Kimberly A. Roth

Curriculum Vitae

Department of Mathematics
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Date of Birth: 04/14/75
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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 classes in mathematics, statistics, and data science at the lower and upper levels. Developed a general education course in mathematics and democracy. 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. Past director of James K. Lakso Center for Teaching and Learning. 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.

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.

Mentor Award- for mentorships of undergraduates in math research to the Allegheny Mountain Section of the Mathematical Association of America, April 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

Grants

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 Corequsite" with John Bukowski, Kristin Camenga, and Henry Escuadro, Summer 2023.
Juniata College's Rural Community Solutions to Address Tickborne Diseases: A One Health Initiative part of team doing research and community engagment on tickborne illnesses at Juniata. 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 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.
SoTL grant from Juniata College for Calculus clicker project Summer 2008 and Summer 2009

Publications and Exhibition

"Calculus Corequisite Model at a Small Liberal Arts College", John Bukowski, Kristin Camenga, Henry Escuadro, Jerry Kruse, Kim Roth, chapter for Mathematical Association of America Notes volume on co-requisite models, submitted.
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 for the MAA Monthly, to appear.

"Hiring a data scientist", Scatterplot, the MAA journal of Data Science. In revisions.

"Mathemalchemy: Math+Art" with Kathryn Blake, Juniata Voices, volume 23. https://www.juniata.edu/o
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

"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 Museum of Mathematics in New York City. 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 Appear-

ance 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:

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 Escuadro, 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 Bookend Talk Series, Huntingdon, PA.
August 2022 "Teaching the Census" , Mathfest, Philidelphia, PA.
August 2022 "A Virtual Tour of Mathemlchemy" with Samantha Pezzimenti, Mathfest, Philidelphia, 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
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 "Trends in the Scholarship of Teaching and Learning", JSI, Westminster Woods, Huntingdon, PA.
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.

Recent Research Students

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.

Natalie Gibson, Spring 2019. Predicting Wolf Genetics in Pennsylvania Coyotes working with data from Uma Ramikrishan. . Presented at the Juniata Liberal Arts Symposium. Results part of related publication.

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

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

Program reviewer for Mounmouth 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 Elect for the College Math Journal. Four year term began January 2024

Past Section Representative for the of Allegheny Mountain Section of the Mathematical Association of America. 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. Currently on the nomination committee.

Co-organized contributed paper session “Teaching Pandemic Prepared Students" at Mathfest 2022 with Russ Goodman 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. Co-organized and co-ran the Contributed Poster Session at Mathfest 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 Mathematical Associations of America's Special Interest Group of Statistics Education for 2012-2014. Have served on the Hogg award committee.
Table leader AP Statistics 2022-present, reader AP statistics 2015-2020, 2021. Past reader of AP Calculus.
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 and 3.