

Claire Merriman

clmerriman@davidson.edu
<https://clairemerriman.com/>

Positions held

- July 2022– Present **Visiting Assistant Professor** *Davidson College*, Davidson, NC.
Department of Mathematics and Computer Science
- Aug 2019– Aug 2022 **Ross Assistant Professor** *The Ohio State University*, Columbus, OH.
Department of Mathematics

Education

- Aug 2019 **PhD** *University of Illinois at Urbana-Champaign*, Urbana, IL.
Department of Mathematics, advisor: Florin Boca
Geometric and ergodic properties of certain classes of continued fractions
- May 2013 **Bachelor of Arts** *Vanderbilt University*, Nashville, TN.
Honors in Mathematics, minor in Earth and Environmental Sciences

Publications

Research Papers

- Submitted **Geodesic flows and slow down maps of continued fraction maps.**
<https://arxiv.org/pdf/2307.11700.pdf>
- Aug 2023 **Natural extensions and entropy of α -continued fraction expansions with odd partial quotients** with Y. Hartono, C. Kraaikamp, and N. Langeveld, *Discrete and Continuous Dynamical Systems.*
<https://doi.org/10.3934/dcds.2023032>
- Nov 2021 **Geodesic flows and the mother of all continued fractions**, *International Journal of Number Theory.*
<https://doi.org/10.1142/S179304212250049X>
- June 2019 **α -expansions with odd partial quotients** with F. Boca, *Journal of Number Theory.*
<https://doi.org/10.1016/j.jnt.2018.11.015>
- Feb 2019 Appendix to **Distribution of the periodic points of the Farey map** by B. Heersink with F. Boca and B. Heersink, *Communications in Mathematical Physics.*
<https://doi.org/10.1007/s00220-019-03283-0>
- Oct 2018 **Coding of geodesics on some modular surfaces and applications to odd and even continued fractions** with F. Boca, *Indagationes Mathematicae*, <https://doi.org/10.1016/j.indag.2018.05.004>.

Other Scholarship

- To Appear **Continued fractions connecting number theory, dynamical systems, and hyperbolic geometry**, Accepted by the editorial board for *Research Connections*, an in progress peer-reviewed volume that aims to introduce math majors to the mathematical interests and careers paths of early career researchers.
https://clairemerriman.com/Merriman_SMP.pdf
- June/July 2021 **Organizing a short online math program successfully** with D. Glasscock, D. Robertson, and C. Smyth, *Notices of the American Mathematical Society.*
<https://www.ams.org/journals/notices/202106/rnoti-p935.pdf>
- May 2019 **Make a difference this summer** with M. Lanius and S. Sisneros-Thiry, *Notices of the AMS.*
<https://www.ams.org/journals/notices/201905/rnoti-p699.pdf>

Grants and Awards

- AMS Epsilon Fund** *American Mathematical Society, Principal Investigator.*
- Summer 2022 Grant to fund Buckeye Aha! Math Moments Beyond the Classroom camp for middle and high school students-\$2,500.
- Summer 2019 Grant to fund Summer Illinois Mathematics Camp for local middle and high school students-\$4,000.
- AY 2021-2022 **Community-Based & Service-Learning Course Development Grants** *The Ohio State University Office of Service-Learning*, Co-PI.
Grant to develop a Recreational Math and Outreach Service Learning course in the Department of Mathematics at Ohio State. -\$3,900

- Dolciani Mathematics Enrichment Grants** *Mathematical Association of America.*
 AY 2021-2022 Principal Investigator, Grants to fund online Beyond the Classroom grant for middle and high school students-\$5,000.
 April 2016- Coauthor, Three grants to fund Summer Illinois Mathematics Camp for local middle and high school students
 May 2019 totaling \$14,000.
 Fall 2018 **Thesis Writing Fellowship** *Noah Snyder's NSF CAREER Grant DMS-1454767.*
 Fellowship for math graduate students doing extraordinary teaching and outreach, <https://nsnyder1.pages.iu.edu/fellowship.html>
 AY 2016-2017, **Chancellor's Public Engagement Student Fellows** *University of Illinois at Urbana-Champaign Office*
 AY 2015-2016 *of Public Engagement, Co-PI.*
 Grants to fund Summer Illinois Mathematics Camp for local middle and high school students totaling \$2500.

