

Kirsten Morris

✉ kmorris1@huskers.unl.edu [in](#) [kirstenmorris](#)

Research Interests

Quantum Error Correction, Graph-based Codes, Iterative Decoding, Algebraic Coding Theory, Applied Discrete Math

Education

- Ph.D. University of Nebraska-Lincoln**, Mathematics August 2025, anticipated
- Graduate Minor in Electrical Engineering
 - Advisors: Dr. Christine Kelley & Dr. Tefjol Pillaha
- M.S. University of Nebraska-Lincoln**, Mathematics August 2022
- M.A. University of Georgia**, Mathematics December 2018
- B.S. Georgia College & State University**, Mathematics May 2016

Positions Held

- Graduate Research and Teaching Assistant** University of Nebraska-Lincoln August 2021-July 2025
- NSF Mathematical Sciences Graduate Internship** Fermi National Accelerator Lab June 2022-August 2022
- Program Analyst (Data)**, AmeriCorps November 2020-July 2021
- Quality Assurance and Data AmeriCorps VISTA**, AmeriCorps Sept 2019-August 2020

Honors and Awards

- Graduate Fellowship for STEM Diversity** National 6-year Fellowship. August 2021-May 2027
- Othmer Scholarship** University of Nebraska-Lincoln. August 2021-Present
- Emeritus Faculty Fellowship** (awarded based on scholarship) University of Nebraska-Lincoln. November 2024
- Steven Haataja Award for Outstanding Exposition by a Graduate Student** University of Nebraska-Lincoln. May 2024
- NSF Research Training Grant** University of Georgia. Aug. 2016-May 2017, Summer 2017-19
- Medallion Award** Georgia College & State University. May 2016
- Outstanding Math Major** Georgia College & State University. May 2016

Publications

6. K. D. Morris, T. Pllaha, C.A. Kelley, “Absorbing Sets in Quantum LDPC Codes,” *Submitted*.
5. K. D. Morris, T. Pllaha, C.A. Kelley, “Effect of redundancy on syndrome-based decoding for QLDPC codes,” to appear in *Proc. of IEEE International Symposium on Topics in Coding*, 2025.
4. O. Ogunkoya, K. Morris, D. Kurkcuglu, “Investigating Parameter Trainability in the SNAP-Displacement Protocol of a Qudit System,” to appear in *Physica Scripta*, 2025.
3. J.F. Chhoa, L. Huang, A. Little, A. Maurais, K. D. Morris, M.D. van der Walt, G. Verma, and Rongrong Wang, “Supervised Dimension Reduction via Local Gradient Elongation,” WiSDM 2023 Springer Proceedings *Advances in Data Science*.
2. K. D. Morris, T. Pllaha, C.A. Kelley, “Analysis of syndrome-based iterative decoder failure of QLDPC codes,” in *Proc. of IEEE International Symposium on Topics in Coding*, Brest, France, 5 pages, September 2023.
[arXiv:2307.14532](#) 
1. G. Buhl, E. Cronk, R. Moreno, K. Morris, D. Pedroza, and J. Ryan. Matrix Completions for Linear Matrix Equations. *Involve, a Journal of Mathematics*, 10(5):781–799, 2017.
[10.2140/involve.2017.10.781](#) 

Select Presentations

Applied Algebra Days

June 2025

University of South Florida

- Presentation (Invited): Analysis and Improvement of QLDPC Decoding Performance, 35 min

2025 AWM Research Symposium

May 2025

University of Wisconsin-Madison

- Presentation (Invited): Quantum Error Correction using QLDPC Codes, 25 minutes

Error-Correcting Codes and Combinatorial Structures Workshop

March 2025

Eindhoven University of Technology, the Netherlands

- Presentation (Invited): Quantum LDPC Code Graphs & Decoding Challenges, 25 minutes

AMS Fall Central Sectional Meeting

September 2024

University of Texas at San Antonio

- Presentation (Invited): Failure inducing sets in Quantum LDPC Codes, 25 minutes

ISIT Quantum Information Knowledge Workshop

July 2024

Athens, Greece

- Poster (Invited): Absorbing Sets in QLDPC Codes

Virginia Tech-Swiss Coding Theory and Cryptography Workshop and Summer School

July 2024

VT Stegar Center, Switzerland

- Presentation: Absorbing Sets and Quantum LDPC Codes (5 minutes)

Department of Mathematics Seminar

April 2024

Creighton University

- Presentation (Invited): The Art of Error: An Introduction to Coding Theory, 50 minutes

AMS Spring Eastern Sectional Meeting

April 2024

Howard University

- Presentation (Invited): Absorbing Sets and Decoding Failures of QLDPC Codes, 20 minutes

Postgraduate International Coding Seminar

March 2024

- Presentation (Invited): Exploring the role of absorbing sets in syndrome decoding, 50 minutes

SIAM Texas-Louisiana Annual Meeting

November 2023

University of Louisiana at Lafayette

- Presentation (Invited): Graphical Characterization of Decoding Failures for Quantum LDPC Codes (25 minutes)

Discrete and Coding Theory Seminar

October 2023

University of Nebraska-Lincoln

- Presentation: Analysis of Graph-Based Iterative Decoders for Quantum Low Density Parity Check Codes (50 minutes)

SIAM Southeastern Atlantic Section Annual Meeting

March 2023

Virginia Tech

- Presentation (Invited): Analysis of syndrome-based iterative decoder failure of QLDPC codes (25 minutes)

