

Christine A. Kelley

Research Interests: Coding theory and applied discrete mathematics: Combinatorial and algebraic design and analysis of codes and algorithms for applications such as storage, distributed storage systems, streaming, and cryptography. Focus on graph-based codes and iterative decoders.

Education

- Ph.D. Mathematics: University of Notre Dame, Indiana, May 2006.
Thesis: *Pseudocodewords, Expander Graphs, and the Algebraic Construction of Low-Density Parity-Check Codes*
Thesis advisor: Professor Joachim Rosenthal.
- M.S. Mathematics: University of Notre Dame, Indiana, May 2003.
- C.A.S.M. Mathematics: Cambridge University, England, June 2001.
Part III of the Mathematical Tripos
Certificate of Advanced Study in Mathematics with Merit.
- B.S. Mathematics: University of Puget Sound, Washington, May 1999.
Budapest Semesters in Mathematics, Hungary, Fall 1998.

Positions Held

- Professor*, Department of Mathematics, University of Nebraska-Lincoln, 08/21 - present.
- Associate Professor*, Department of Mathematics, University of Nebraska-Lincoln, 08/13 - 07/21.
- Harold and Esther Edgerton Assistant Professor*, Department of Mathematics, University of Nebraska-Lincoln, 08/10 - 07/12.
- Assistant Professor*, Department of Mathematics, University of Nebraska-Lincoln, 08/07 - 07/13.
- VIGRE Arnold Ross Assistant Professor*, Department of Mathematics, The Ohio State University, Columbus, Ohio, 01/07 - 06/08. (On leave from UNL in 2007-2008 year)
- Postdoctoral Fellow*, The Fields Institute for Research in the Mathematical Sciences, Toronto, Ontario, 07/06 - 12/06.
- Teaching and Research Assistant*, Department of Mathematics, University of Notre Dame, Indiana, 08/01 - 05/06. The 2004-2005 year was spent at the Institute of Mathematics, University of Zürich, Switzerland.
- Research Assistant*, Los Alamos National Laboratory, New Mexico, 08/99 - 08/00.

Honors

- Roger Wiegand Award. Awarded for contributions to the graduate students in the Department of Mathematics at UNL (nominated by the graduate students). 2021.
- Distinguished Teaching Award (\$1,000), College of Arts & Sciences, UNL, 2012.
- Harold and Esther Edgerton Junior Faculty Award (\$5,000), University of Nebraska-Lincoln. Awarded annually to one faculty member (across all disciplines) in the third year of the tenure track for excellence in research and teaching. 2010.

- Received “Certificate of Recognition for Contributions to Students” by UNL Parents Association in Jan. 2015 for teaching performance in large lecture Calculus II, and in Jan. 2019 for teaching performance in large lecture Calculus II and/or Group Theory.

FUNDING

Current Grants Under Review

- PI Gretchen Matthews, co-PI Christine Kelley. NSF Collaborative Research: Graphs, Codes, Transitivity, and Decoding (\$664,940). Submitted. July 2022-June 2025.
- PI Christine Kelley. Simons Collaboration Grant (\$42,000). Submitted. September 2022-August 2027.

Funded Grants

- PI Christine Kelley, Co-PI Alexander Zupan. NSA Grant: Nebraska Conference for Undergraduate Women in Mathematics, (\$50,000). January 2022 - December 2024.
- PI Christine Kelley, Co-PIs Glenn Ledder and Alex Zupan, NSF Grant for Nebraska Conference for Undergraduate Women in Mathematics, (\$150,000), Jan. 2020 - Dec. 2022.
- PI Christine Kelley, Co-PIs Glenn Ledder and Alex Zupan, NSA Grant for Nebraska Conference for Undergraduate Women in Mathematics, (\$50,000), Dec. 2019 - Dec 2021.
- PI Christine Kelley, Co-PIs Glenn Ledder and Alex Zupan, NSF Grant for Nebraska Conference for Undergraduate Women in Mathematics, (\$50,000), Jan. 2019 - Dec 2019.
- PI Judy Walker, Co-PIs Allan Donsig, Christine Kelley, and Glenn Ledder, NSF Grant for Nebraska Conference for Undergraduate Women in Mathematics, (\$150,000), July 2016 - Dec. 2018.
- PI Christine Kelley, Co-PI Glenn Ledder, NSA Grant for Nebraska Conference for Undergraduate Women in Mathematics 2018. (\$50,000), Dec. 2017- Dec. 2019.
- PI Christine Kelley, Co-PI Glenn Ledder, NSA Grant for Nebraska Conference for Undergraduate Women in Mathematics 2016, (\$20,000), July 2015 - July 2016.
- PI Glenn Ledder, Co-PI Christine Kelley, NSA Grant for Nebraska Conference for Undergraduate Women in Mathematics 2015, (\$20,000), July 2014 - July 2015.
- PI Christine Kelley, Co-PIs Brian Harbourne and Glenn Ledder, NSA Grant for Nebraska Conference for Undergraduate Women in Mathematics 2014. (\$20,000), July 2013 - July 2014.
- PI Christine Kelley, NSA Young Investigator Grant (\$29,930), Spring 2011 - Fall 2013.
- PI Christine Kelley, NSF EPSCoR First Award, (\$20,000), 2009-2010.

