

Dr. Rosemarie Bongers
Assistant Teaching Professor
University of California Merced

CONTACT
INFORMATION

Department of Applied Mathematics
University of California Merced
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Pronouns: she/her or they/them

RESEARCH
INTERESTS

Intersections between quasiconformal maps, geometric measure theory, harmonic and complex analysis.
Implementation and analysis of equity-focused pedagogy in data science and statistics.

EDUCATION

- 2018 **Michigan State University: Ph.D., Mathematics**
Dissertation: Applications of Geometric Measure Theory to Complex and Quasiconformal Analysis
Advisor: Ignacio Uriarte-Tuero
- 2012 **Colorado State University - Pueblo: B.S., Mathematics**
Summa cum laude, minor in computational mathematics
- 2012 **Colorado State University - Pueblo: B.S., Physics**
Summa cum laude, emphasis and minor in chemistry

POSITIONS HELD

- 2023– **University of California Merced**
Assistant Teaching Professor
- 2021–2023 **Harvard University**
Preceptor
- 2020–2021 **Harvard University**
Lecturer
- 2018–2020 **Washington University in St. Louis**
Postdoctoral Lecturer
- 2012–2018 **Michigan State University**
Graduate Assistant

PUBLICATIONS

*Note: Some publications prior to 2022 are under the name **Tyler Bongers**.*

- 1 Tyler Bongers and James Gill, *Existence of quasiconformal maps with maximal stretching on any given countable set*, *Comput Methods Funct. Theory* (2022).
- 2 Rosemarie Bongers and Krystal Taylor, *Transversal families of nonlinear projections and generalizations of Favard length*, to appear *Anal. PDE*, 2021.
- 3 Tyler Bongers, Zihua Guo, Ji Li, and Brett D. Wick, *Commutators of Hilbert transforms along monomial curves*, *Studia Math.* 257 (2021), no. 3, 295-311.
- 4 Rosemarie Bongers, *Improved Hölder Regularity of Quasiconformal Maps*, *Ann. Acad. Sci. Fenn. Math.* 44 (2019), no. 2, 973-985.

- 5 Rosemarie Bongers, *Stretching and Rotation Sets of Quasiconformal Maps*, Ann. Acad. Sci. Fenn. Math. 44 (2019), no. 1, 103-123.
- 6 Rosemarie Bongers, *Geometric Bounds for Favard Length*, Proc. Amer. Math. Soc. 147 (2019), 1447-1452.

TEACHING
EXPERIENCE

University of California Merced

- 2024 Spring Math 032 (**Probability and Statistics**)
Instructor of record for 115 students. Calculus-based probability and statistics course integrating applied computations in Jupyter.
- 2024 Spring Math 150 (**Mathematical Modeling**)
Project-based upper division course which focuses on designing, implementing, and analyzing models for applied mathematics problems.
- 2023 Fall Math 032 (**Probability and Statistics**)
Instructor for about 205 students.

Harvard University

- 2022 Fall Math 21b (**Linear Algebra and Differential Equations**)
Course head, responsible for setting the curriculum and leading the teaching team for all sections. Math 21b covers matrix and vector algebra, dynamical systems, Fourier analysis, and introductory partial differential equations with an emphasis on quantitative reasoning.
- 2022 Spring Math 21b (**Linear Algebra and Differential Equations**)
Course preceptor, responsible for administrative support.
- 2021 Fall Math 1a (**Introduction to Calculus**)
Course head, responsible for course redesign and coordinating the teaching team for all sections. Math 1a covers introductory calculus (limits, derivatives, integrals, and applications) with a special emphasis on quantitative reasoning and applied problems.
- 2021 Spring Math 21a (**Multivariable Calculus**)
Teaching fellow. Math 21a covers partial derivatives, multiple integrals, higher-dimensional reasoning, and introductory vector calculus.
- 2020 Fall Math 1a (**Introduction to Calculus**)
Teaching fellow.

