

Kimberly A. Roth

Curriculum Vitae

Department of Mathematics
Juniata College
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Education

Masters of Applied Statistics, Pennsylvania State University, Fall 2016

PhD., Mathematics, Pennsylvania State University, Summer 2002

Advisor: Grzegorz Świątek

Budapest Semesters in Mathematics, Fall 1996 and Spring 1997

B.A., Mathematics, Oberlin College, Spring 1996

Minor: Computer Science

Professional Experience

Statistical Consultant, Contamination Source Investigation, Fall 2019- present

Helped with various statistical procedures including establishing Level of Detection and modeling probabilities of testing people positive with pooled and unpooled testing.

Statistical Consultant, Wright Labs, Fall 2019- present

Worked with implementing and analyzing output from various statistical routines including SparCC and SourceTracker.

Professor of Statistics and Mathematics, since Fall 2016, Juniata College, Fall 2006-present

Taught Quantitative Methods, Math and Democracy, Introduction to Data Science, Discrete Structures, Linear Algebra, Calculus I, Calculus II, Calculus III, Elementary Statistics, Introduction to Probability and Statistics, Data Acquisition, Statistical Consulting, Numerical Analysis, Probability, Probability and Statistics, Multivariate Statistics, Chaos and Fractals, Differential Equations, Bayesian Statistics, and Mathematics Research. 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: Data Science Fundamentals, Mathematics Fundamentals, Statistics Fundamentals, and Capstone. Taught Mathematics Fundamentals and the Capstone. Advised students, co-advised the math club and knitting club, and served on Personal Evaluation Committee, General Education Steering Committee, Student Academic Development, Curriculum Committee, Committee on Advancement and Marketing. Faculty Governance Committee, a Middle States Working Group, the Science in Motion Advisory Committee, Mellon Grant Group in Integrative and Applied Learning co-chair, Summer Inquiry groups, and the Q assessment committee. Lead Integrated Science Learning Community as part of the past HHMI grant.

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

Taught Math in Society, Precalculus, Calculus I, Calculus II, Calculus III, Discrete Math, Linear Algebra, Introduction to Research Seminar, Introduction to Real Variables, Freshman Year Seminar, and Sophomore Honors Seminar. Advised students, mentored senior theses, and did service within my department and in the university.

Honors and Awards

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

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

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.

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 Escuadro, 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.

HHMI Summer Research Grant with Gina Lamendella, “Modeling the degradation potential of groundwater microbial communities using multi-omics data sets.” Summer 2015.

Course revision grant for finding and including genomics data in Introduction to Probability and Statistics, part of the HHMi funded genomics initiative at Juniata college, August 2013.

CAUSE grant for attendance at Teaching Introductory Data Analysis through Modeling Workshop at Joint Mathematics Meetings, January 2009 and participation at US Conference on Teaching Statistics, June 2009.

SoTL grant from Juniata College for Calculus clicker project Summer 2008 and Summer 2009

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

Publications and Exhibition

“Math and Democracy” with Erika Ward, Journal of Humanistic Mathematics, Submission for Special Issue on Math and Society, Submitted.

“A Mathematician Knits an Afghan. How many possible Hue Shifts?”, Journal of Mathematics and the Arts, Submission for Special Issue on Mathematics and Fiber Arts . Submitted.

“Biological correlates with degree of introgressive hybridization between coyotes *Canis latrans* and wolves *Canis lupus* 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 Boston University. <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:

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.

August 2022 “Teaching the Census” , Mathfest, Philidelphia, PA.

August 2022 “A Virtual Tour of Mathemlchemy” with Samantha Pezzimenti, to be presented at Mathfest, Philidelphia, PA.

June 2022 “Mathemalchemy: math+art”, Summer Research Seminar. 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

February 2020, “Seeing the Forest for the Trees: Random Forests and Predicting Fracking” , Penn State Microbiome Center, State College, PA. <https://youtu.be/w0La4iHMyWI>

February 2020, “Seeing the Forest for the Trees: Random Forests and Predicting Fracking” , Juniata College Math Department Colloquium, Huntingdon, PA.