Teaching

Davidson College

- Fall 2022- **Instructor.**
 Present
- o MAT-150 Linear Algebra Fall 2022, Fall 2023, Spring 2024
 - Includes Mathematica Labs designed for self-discovery of applications of linear algebra
 - Standards based grading
 - o MAT-255 Number Theory Spring 2023, Spring 2024
 - Serves as one option for introduction to proofs
 - Focus on mathematical writing skills with papers throughout the semester
 - o MAT 108 Exploring Mathematical Ideas Fall 2023
 - o MAT-113 Calculus II Spring 2023
 - o MAT-160 Calculus III Fall 2022

The Ohio State University

- Fall 2019- **Instructor.**
 Spring 2022
- o MATH 2194 Recreational Mathematics and Outreach Spring 2022
 - Pilot version of a team-taught service learning course
 - Students will learn about recreational math topics, then design hands-on math puzzles and activities for K-12 students. Students will also lead activities with K-12 students
 - o MATH 4573 Elementary Number Theory Spring 2020, Spring 2021, Spring 2022
 - o MATH 1118 Math for Architects Autumn 2021
 - Active learning course, with in-class activities influenced by inquiry based learning and hands-on outreach activities
 - o MATH 4507 Geometry Autumn 2020
 - Fully online, inquiry based learning course with an emphasis on communication and writing skills. This course is required for Mathematics Education major and covers Euclidean and non-Euclidean geometries
 - o MATH 1152 Calculus II flipped and flexible, 3 sections Autumn 2019
 - Consist of online lectures and homework with twice a week recitations and active learning worksheets
- Summers 2020, **Instructor** *Beyond the Classroom, Columbus, OH.*
 2021 Developed material for online summer camp
- o Polyforms and Polytopes in Art, Day 3-Polyhedra Summer 2020
 - o Math and Magic Summer 2021

University of Illinois at Urbana-Champaign

- Spring 2013- **Teaching Assistant** *University of Illinois at Urbana-Champaign.*
 Spring 2019 * ranked as Excellent by student course evaluations, ** ranked Outstanding, + Merit section
 All calculus courses use active learning group work
 The Merit Scholars program focuses on retaining students from underrepresented minorities or rural schools, as well as those who have not declared a major and women in engineering. Teaching assistants create the group work assignments for these sections.
- o MATH 231 Calculus II +Spring 2019, *Fall 2017, **Spring 2015, Fall 2014
 - o MATH 241 Calculus III Spring 2016
 - o MATH 220 Calculus +Fall 2015
 - o MATH 234 Business Calculus *Spring 2014
- Summers 2015, **Instructor** *Summer Illinois Math Camp, Urbana, IL.*
 2016 Developed and taught week-long classes with a focus on hands on discovery
- o Making and breaking codes: cryptology, rising 8th and 9th grade students Summer 2016
 - Team taught with undergraduate teaching assistants from Merit program
 - o Number theory and cryptology, rising 9th-12th grade students Summer 2015

Undergraduate Research Mentored

Davidson College

Summer 2023 **Mentor** *Research in Science Experience (RISE)*, Davidson, NC.
An intensive summer research fellowship program to introduce students to undergraduate research after their freshman year

University of Illinois at Urbana-Champaign

Fall 2015-
Summer 2018 **Lab Leadership** *Illinois Geometry Lab*, Urbana, IL.
As outreach director, I also was also part of the lab leadership team. Each semester, we reviewed the undergraduate and graduate student applications and placed 3-5 undergraduate and 1-2 graduate students on each project

Graduate Student Mentor *Illinois Geometry Lab*.

Worked with 1-2 faculty members to mentor group of undergraduate research projects

- Natural extension domains of α -odd continued fractions Spring 2019
- Developing exciting outreach material Fall 2018
- Interactive tool to learn linear algebra Spring 2016
- Gaps between successive numbers in a sequence after random sampling Fall 2014

Talks

Invited Talks

Natural extensions and entropy of α -odd continued fractions.

- AMS Spring Southeastern Sectional Meeting, *Special Session on Fractal Geometry and Dynamical Systems*, Atlanta, GA Mar 2023
- AMS Fall Central Sectional Meeting, *Special Session on The Intersection of Number Theory and Combinatorics*, El Paso, TX Sept 2022
- Oregon State University *Number Theory Seminar*, Online. Corvallis, OR Jan 2022

What do fractions, dynamical systems, and geometry have to do with each other?.

- Carolina Dynamics Symposium, *Colloquium*, Greenville, SC Apr 2022
- Pacific Lutheran University, *Colloquium*, Online. Tacoma, WA Mar 2021

Cutting sequences of Lehner and Farey expansions.