Washington University in St. Louis

- 2020 Spring MATH 523 (**Topics in Geometric Measure Theory**)
Special topics course covering geometric measure theory, Hausdorff measures, projection theory, and topics in rectifiability theory for graduate students working in analysis.
- 2020 Spring MATH 430 (**Abstract Algebra**)

- Introductory course to abstract algebra, covering groups, rings, and fields for students experienced in proof-writing.
- 2019 Fall MATH 318 (**Calculus of Several Variables**)
Applications of linear algebra to multivariable calculus and an introduction to manifolds for students transitioning to higher level mathematics.
- 2019 Spring MATH 308 (**Mathematics for the Physical Sciences**)
Continuation of vector calculus, partial differential equations, and calculus of variations for students concentrating in physics and related fields.
- 2019 Spring MATH 233 (**Calculus III**)
Multivariable calculus, covering partial derivatives, multiple integrals, and vector calculus.
- 2018 Fall MATH 217 (**Differential Equations**)
Engineering- and application-focused differential equations course with focus on modeling and solution techniques.

Michigan State University, Instructor roles

- 2017 Fall MTH 299 (**Transitions**)
Introduction to proofs for mathematics majors and minors after completing calculus.
- 2015 Fall MTH 202 (**Elementary Geometry for Teachers**)
Plane and elementary geometry for pre-service teachers.
- 2015 Summer MTH 234 (**Calculus III**)
Multivariable calculus, covering partial derivatives, multiple integrals, and vector calculus.
- 2014 Summer MTH 132 (**Calculus I**)
Introductory calculus with an emphasis on limits, derivatives, and integrals.
- 2013 Fall MTH 124 (**Survey of Calculus I**)
Introductory calculus course for students concentrating in business, life sciences, and other applied fields.

Michigan State University, Teaching Assistant roles

- 2018 Spring MTH 133 (**Calculus II**)
Recitation sections for a second semester calculus course focusing on integration techniques and sequences and series.
- 2014–2017 MTH 235 (**Differential Equations**)
Recitation sections for an engineering-focused differential equations course; five semesters in total.

SEMINARS AND CONFERENCE PRESENTATIONS

- 2023 *Energy estimates for families of nonlinear projections*
Plenary Talk, **Harmonic Analysis and Fractal Sets 2023, Ohio State University**
- 2022 *Using energies to study the geometry of a set*

Analysis and Applied Math Seminar, Kennesaw State University,
Remote

- 2020 *Energy techniques for nonlinear projections and Favard curve lengths*
Invited Talk, **Mid-Atlantic Analysis Meeting**, Remote
- 2019 *Regularity of quasiconformal maps*
Analysis Seminar, Washington University in St. Louis
- 2019 *Commutators of the Hilbert transform along a parabola*
Contributed Talk, **Ohio River Analysis Meeting**, University of Cincinnati
- 2019 *Stretching and rotation sets of quasiconformal maps*
Departmental Colloquium, Saint Louis University
- 2018 *Geometric regularity of quasiconformal maps*
Contributed Talk, **Mid-Atlantic Analysis Meeting**, Virginia Tech
- 2018 *Geometric distortion properties of quasiconformal maps*
Analysis Seminar, Washington University in St. Louis
- 2018 *Stretching and rotation sets of quasiconformal maps*
Departmental Colloquium, Northern Illinois University
- 2018 *Hölder regularity of quasiconformal maps*
Analysis Seminar, Michigan State University
- 2018 *Stretching and rotation sets of quasiconformal maps*
AMS Special Session on Extremal Problems in Approximations and Geometric Function Theory, Joint Mathematics Meetings
- 2017 *Stretching and rotation sets of quasiconformal maps*
Contributed Talk, **Second Northeastern Analysis Meeting**, SUNY Albany
- 2017 *Stretching and rotation sets of quasiconformal maps*
Analysis Seminar, Michigan State University
- 2017 *Stretching and rotation sets of quasiconformal maps*
Poster Presentation, **2017 Global Research Symposium - Geometry, Analysis and Probability** at KIAS, Seoul, Korea
- 2012 *Optimal Transfer Orbits in 3-Dimensional Systems*
MAA Rocky Mountain Sectional Meeting
- 2012 *Optimal Transfer Orbits in 3-Dimensional Systems*
Pikes Peak Regional Undergraduate Mathematics Conference, Colorado College
- 2012 *On Constructible Sets*
MAA Undergraduate Poster Session, Joint Mathematics Meetings, Boston.