January 2020, “So You Want to Start an Undergraduate Statistics or Data Science Program?” Panel for SIGMAA StatEd, Joint Mathematics Meetings, Denver, CO.

October 2019, “Seeing the Forest for the Trees: Random Forests and Predicting Fracking” , California University of Pennsylvania Mathematics Club, California, PA.

October 2019, “Seeing the Forest for the Trees: Random Forests and Predicting Fracking” , Franklin and Marshall College and Millersville University Joint Colloquium in Mathematics, Lancaster, PA.

August 2019, “A Mathematician Knits an Afghan.” Mathematics of Various Entertaining Subjects, New York City, NY.

January 2019, “Effective Practice and Feedback Methods in Calculus I.” with Kristen Camenga, Joint Mathematics Meetings, Baltimore, MD.

November 2018, “Classroom Response Systems and Peer Instruction: Two Literature Reviews and a Demo”, SoTL brown bag, Juniata College.

October 2018, “Effective Practice and Feedback in Calculus I” with Kristen Camenga, SoTL brown bag, Juniata College.

May 2018, “Introduction to Data Science with No Prerequisites” with Loren Rhodes at the Electronic Conference on Teaching Statistics.

January 2018, “Introducing R to Different Statistical Audiences”. Joint Mathematics Meetings, San Diego, CA.

Recent Research Students

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.

Natalie Gibson, Spring 2019, presented at the Juniata Liberal Arts Symposium. Predicting Wolf Genetics in Pennsylvania Coyotes working with data from Uma Ramikrishan. Publication of parts of results accepted.

Cori Timney, Spring 2019, presented at the Juniata Liberal Arts Symposium. The Fairness of Unique Four-Sided Dice. Presented at the spring meeting of the Allegheny Mountain Section of the Mathematical Association of America.

Andrew Guide, Spring 2018, Predicting Stream Locations using Random Forest Models. Joint work with Gina Lamendella. Presented at the Juniata Liberal Arts Symposium.

Zeph Turner, Spring 2018, Estimating the Sources of Metagenomic Data using Bayesian Statistical Methods. Joint work with Gina Lamendella. Presented at the Juniata Liberal Arts Symposium. Presented at the spring meeting of the Allegheny Mountain Section of the Mathematical Association of America.

Selected Professional Service

Associate Editor Elect for the College Math Journal

Currently Section Representative for the of Allegheny Mountain Section of the Mathematical Association of America and serving on the nomination committee. Past Section New Experiences in Teaching Co-coordinator, Chair, Chair Elect, First Vice Chair, and Second Vice Chair. Have served on nomination committee, teaching award committee, and service award committee.

Co-organized contributed paper session “Teaching Pandemic Prepared Students” at Mathfest 2022 with Russ Goodmand and Melissa Innerst. Past co-organizer of the Project NExT(New Experiences in Teaching)/Young Mathematicians Network(YMN) poster session at Joint Math Meetings January 2010 to January 2014. Past co-organizer of several panels at the Joint Mathematics Meetings.

Member of MAA Committee on Contributed Paper session. Term one 2018-2021. Term 2, 2021-2024

Past member of the Mathematical Association of America’s Committee on the Participation of Women, two three year terms beginning January 2011 and January 2014. Chair for 2015 year. As part of the committee, read TENSOR grant applications, March 2012 and March 2014.

Past webmaster of the the Mathematical Associations of America’s Special Interest Group of Statistics Education. Past treasurer of the the Mathematical Associations of America’s Special Interest Group of Statistics Education for 2012-2014. Have served on the Hogg award committee.

Reader AP Statistics, 2015 -present. Past reader of AP Calculus.

Program reviewer for Mounmouth University Math Department, Spring 2022.

Referee currently for College Math Journal, Problems, Resources, and Issues in Mathematics Undergraduate Studies, Journal of Humanistic Mathematics and Journal of Statistics and Data Science Education.

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.