- University of Texas at Tyler, *UT Tyler and UTRGV joint Number Theory and Combinatorics Seminar*, Online. Tyler, TX Oct 2021
- Rutgers University, *Number Theory Seminar*, Online. New Brunswick, NJ Sept 2021

α -odd continued fractions.

- One World Numeration Seminar, Online, <https://www.irif.fr/~numeration/OWNS> Jan 2021
- Expanding Dynamics VII—Creative Online Ventures in Dynamics, Online, <https://youtu.be/TuyQA3Zh53M> Dec 2020
- Queen's University, *Dynamics, Geometry, and Groups Seminar*, Kingston, ON, Canada Oct 2018

Changing the rules for continued fraction expansions and their natural extension domains.

- Midwest Dynamical Systems Early Career Conference, Online, <https://youtu.be/b8qYxoJ9dN8> Nov 2020

Lecturer, Ergodic Theory with Applications to Continued Fractions.

- University of North Carolina—Greensboro, *UNCG Summer School in Computational Number Theory*, Online. Greensboro, NC May 2020

Hyperbolic surfaces, cutting sequences, and continued fractions.

- ICERM, *Illustrating Number Theory and Algebra*, Providence, RI, https://icerm.brown.edu/video_archive/?play=2050 Oct 2019

From modular surfaces to continued fractions.

- University of Wisconsin, *Junior Geometry & Topology Conference*, Madison, WI Oct 2019

Coding geodesic flows for various continued fractions.

- Joint Math Meetings, *AMS Special Session: Geometry and Dynamics of Continued Fractions*, Baltimore, MD Jan 2019
- University of Virginia, *Geometry Seminar*, Charlottesville, VA Dec 2018
- University of Maryland, *Student Dynamics Seminar*, College Park, MD Nov 2018
- University of Houston, *Dynamics Seminar*, Houston, TX Nov 2018
- Northwestern University, *Dynamical Systems Seminar*, Evanston, IL May 2018
- Eastern Illinois University, *Mathematics Colloquium*, Charleston, IL Feb 2018

Connecting the upper half plane, geodesic flows, and continued fractions.

- University of Illinois at Urbana-Champaign, *AWM Graduate Student Colloquium*, Urbana, IL Oct 2018

Increasing outreach activities in the Illinois Geometry Lab.

- George Mason University, *Student Research Talks at George Mason University*, Fairfax, VA Sept 2018

Connecting outreach and continued fraction expansions through tessellations.

- o George Mason University, *Topology, Algebraic Geometry, and Dynamics Seminar*, Fairfax, VA Apr 2018

From hyperbolic planes to continued fractions.

- o Rose-Hulman Institute of Technology, *Mathematics Seminar*, Terra Haute, IN Sept 2017

Illinois Geometry Lab+Mathways: Summer Illinois Math Camp.

- o Geometry Labs United, *Presentations from Directors*, Seattle, WA Aug 2017

Other Conference and Seminar Talks

Cutting sequences of Lehner and Farey expansions.

- o University of North Carolina at Charlotte, *Palmetto Number Theory Series*, Charlotte, NC Sept 2022
- o MAA Mathfest, *Great Talks for a General Audience: Coached Presentations by Graduate Students*, Cincinnati, OH Aug 2019
- o University of Maryland, *Workshop on Dynamical Systems and Related Topics*, College Park, MD Apr 2019

Natural extensions and entropy of α -odd continued fractions.

- o Penn State University, *Workshop in Dynamical Systems and Related Topics*, State College, PA Oct 2021

Playing billiards to find continued fractions.

- o *Talk Math with Your Friends*, Online, <https://www.youtube.com/watch?v=A8NynTWRNAM> Jun 2020

Caroline Series' Paper The modular surface and continued fractions.

- o University of Utah, *Online Working Seminar in Ergodic Theory*, Online <https://mathtube.org/lecture/video/caroline-series-modular-surface-and-continued-fractions> Apr 2020

Using geodesics to generate continued fractions.

- o MAA Mathfest, *Great Talks for a General Audience: Coached Presentations by Graduate Students*, Denver, CO Aug 2018
- o MAA Trisectional Meeting, Valparaiso, IN Mar 2018
- o Agnes Scott College, *Carolina Dynamics Symposium*, Decatur, GA Apr 2018

Unfolding Billiard Tables.