OTHER TEACHING
AND MENTORING

- 2022–2023 **Math Includes, Harvard University**
Mentor a family of undergraduate students with shared identities.
- 2019–2020 **MAA Project NExT**
Silver '19 Fellow.

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| | 2017 | Mentoring of Undergraduate Learning Assistants (MSU) Observed, supported, and mentored undergraduate assistants working in calculus courses at MSU's Honors College (Lyman Briggs). |
| | 2016–2017 | Center for Instructional Mentoring (MSU), Lead TA Mentored junior graduate students at MSU as they transitioned into the classroom to teach introductory calculus courses; conducted video observations and feedback. |
| | 2016 | Course and Curriculum Development for Differential Equations Worked with MSU faculty to develop <i>Mathematica</i> projects for use in engineering-focused differential equations course. |
| | 2014–2017 | Math Learning Center (MSU), Lead TA Supervised and coordinate graduate and undergraduate tutors. |
| SERVICE AT UC MERCED | 2024– | MS Advisor, Indar Freitas Advising a thesis project to apply modern applied mathematical data techniques to UC Merced student data and assess teaching effectiveness through an equity lens. Expected graduation Fall 2024. |
| | 2024 | Undergraduate research advisor, Jacob Bates Supervised a project on computational number theory; this work led to a poster presentation at the MAA Golden Section meeting and a SIAM student chapter conference. |
| | 2023– | Chancellor's Advisory Committee on Queer Issues Faculty representative on CACQI; working on issues with gender-neutral facilities and transgender rights on campus, as well as data processing. |
| | 2023– | Co-PI, DUBOIS Grant Joint grant with UC Berkeley, Tuskegee University, and other institutions; building equity-focused data science modules for export to community colleges. |
| PREVIOUS SERVICE AND OUTREACH | 2022 | Gifted Math Summer Camp, Epsilon India Foundation Gave two remote talks about fractal geometry for 9–12 year old math students in India during a summer camp. |
| | 2022 | Raising a Mathematician Foundation Assisted with an online math camp for girls in grades 7–10 in India. |
| | 2021–2022 | Undergraduate Events Committee, Harvard Math Assist in organizing the biweekly undergraduate Math Table event. Includes mentoring speakers as they develop 30-minute talks. |
| | 2018– | Reviewer AMS <i>Mathematical Reviews</i> , Journal of Geometric Analysis (JGEA), International Mathematics Research Notices (IMRN). |
| | 2015–2016 | Organizer, MSU Student Analysis and PDE Seminar Organized a weekly seminar for graduate students. |
| HONORS AND AWARDS | 2022 | Distinguished Young Alumni Award Colorado State University – Pueblo |

- 2018 **Dissertation Completion Fellowship**
Michigan State University, College of Natural Sciences
- 2018 **Graduate Student Travel Grant for JMM 2018**
American Mathematical Society
- 2018 **Douglas A. Spragg Endowed Fellowship in Mathematics**
Michigan State University, Department of Mathematics
- 2018 **Paul and Wilma Dressel Endowed Scholarship**
Michigan State University, Department of Mathematics
- 2017 **Teaching Assistant Award for Excellence in Teaching**
Michigan State University, Department of Mathematics
- 2015 **Dissertation Continuation Fellowship**
Michigan State University, College of Natural Sciences
- 2015 **Teaching Assistant Award for Excellence in Teaching**
Michigan State University, Department of Mathematics
- 2014 **Paul and Wilma Dressel Endowed Scholarship**
Michigan State University, Department of Mathematics
- 2012 **Recruiting Fellowship**
Michigan State University, College of Natural Sciences
- 2012 **Outstanding Presentation**, 2012 Joint Mathematics Meetings
MAA Undergraduate Student Poster Session

LANGUAGES AND
RELEVANT SKILLS

English (native speaker), Hindi (working knowledge), Spanish (reading).
L^AT_EX, Matlab, Python.