Other Funded Support

- Simons Visiting Professorship to Oberwolfach.
Awarded to fund a research visit to Aalto University in Finland, in conjunction with travel to Oberwolfach for a meeting, in March 2019.
- UNL College of Arts and Sciences International Travel Award, 2015, 2019.
- Invited academic researcher to the Institute of Mathematics, University of Zürich, Switzerland, October 24 - November 24, 2011. (Housing and travel provided by the University of Zürich for myself and graduate student Haymaker.)

- Invited academic researcher to the Swiss Federal Institute of Technology Lausanne (EPFL), Switzerland, August 1 - September 30, 2011. Participated in the “Combinatorial, Algebraic and Algorithmic Aspects of Coding Theory” thematic program at the Centre Interfacultaire Bernoulli. (Awarded 10,000 CHF to participate in the program.)
- Research Development Fellow, University of Nebraska-Lincoln, 2010-2011
- Mathematical Association of America Project NExT Fellow, 2008-2009.
- Association for Women in Mathematics travel award, 2008.
- IEEE Information Theory Workshop travel grant, 2007.
- Two Institute of Mathematics of Applications travel grants, 2007.
- IEEE International Symposium on Information Theory travel grants, 2004 and 2006.
- Center for Applied Mathematics Graduate Fellowship, University of Notre Dame, 2003-2004. Competitive award for students in math, science, and engineering.

PUBLICATIONS

I. Books and Chapters

3. C.A. Kelley, Invited book chapter on “Codes over Graphs” to be part of *A Concise Encyclopedia of Coding Theory* for CRC Press. 44 pages. Editors: W. Cary Huffman, Jon-Lark Kim, and Patrick Solé. March 2021.
2. C. A. Kelley, G. Ledder, Invited book chapter on “Building a Community: The Nebraska Conference for Undergraduate Women in Mathematics”, Edited by Della Dumbaugh and Deanna Haunsperger. 2021.
1. Nathan Wakefield, Christine Kelley, Marla Williams, Michelle Haver, Lawrence Seminario-Romero, Robert Huben, Aurora Marks, Stephanie Pahl, *Coordinated Calculus*, (2019). Based upon Active Calculus by Matthew Boelkins. Open Educational Resource. Available at <https://mathbooks.unl.edu/Calculus>.

II. Journal and Conference Papers

The following publications are all refereed, with the exception of [5] and [17]. Papers [5], [17], [22], and [23] were invited.

Note on the order of authors: All papers have the authors ordered alphabetically except for [6], [11], [18], [27], [30], [33], [35], [37], [38] where advisor(s) are listed last and/or authors are listed junior to senior, papers [8], [9], [14] where the intended speaker was listed first, and papers [29], [31] and [1]-[3] that are listed according to author contribution.

39. K. Benson, J. Bolkema, K. Haymaker, C.A. Kelley, S. Kingan, G. Matthews, and E. Nastase, Design of Measurement Matrices for Compressed Sensing. *Springer Association for Women in Mathematics Series*. 2021.
38. E. McMillon, A. Beemer, C. A. Kelley, Extremal Absorbing Sets in Low-Density Parity-Check Codes. 19 pages. *Advances in Mathematics of Communications*. 2020
37. E. McMillon, A. Beemer, C.A. Kelley, Analysis of Absorbing Sets using Cosets and Syndromes. Proceedings of the *IEEE Int'l Symposium on Information Theory*, June 2020.
36. A. Beemer, K. Haymaker, C.A. Kelley, Absorbing Sets of Codes from Finite Geometries. *Cryptography and Communications*, Vol. 11, pp. 1115-1131, January 2019.
35. C. Mayer, K. Haymaker, C.A. Kelley, Coding for Multilevel and Partial Erasure Channels. *Advances in Mathematics of Communications*. Feb. 2018, 12 (1), pp. 151-168.

