Poster Session at Mathfest 2024.

Past webmaster and past treasurer of the the Mathematical Associations of America's Special Interest Group of Statistics and Data Science Education. Have served on the Hogg award committee.

Early Table Leader AP Statistics May 2025, Table leader AP Statistics 2022-2024, reader AP statistics 2015-2020, 2021. Past reader of AP Calculus.

Set up ratings survey and analyzed and summarized ratings data for Association for Women in Mathematics EvenQuads/Women in Mathematics Cards project rounds 1 and 2 and 3.