Commutative Algebra Reading Seminar

March 2023

University of Nebraska-Lincoln

- Presentation: An Introduction to Algebraic Geometry Codes (30 minutes)

Math for All

February 2023

University of Colorado-Boulder

- Presentation: Absorbing Set Analysis of QLDPC Codes (20 minutes)

Graduate Student Seminar

April 2022

University of Nebraska-Lincoln

August 2022

- Presentation: An Introduction to Quantum Error Correction (50 minutes)
- Presentation: Quantum Computing and the Barren Plateau Phenomenon (50 minutes)
- Presentation: An Introduction to QR Codes (50 minutes)

September 2023

Coding Theory Research Group

Feb 2022

University of Nebraska-Lincoln

- Presentation: An Introduction to Quantum Error Correction (50 minutes)

Graduate Student Summer Conference

July 2018

University of Georgia

July 2019

- Presentation: An Introduction to Topological Data Analysis (15 minutes)
- Fractional Coloring (15 minutes)

Teaching Experience

Instructor of Record

August 2017-May 2019

- Courses taught:

Fall 2022

- Math 100A: Intermediate Algebra (UNL)
- Calculus I (3x) (UGA)
- Precalculus (1x) (UGA)

- Received year long classroom training in mathematics pedagogy, including theories of learning, DEI considerations in the classroom, and active learning

STEM CONNECT Tutor

August 2023-May 2024

University of Nebraska-Lincoln

- STEM CONNECT awards scholarships to and provides curricular and co-curricular support to academically talented, low-income students with interest in careers that require strong skills in mathematics or computer science
- Courses Served:
 - Linear Algebra (3 students)
 - Differential Equations (4 students)

Teaching Assistant

June 2023, January 2025

University of Nebraska-Lincoln

- Math 814T: Linear Algebra for High School Teachers
- ECEN 498: Quantum Programming for STEM

Co-Organizer: Graduate Teaching Assistant Orientation

August 2023

University of Nebraska-Lincoln

- Assisted in creating the schedule, selecting speakers, designing programming, and providing logistical support for the Math Department GTA Orientation

Professional Development**VT-Swiss Coding Theory & Cryptography Summer School and Collaboration Workshop**

July 2024

Virginia Tech Steger Center, Riva San Vitale, Switzerland

- Researched the construction of good quantum MDS codes.

Women in the Science of Data and Machine Learning (WiSDM) Research Workshop

August 2023

Institute for Pure and Applied Mathematics (IPAM)

- Investigated the efficacy of a certain distance metric for prediction of unlabeled data.

Rethinking Number Theory

June 2023

AIM Research Community

- Investigated using group algebras to construct linear codes with desirable properties.

EDGE Summer Program Participant

June 2016

The Enhancing Diversity in Graduate Education (EDGE) Program

Research Experience for Undergraduates (REU)

Summer 2015

California State University Channel Islands

Leadership & Service**Nebraska Conference for Undergraduate Women in Mathematics (NCUWM)**

August 2023-May 2025

Organizing Committee Member and Volunteer

Postgraduate International Coding Theory Seminar (PICS) Co-Organizer

August 2024-Present

Co-organize this online seminar for graduate students and early career postdocs

Graduate Student Assembly

August 2023-May 2025

University of Nebraska-Lincoln

- Vice President of Finance, August 2024-May 2025
- Math Department Representative, August 2023-May 2024

Math Department Graduate Mentoring Program Coordinator

August 2024-May 2025

University of Nebraska-Lincoln

Discrete & Coding Theory (DISCO) Seminar Co-Organizer

August 2023-May 2024

University of Nebraska-Lincoln

Graduate Student Mentor

August 2023-May 2024

University of Nebraska-Lincoln

- Mentor for a first-year math graduate student. Meet weekly and on an as-needed basis to help support a successful transition to graduate school.
- Mentor for an undergraduate student interested in graduate school. Meet quarterly to discuss goals and career plans.

Panelist

Oct 2022

University of Nebraska-Lincoln

March 2022

- Math Club- "Getting into Graduate School: Applications"
- Admitted Student Weekend- "Being a Math Grad Student at UNL"
- Graduate School Workshop- "Getting into Graduate School and Applying for Fellowships"

October 2021

President, Vice-President, Treasurer

March 2014-May 2019

GCSU & University of Georgia
Association for Women in Mathematics Chapters

Mathematics Active Learning Team (MALT) Member

Fall 2018-Spring 2019

University of Georgia

Community Outreach

Girls Inc. Math Instructor

July 2023

University of Nebraska-Lincoln

- Designed and facilitated week-long programming for middle school girls. Led the campers through interactive mathematics activities.

AGAM: Discover Cryptography Workshop Leader

June 2023

University of Nebraska-Lincoln

- Designed and facilitated a workshop for high school students on “The Mathematics of QR Codes” as part of a week long math camp.

EvenQuads: Notable Women in Mathematics-Data Collector

February 2022

Association for Women in Mathematics

- Collected data on five notable mathematicians in pursuit of the assembly of Deck Two of Even-quads, a card game featuring woman mathematicians from the global mathematics community who have made significant contributions to the field

Athens Area Girls Math Team Coach

August 2016-April 2017

STEM Pump

- Led weekly meetings with girls in grades 1-4. Used workbooks, logic games, and puzzles to introduce new mathematical concepts, develop logic and critical thinking skills, and increase the mathematical abilities and confidence of the participants

Technology

SageMath, Python, Matlab