34. A. Beemer, S. Habib, C.A. Kelley, J. Kliewer, A General Algebraic Approach to Optimizing SC-LDPC codes. *Proc. of the 55th Annual Allerton Conference on Communication, Control, and Computing*, 8 pages. Monticello, IL, October 2017.
33. A. Beemer, C. Mayer, C.A. Kelley, Erasure Correction and Locality of Hypergraph Codes. *Lecture Notes in Computer Science 10495*, Springer. pp 21-29. August 2017.
32. A. Beemer, C.A. Kelley. Multidimensional Decoding Networks for Trapping Set Analysis. *Lecture Notes in Computer Science 10495*, Springer. pp 11-20. August 2017.
31. Z. Sakkaff, M. Pieroban, J. L. Catlett, N. Buan, M. Cashman, M. Cohen, and C.A. Kelley. End-to-end Molecular Communication Channels in Cell Metabolism: an Information Theoretic Study, *Proc. of the ACM Int'l Conference on Nanoscale Computing and Communication, NanoCom 2017*. vol. 21, pp 1-6. (ACM Nanocom Best Paper Award 2017).
30. C. Mayer, C.A. Kelley. LT Codes for Partial Erasure Channels. In *Proc. of IEEE International Symposium on Information Theory*, Aachen, Germany, 5 pages, June 2017.
29. M. Cashman, J. L. Catlett, M. B. Cohen, N. R. Buan, Z. Sakkaff, M. Pierobon, and C.A. Kelley, Sampling and Inference in Configurable Biological Systems: A Software Engineering Perspective. In *Proc. of Int'l Workshop on Software Engineering for Science*. 8 pages, 2017.
28. J. Bolkema, H. Gluesing-Luerssen, C.A. Kelley, K. Lauter, B. Malmskog, and J. Rosenthal, *Variants of the McEliece Cryptosystem*, In: Howe E., Lauter K., Walker J. (eds) Algebraic Geometry for Coding Theory and Cryptography. Association for Women in Mathematics Series, vol. 9, pp. 129-150, 2017.
27. A. Beemer, C.A. Kelley. Avoiding trapping sets of SC-LDPC codes with respect to the windowed-decoder. In *Proceedings of the IEEE International Symposium on Information Theory and its Applications*, Monterey, CA, pp. 206-210, October 2016.
26. J. Cummings, C. A. Kelley. On the independence and domination numbers of replacement product graphs. *Involve: A Journal of Mathematics*. Vol. 9, No. 2, pp181-194, 2016. (Journal showcases work involving undergraduate research students)
25. K. Haymaker, C. A. Kelley. Structured bit-interleaved LDPC codes for MLC flash memory. *IEEE Journal on Selected Areas of Communications (JSAC)*, Special Issue on Communication Methodologies for the Next-Generation Storage Systems, vol. 32, no. 5, pp. 870-879, May 2014.
24. C. A. Kelley. Algebraic design and implementation of protograph codes using non-commuting permutation matrices. *IEEE Transactions on Communications*, pp. 910-918, March 2013.
23. K. Haymaker, C. A. Kelley. Covering codes for multi-level flash memories. *Proceedings of the IEEE Asilomar Conference on Signals, Systems, and Computers*. Invited paper for a Special Session on Coding for Next-Generation Storage. Nov. 2012, pp. 942-949.
22. K. Haymaker, C. A. Kelley. Geometric WOM codes and coding strategies for multi-level flash memories. Special Issue on Coding Theory and Applications, *Designs, Codes, and Cryptography*, 70, pp. 91-104 Springer, May 2012.
21. K. Haymaker, C. A. Kelley. Coding strategies for reliable storage in multi-level flash memories. *Proceedings of the International Castle Meeting on Coding Theory and Applications (3ICMCTA)*, Cardona, Spain, 7 pages, September 2011.
20. C. A. Kelley, J. Kliewer. Algebraic constructions of graph-based nested codes from protographs. *Proceedings of the IEEE International Symposium on Information Theory*, Austin, TX, pp. 829-833, June 2010.
19. C. A. Kelley. Minimum distance and pseudodistance lower bounds for generalized LDPC codes. *Int'l Journal of Information and Coding Theory*, Special Issue on Algebraic and Combinatorial Coding Theory: in Honor of Vera Pless. pp. 313-333. Spring 2010.
18. C. Kelley, D. Sridhara, J. Rosenthal. Zig-zag and replacement product graphs and LDPC