- o Summer Illinois Math Camp, *SIM Camp Epsilon (rising 8th and 9th graders)*, Urbana, IL June 2018

Coding continued fractions as cutting sequences.

- o University of Maryland, *Workshop on Dynamical Systems and Related Topics*, College Park, MD Apr 2018

Summer Illinois Math Camp.

- o Joint Math Meetings, *MAA General Contributed Paper Session on Outreach*, San Diego, CA Jan 2018
- o Joint Math Meetings, *MAA General Contributed Paper Session on Outreach*, Atlanta, GA Jan 2017

Outreach

Charlotte Math Club

Jan, Feb 2023 **Volunteer**, Charlotte, NC.

Lead "team time" activity on Farey fractions for the senior group of students. The senior group is any student who is in or has taken geometry.

The Ohio State University

Spring 2020- **Director of Outreach** *Buckeye Aha! Math Moments*, Columbus, OH.

Spring 2022 Initiative that increases the public awareness, appreciation, and enjoyment of mathematics through a variety of activities, periodic events, and long term outreach projects

- o Handle administrative aspects of the program
- o Help with classroom visits
- o Help convert the Summer 2020 camp and Academic Year 2020-2021 activities to online format

University of Illinois at Urbana-Champaign

Spring 2015- **Founder, Director** *Summer Illinois Math Camp*, Urbana, IL.

Fall 2018 Day camps that introduce local middle and high school students to the creative, discovery driven side of mathematics. Each camp is one week and covers two topics outside of the K-12 curriculum

- o Raise funds to make camp free for all participants
- o Recruit and hire graduate student instructors
- o Hire undergraduate assistant instructors
- o Advertise camp, manage camper application process, manage staff training

Fall 2015- **Outreach manager** *Illinois Geometry Lab*, Urbana, IL.

Summer 2018 Undergraduate research lab that runs public engagement and outreach activities

- o Train volunteers and maintain lesson plans for IGL outreach activities
- o Organize class trips to the University of Illinois Department of Mathematics
- o Run hands-on math activities with local K-12 students

- Fall 2014- **Volunteer** *Sonia Math Day for Girls*, Urbana, IL.
- Spring 2019 Day long workshop for local high school girls on mathematical topics not covered in high school
 o Ran hands-on math activities based around a theme *Fall 2014-Fall 2015, Fall 2018, Spring 2019*
 o Organize volunteers *Spring 2016-Fall 2016*
 o Organized activities and materials *Fall 2017*
- Fall 2014-Fall 2015, **Volunteer** *Girls Engaged in Math and Science*, Urbana, IL.
- Spring 2018 Series of 2-hour workshops for local middle school girls to learn about geometric topics not typically covered in school, with an emphasis on creating objects that they can take home
 o Run hands-on math activities

Service

- Apr 2023 **Organizer** *Carolina Dynamical Systems Conference*.
- AY 2020-2021 **Organizer** *Geometry Labs United Seminar*.
- Aug 2018, 2019 **Panelist and mentor** *MAA MathFest Mentoring Workshop for Women*.
- Summer 2015 **Academic Advisor** *Undergraduate Office, University of Illinois Department of Mathematics*.
 Advise income freshmen in mathematics, mathematics and computer science, and actuarial science on their schedule

Research Workshops

- July 2023 **Thermodynamic Formalism for Geodesic Flows** *BIRS, UBC Okanagan campus, Kelowna, BC*.
- Nov 2019 **Illustrating Probability and Dynamics** *ICERM, Providence, RI*.
- Oct 2019 **Illustrating Number Theory and Algebra** *ICERM, Providence, RI*.
- Oct 2018 **Workshop on Dynamics and Moduli Spaces of Translation Surfaces** *Fields Institute, Toronto, ON*.
- Aug 2018 **Summer School on Teichmüller Theory and its Connections to Geometry, Topology and Dynamics** *Fields Institute, Toronto, ON*.
- June 2017 **AMS Mathematics Research Community** *Snowbird, UT*.
 Dynamical Systems: Smooth, Symbolic, and Measurable
- June 2016 **ICERM Illustration Mathematics Workshop** *Providence, RI*.

Professional Development

- AY 2020-21 **Project NeXT** *MAA MathFest and Joint Math Meetings*.
- June 2018 **Career Mentoring Workshop (CaMeW)** *Mt Holyoke, MA*.
- Jan 2015 **SMP Graduate Education Mentoring Workshop** *Joint Math Meetings*.
 2016, 2017