- codes. *Advances in Mathematics of Communications*, 2(4): pp. 347-372. November 2008.
17. C. A. Kelley, On codes designed via algebraic lifts of graphs, *Proceedings of the 46th Annual Allerton Conference on Communication, Control, and Computing*, pp. 1254-1261, Monticello, IL, September 2008.
 16. C. Kelley, J.L. Walker. LDPC codes from voltage graphs. *Proceedings of International Symposium on Information Theory*, pp. 792-796, Toronto, Canada, July 2008.
 15. C. Kelley, D. Sridhara. Pseudocodewords of Tanner Graphs. *IEEE Transactions on Information Theory*, vol. 53, no. 11, pp. 4013-4038, November 2007.
 14. J. Rosenthal, C. Kelley, D. Sridhara. Systems theoretic questions in coding theory. *Proc. in Applied Mathematics and Mechanics*, ICIAM, 3 pages, Zürich, Switzerland, Oct. 2007.
 13. C. Kelley, D. Sridhara. Eigenvalue bounds on the pseudocodeword weights of expander codes. *Advances in Mathematics of Communications*, vol. 1, no. 3, pp. 287-306, August 2007.
 12. C. Kelley, D. Sridhara. On the pseudocodeword weight and parity-check matrix redundancy of linear codes. *Proceedings of IEEE Information Theory Workshop*, pp. 1-6, Lake Tahoe, California, September 2007.
 11. C. Kelley, D. Sridhara, J. Rosenthal. Tree-based construction of LDPC codes having good pseudocodeword weights. *IEEE Transactions on Information Theory*, vol. 53, no. 4, pp. 1460-1478, April 2007.
 10. C. Kelley, D. Sridhara. Pseudocodeword weights for non-binary LDPC codes. *Proceedings of IEEE International Symposium on Information Theory*, pp. 1379-1383, Seattle, Washington, July 2006.
 9. D. Sridhara, C. Kelley. LDPC coding for the three-terminal erasure relay channel. *Proceedings of IEEE International Symposium on Information Theory*, pp. 1229-1233, Seattle, Washington, July 2006.
 8. D. Sridhara, C. Kelley, J. Rosenthal. Tree-based construction of LDPC codes. *Proceedings of IEEE International Symposium on Information Theory*, pp. 845-849, Adelaide, Australia, September 2005.
 7. C. Kelley, D. Sridhara. Structure of pseudocodewords in Tanner graphs. *Proceedings of IEEE International Symposium on Information Theory and Applications*, 6 pages, Parma, Italy, October 2004.
 6. C. Kelley, D. Sridhara, J. Xu, J. Rosenthal. Pseudocodeword weights and stopping sets. *Proc. of IEEE Int'l Symposium on Information Theory*, p.150, Chicago, June 2004.
 5. C. Kelley, J. Rosenthal, D. Sridhara. Some new algebraic constructions of codes from graphs which are good expanders. *Proceedings of Allerton Conference on Communication, Control, and Computing*, pp.1280-1289, Monticello, IL, October 2003.
 4. E. Byrne, C. Kelley, C. Monico, J. Rosenthal. Non-linear codes for belief propagation. *Proceedings of IEEE International Symposium on Information Theory*, p.43, Japan, June 2003.
 3. D. Pickard, L. Lovatt, M. Novelli, P. Ripley, C. Kelley, I. Bigio, S. Brown. Diagnosis of dysplasia in Barrett's oesophagus with in-situ elastic-scattering spectroscopy. *Optical Biopsy and Tissue Optics*, SPIE vol. 4161, November 2000.
 2. P. Ripley, I. Rose, C. Kelley, I. Bigio, D. Pickard, G. Briggs, L. Lovatt, S. Brown. A comparison of artificial intelligence techniques for spectral classification in the diagnosis of human pathologies based upon optical biopsy. *Optical Society of America Biomedical Topical Meeting*, Miami, FL, April 2000.
 1. I. Bigio, S. Brown, G. Briggs, C. Kelley, S. Lakhani, D. Pickard, P. Ripley, I. Rose, C. Saunders. Diagnosis of breast cancer using elastic-scattering spectroscopy: preliminary clinical results. *Journal of Biomedical Optics*, Opt.5 Vol.5, April 2000.

III. Papers under Review

- (i) M. Martinez, C. A. Kelley, Properties of Quasi-dyadic parity check codes. Submitted.
- (ii) E. McMillon, C. A. Kelley, Cycle-free Windows in SC-LDPC Codes. Submitted.
- (iii) J. Catlett, S. Carr, M. Cashman, M. Smith, M. Walter, Z. Sakkaff, M. Cohen, M. Pieroban, C. Kelley, and N. Buan, “Metabolic syntrophy between human symbionts *Bacteroides* and *Methanobrevibacter*.” Submitted.

Organizer of AMS Special Sessions

- Special Session on Storage, Coding, and Applications (with Swanand Kadhe and Gretchen Matthews), AMS Sectional Meeting, Omaha, October 2021.
- Special Session on Graph Theory and Applications (with Katherine Benson, JD Nir, and Esmeralda Nastase), AMS Sectional Meeting, Cincinnati, April 2021.
- Special Session on Coding Theory and Applications (with Allison Beemer, Ian Blake, and Felice Manganiello), Joint Math Meeting, Denver, CO January 2020.
- Special Session on Coding Theory and Applications (with Heide Gluesing-Luerssen and Steve Szabo), AMS Sectional Meeting, Columbus, OH March 2018.
- Special Session on Coding Theory for Modern Applications (with Iwan Duursma and Gretchen Matthews), Joint Math Meeting, Atlanta, GA, January 2017.
- Special Session on Advances in Coding Theory (with Judy Walker), AMS Sectional Meeting, Lincoln, NE, October 2011.

Past and Upcoming Talks (All talks are invited unless indicated as contributed)

- 53. AMS Special Session on Programs that Support Student Research, “Nebraska Conference for Undergraduate Women in Mathematics”, (20 min) AMS Fall Central Sectional Meeting, Omaha (Virtual). October 2021.
- 52. East Tennessee State and U. Puerto Rico REU, “Coding on Partial Erasure Channels”, (50 min), July 2021.
- 51. Colloquium, “Graph-based codes and Iterative Decoding” (50 min), Metropolitan State University, Denver, September 2019.
- 50. “Communicating over partial erasure channels” (50 min.), Algebra, Number Theory, and Applications Seminar, Aalto University, Finland, March 2019.
- 49. AMS Special session on Algebraic Coding Theory, “Relay Channels with Partial Erasures” (20 min.), Columbus, Ohio, March 2018.
- 48. Mathematical Congress of the Americas, Special Session on Theory and Applications of Finite Fields, “Multilevel Coding and Multistage Decoding on Partial Erasure Channels”, (20 min.), Montreal, Canada, July 2017.
- 47. Discrete Mathematics Seminar, University of Colorado, Denver, “An Introduction to LT Codes and Recent Directions”, (50 min.), Denver, CO, April 2016.
- 46. Special Session on Finite Fields, 47th Southeastern International Conference on Combinatorics, Graph Theory, and Computing, “Edge Spreading in Spatially Coupled LDPC codes” (20 min.), Boca Raton, FL, March 2016.
- 45. AMS Special Session on Advances in Coding Theory, AMS sectional meeting, “On the erasure correcting capability of hypergraph codes” (20 min.), Chicago, IL, Oct. 2015.
- 44. Combinatorics and Computer Algebra Conference (CoCoA), “Graph-based codes for distributed storage systems”, (25 min.) Fort Collins, CO, July 2015. (Contributed)
- 43. AMS Special Session on Advances in Coding Theory, JMM national meeting, “Designing

- error correcting codes for flash memories” (45 min.), San Antonio, TX, Jan. 2015.
42. San Jose State University, Department of Mathematics Colloquium, “Designing error-correcting codes from graphs” (50 min.), San Jose, CA February 2012.
 41. University of Basel, Coding Theory Seminar, “Designing codes from lifts of graphs” (50 min.), Switzerland, September 2011.
 40. Texas Tech University, Department of Mathematics Colloquium, “Designing codes algebraically from lifts of graphs” (50 min.), Lubbock, TX, March 2011.
 39. Combinatorial Potlatch Plenary Speaker, Western Washington University, December 2010. “Codes designed from algebraic lifts of graphs” (50 min.). The Potlatch is a one-day conference that has three talks only (all invited), and is designed to encourage interaction among researchers on combinatorics topics.
 38. Plenary speaker at Math on the Northern Plains Conference for Undergraduates, “Codes on graphs and the quest for good codes”, (50 min.), Morningside College, Iowa, April 2010.
 37. AMS Special session on Advances in Algebraic Coding Theory, AMS sectional meeting, “Lower bounds on the minimum distance and pseudodistance of generalized LDPC codes using graph connectivity” (20 min.), Lexington, KY, March 2010.
 36. Keynote speaker at Math Days for Women, University of South Dakota, “Fun in Cryptography: a look at how to send and protect secret messages” (75 min.), Sept. 24, 2009.
 35. AMS Special session on Recent Trends in Coding Theory, “Ordinary and permutation voltage graph based codes” (20 min.), AMS Joint Meetings, Washington, D.C., January 2009.
 34. University of Nebraska-Lincoln, Department of Mathematics Colloquium (50 min.), “Algebraic constructions of codes using voltage graphs”, Dec. 2008. (Contributed)
 33. AMS Special session on Codes over Rings, “Recent results on codes designed from permutations” (25 min.), AMS sectional meeting, Kalamazoo, MI, October 2008.
 32. Mini-conference on Discrete Mathematics, Clemson University, “Codes designed via algebraic lifts of graphs” (50 min.), Clemson, SC, October 2008.
 31. Special session on Emerging Applications of Coding Theory, Allerton Conference on Communication, Control, and Computing, “On codes designed via algebraic lifts of graphs” (25 min.), Illinois, September 2008.
 30. IEEE International Symposium on Information Theory (20 min.), “A voltage graph framework for LDPC codes”, Toronto, Canada, July 2008. (Contributed)
 29. University of Zürich, Applied Algebra Seminar, “A voltage graph framework for LDPC codes” (50 min.), Zürich, Switzerland, May 2008.
 28. Ohio University, Department of Mathematics Colloquium, “A voltage graph framework for LDPC codes” (50 min.), Athens, OH, April 2008.
 27. University of Kentucky, Algebra and Geometry Seminar, “An introduction to Low-Density Parity-Check codes” (50 min.), Lexington, KY, April 2008.
 26. AMS Special Session on Algebraic Coding Theory, “Pseudocodeword weights and the parity-check matrix redundancy of linear codes” (20 min.), Bloomington, IN, April 2008.
 25. Mathematisches Forschungsinstitut Oberwolfach, “A voltage assignment approach to the analysis of LDPC codes” (30 min.), Coding Theory Workshop, Germany, December 2007.
 24. IEEE Information Theory Workshop, “On the pseudocodeword weight and parity-check matrix redundancy of linear codes.” (poster), Lake Tahoe, CA, Sept. 2007. (Contributed)
 23. University of Puget Sound, Science Colloquium, “Codes on graphs and the quest for good codes” (50 min.), Tacoma, WA, February 2007.
 22. University of Nebraska - Lincoln, Mathematics Department Colloquium, “Pseudocodeword-based iterative decoding analysis of LDPC codes” (50 min.), January 2007.
 21. AMS Special Session on Coding Theory and Its Applications, “Pseudocodeword weights of codes from expander graphs” (20 min.), AMS Joint Meetings, New Orleans, January 2007.
 20. Workshop on Coding and Systems, “Pseudocodeword weights of expander codes” (30 min.), Zürich, Switzerland, December 2006.

19. University of Zürich, Applied Algebra Seminar, “Pseudocodeword weights of non-binary LDPC codes” (50 min.), December 2006.
18. IEEE International Symposium on Information Theory (20 min.), “Pseudocodeword weights of non-binary LDPC codes”, Seattle, Washington, July 2006. (Contributed)
17. Occidental College, Mathematics Colloquium, “Codes on Graphs” (50 min.), March 2006.
16. University of Texas at Dallas, Mathematics Department Colloquium, “Pseudocodewords and Iterative Decoding of LDPC Codes” (50 min.), February 2006.
15. East Tennessee State University, Mathematics Department Colloquium, “Pseudocodewords and Iterative Decoding of LDPC Codes” (50 min.), February 2006.
14. Virginia Commonwealth University, Mathematics Department Colloquium, “Pseudocodewords and Iterative Decoding of LDPC Codes” (50 min.), February 2006.
13. University of North Florida, Mathematics Department Colloquium, “Pseudocodewords and Iterative Decoding of LDPC Codes” (50 min.), February 2006.
12. University of Dayton, Mathematics Department Colloquium, “Pseudocodewords and Iterative Decoding of LDPC Codes” (50 min.), February 2006.
11. Beloit College, Mathematics Department Colloquium, “Codes on Graphs and Iterative Decoding” (50 min.), February 2006.
10. Buffalo State College, Mathematics Department Colloquium, “Pseudocodewords and Iterative Decoding of LDPC Codes” (50 min.), February 2006.
9. Acadia University, Nova Scotia, Mathematics Department Colloquium, “Pseudocodewords and Iterative Decoding of LDPC Codes” (50 min.), January 2006.
8. North Dakota State University, Mathematics Department Colloquium, “Pseudocodewords and Iterative Decoding of LDPC Codes” (50 min.), January 2006.
7. University of Wyoming, Mathematics Department Colloquium, “A Survey of Coding Theory” (50 min.), November 2005.
6. University of Wyoming, Algebra/Combinatorics/Number Theory Seminar, “Construction of LDPC codes having good pseudocodeword weights” (50 min.), October 2005.
5. University of Notre Dame, Center for Applied Mathematics Colloquium, “Construction of LDPC codes with relatively few low-weight pseudocodewords” (50 min.), September 2005.
4. Swiss Federal Institute of Technology (ETH), Advanced Topics in Discrete Mathematics Seminar, “0/1 Polytopes and the Hirsch Conjecture” (50 min.), Zürich, Switzerland, Nov. 2004.
3. International Symposium on Information Theory and Applications (20 min.), “Structure of Pseudocodewords in Tanner Graphs”, Parma, Italy, Oct. 2004. (Contributed)
2. IEEE International Symposium on Information Theory, “Pseudocodeword Weights and Stopping Sets” (20 min.), Chicago, June 2004. (Contributed)
1. San Diego State University, Math/Communications Colloquium, “Pseudocodewords and Iterative Decoding on Tanner Graphs” (50 min.), May 2004.

Invited Panelist

- *How to Apply for Jobs in Academia and Industry after Your PhD.* Organized by Stefanie Wang on behalf of MAA Committee on Grad Students. Mathfest, August 2021.
- *Recruiting and Retaining Women in STEM*, Maria Mitchell Women in Science Symposium, Co-organized by Dr. Regina Jorgenson, Director of Astronomy at Loines Observatory. Wellesley MA, Oct. 2018.
- *From Calculus to a Bachelor’s Degree: Encouraging and Developing Undergraduate Mathematics Majors*, Joint Mathematics Meeting, Organized by Jenna Carpenter as part of the Joint Committee on Women Program, Atlanta, GA. January 2017.
- *Undergraduate Research: from Funding to Publishing.* Joint Mathematics Meeting, Organized by Project NExT Fellows, San Antonio, TX. January 2015.

- *Starting Outreach Programs.* Joint Mathematics Meeting, Organized by Project NExT Fellows, San Antonio, TX. January 2015.

Other Conference Participation (Conferences with limited, invitation-only attendance are indicated by †.)

- IEEE International Symposium on Information Theory, July 2021. (Virtual).
- IEEE International Symposium on Information Theory, June 2020. (Virtual) (was co-author on work presented).
- Joint Mathematics Meeting, Denver 2020. (was co-author on work presented).
- Co-led research team (with Gretchen Matthews) at the IMA Women in Graph Theory and Applications Workshop on “Data Storage, Protection, and Accessibility”, August 19-23, 2019.
- †Mathematisches Forschungsinstitut Oberwolfach, Contemporary Coding Theory, March 2019.
- Allerton Conference on Communication, Control, and Computing, Illinois, October 2017. (was co-author on work presented).
- 5th International Castle Meeting on Coding Theory and Applications (5ICMCTA), Vihula, Estonia, August 2017. (was co-author on two works presented).
- IEEE International Symposium on Information Theory (ISIT), Aachen, Germany, June 2017. (was co-author on work presented).
- PIC Math Workshop on Data Analytics, Brigham Young University, Provo, UT, June 2017.
- IEEE International Symposium on Information Theory and its Applications (ISITA), Monterey, CA, October 2016. (Was co-author on two works presented).
- † Dagstuhl Seminar on Coding Theory in the time of Big Data, Leibniz-Zentrum für Informatik, Saarbrücken, Germany, August 2016.
- † Institute for Pure and Applied Mathematics, Algebraic Geometry for Coding Theory and Cryptography Workshop, February 2016. Researchers were organized into six teams of roughly six people to work on new problems.
- † Banff International Research Station, Mathematical Coding Theory in Multimedia Streaming. October 2015.
- Allerton Conference on Communication, Control, and Computing, Illinois, September 2015.
- IEEE Asilomar Conference on Signals, Systems, and Computers, Special Session on Coding for Next-Generation Storage, Nov 2012. (Was co-author on work presented)
- † Dagstuhl Seminar on Coding Theory, Leibniz-Zentrum für Informatik, Saarbrücken, Germany, November 2011.
- AMS Central Section Meeting, Lincoln, Nebraska, October 2011. (Was co-author on work presented)
- International Castle Meeting on Coding Theory and Applications (3ICMCTA), Cardona, Spain, September 2011. (Was co-author on work presented)
- Workshop on Algebraic Coding Theory, EPFL, Lausanne, Switzerland, September 2011. (Was co-author on work presented)
- Allerton Conference on Communication, Control, and Computing, Illinois, September 2009.
- MAA Mathfest, Portland, OR, August 2009.
- MAA Mathfest, Madison, WI, August 2008.
- Workshop on the Mathematics of DNA, its structure and interactions, Institute for Mathematics and its Applications, September 2007.
- Tutorial on the Mathematics of Nucleic Acids, Institute for Mathematics and its Applications, September 2007.

- Midwestern Graph Theory Conference (MIGHTY), Wright State, Dayton, Ohio, May 2007.
- Workshop on Complexity, Coding and Communications, Institute for Mathematics and its Applications, April 2007.
- Cryptography: Underlying Mathematics, Provability and Foundations, The Fields Institute, Toronto, November 2006.
- Computational Challenges Arising in Algorithmic Number Theory and Cryptography, The Fields Institute, Toronto, October 2006.
- Quantum Cryptography and Computing Workshop, The Fields Institute, Toronto, October 2006.
- The 10th Workshop on Elliptic Curve Cryptography, The Fields Institute, Toronto, September 2006.
- AMS Midwest Sectional Meeting, Notre Dame, Indiana, April 2006.
- AMS/MAA Joint Mathematics Meetings, San Antonio, Texas, January 2006.
- Allerton Conference on Communication, Control, and Computing, Illinois, September 2005.
- Coding Theory & Quantum Computation, University of Virginia, Charlottesville, May 2003.
- Allerton Conference on Communication, Control, and Computing, Monticello, Illinois, October 2002.
- IEEE International Symposium Information Theory, Lausanne, Switzerland, July 2002.

UNL Seminar Talks and Panels (each 50 minutes unless otherwise noted)

Discrete Math Seminar

- “Tree-based bounds for LDPC codes”, October 2018.
- “Rediscovering Reed Muller Codes”, February 2018
- “Fountain codes”, November 2015.
- “Coding for the wiretap channel”, Feb. 2010.
- “Hash functions and Cayley graphs”, Sept. 2009.
- “The spectral gap and expander graphs”, Feb. 2009.
- “0/1 polytopes and the Hirsch conjecture”, Sept. 2008.

Landscape Seminar (aimed at early graduate students)

- “Research directions in coding theory”, March 2012.
- “Some research directions in coding theory”, April 2011
- “Coding theory overview & new research directions”, April 2009.

Panelist

- *Aspects of the Application Process*. Organized by Tom Marley for graduating students in the Job Search Seminar. November 2017.
- *Working in industry/government*. Organized by Susan Hermiller for the graduate students professional development seminar.
- *On teaching teachers*. Organized by Michelle Homp for the Nebraska Math and Science Summer Institute (NMSSI) Workshop. April 2013.
- *On teaching*. Organized by Mark Walker for the math graduate teaching seminar at UNL. November 2010.
- *Choosing and applying to graduate school*. Organized by the UNL Math Club and Women in Math Network. October, 2010.
- *How to survive graduate school*. Organized by the UNL math graduate students for the incoming graduate students. August, 2009.

- *Being a new faculty member.* Organized by Sylvia Wiegand for the math graduate students at UNL. April 2009.

Professional Society Memberships

American Mathematical Society (AMS)
 Mathematical Association of America (MAA)
 Association for Women in Mathematics (AWM)
 Society for Industrial and Applied Mathematics (SIAM), Discrete Mathematics
 IEEE Information Theory Society
 IEEE Communications Society

TEACHING AND EDUCATION ACTIVITIES

Courses Taught

University of Nebraska-Lincoln, (All courses are 3 credits unless otherwise noted)

- Math 958: *Topics in Information Theory*, Fall 2017.
- Math 958: *Topics in Coding Theory*, Spring 2009, Fall 2012, Fall 2020. (different topics)
- Math 852: *Discrete Math II*, Spring 2011.
- Math 850: *Discrete Math I*, Fall 2010, Fall 2014, Fall 2020.
- Math 812T: *Geometry for Geometry Teachers*, Spring 2013; Online version Spring 2015, Spring 2021. Course for in-service and pre-service high school teachers.
- Math 806T: *Number Theory and Cryptology for Teachers*, Online version; Spring 2016. Summer 2021. Course for in-service high school teachers.
- Math 805T: *Discrete Mathematics for Middle Level Teachers*, Online version; Spring 2018, Spring 2020, Spring 2022. Course for in-service middle school teachers.
- Math 804T: *Experimentation, Conjecture, and Reasoning*, Summer 2012. Course for in-service middle school teachers.
- Math 450: *Combinatorics*, Fall 2015. Fall 2021.
- Math 450: *Combinatorics and Graph Theory*, Spring 2010, 2012.
- Math 417: *Group Theory*, Fall 2019.
- Math 408: *Mathematics for Secondary Teachers II*, Fall 2018.
- Math 301: *Geometry Matters*, Fall 2009, 2012; Spring 2011, 2012. Course for pre-service elementary education teachers.
- Math 203: *Contemporary Mathematics*, Fall 2008.
- Math 107: *Calculus II (Large Lecture)*, Fall 2014, Fall 2015, Fall 2017, Fall 2018, Fall 2019, Fall 2021 (11 Large Sections in total; 4 credits each).

The Ohio State University

- *Probability*, 3 credits; Fall 2007.
- *Combinatorics and Graph Theory*, 5 credits; Winter 2008, 2007.
- *Algebra and Trigonometry*, 2 credits; Large lecture (180 students); Fall 2007.

University of Notre Dame

- *Calculus II for Pre-med*, teaching assistant; Spring 2003.
- *Calculus I for Engineers*, teaching assistant; Fall 2002.

- *Calculus I for Pre-med*, teaching assistant; Fall 2002.
- *Finite Mathematics*, 3 credits; Fall 2005, Summer 2003.

University of Zürich, Switzerland:

- *Coding Theory*, teaching assistant; Spring 2005.

Formal Reading Courses and Independent Study Supervision

- UNL Graduate reading courses (Math 896)
 - *Quantum error-correcting codes*. Weekly reading course and Seminar. Co-led by Tefjol Pllaha. Spring 2022. Four students.
 - *Coding Theory*, Winter term 2020-2021; Four students.
 - *Foundations of Discrete Mathematics*, Fall 2020; One student.
 - *Information Theory*, Fall 2008, Fall 2019; Two students.
 - *Introduction to Covering Codes*, Summer 2011; One student.
 - *Introduction to Coding Theory*, Summer 2009; One student.
- The Ohio State University Independent Study
 - *Graph Theory*, Winter 2008; One student
 - *Discrete Mathematical Models*, Summer 2007; One student.

Other Teaching Experience

- Teaching Assistant for *Academic Challenge Program*, a math and science enrichment program for high school students. University of Puget Sound, WA, Summer 1999.
- *Math and ESL (English as a Second Language) Tutor*, Tacoma, WA, 1997-1999.

Curriculum Development

- I oversaw the development of the Calc II material of the OER text in Summer 2019. This involved organizing the topics to develop and add, and supervising the graduate students who contributed to those sections.
- I have developed guided notes for the following courses: Math 107, Math 203, Math 417, Math 450, Math 850, Math 852, and Math 958. These consist of daily handouts for the students to allow them to listen more and write less during class time. Consequently, more time is spent discussing concepts and working out examples during class, either as a class or in small groups. I also have complete notes typed for most of the above courses, and have provided my notes to others upon request.
- I designed all of my topics courses (Math 958) and wrote and provided complete notes.
 - *Topics in Coding Theory 2020*: Classical coding (Reed-Solomon, Reed-Muller), Graph-based codes, fountain codes, iterative decoding algorithms and analysis.
 - *Topics in Information Theory 2017*: entropy, mutual information, source coding, channel coding, rate distortion theory. Special Topics included: wiretap channel, broadcast channel, multi-access channel, private information retrieval. I have provided these notes to colleagues (nationally and internationally) upon request.
 - *Topics in Coding Theory 2012*: Classical coding (Reed-Solomon, BCH, Golay, Reed-Muller and cyclic codes), covering codes, graph-based codes and iterative decoding, Justesen's concatenated codes.
 - *Topics in Coding Theory 2009*: Classical coding, graph-based codes and iterative decoding, array codes, insertion-deletion codes, expander codes.

- Online courses:
 - I taught the first online version of 806T which entailed converting and developing the materials into a suitable online format and delivery.
 - I incorporated partition numbers, Ferrers diagrams, circular permutations and Stirling numbers, the twelvefold way, and more applications of graph theory into 805T.

Postdoctoral Fellows

- Tefjol Pllaha, since August 2021.

Ph.D. Students

7. Kirsten Morris, expected graduation May 2026.
 - Received a Graduate Fellowship for STEM Diversity.
 - Plans to work on quantum error correction.
6. Meraiah Martinez, expected graduation May 2025.
 - Working on reproducible codes and code-based cryptography.
5. Daniel Welchons, expected graduation May 2025.
 - Working on iterative list decoding of graph-based codes.
4. Emily McMillon, expected graduation May 2022
 - Supervising her dissertation on *Theory and Design of Graph-Based Codes for Improved Iterative and Window Decoding*.
 - Received the G.C. Young and W. H. Young Research Award (\$1000) in Nov. 2020.
 - Received a Linda Bors Fellowship (\$1000) for scholarship in October 2020.
 - Partially supported by a NASA Nebraska space grant fellowship, 2020-2021.
 - Has applied for an AAUW American Dissertation Fellowship, an Amelia Earhart Fellowship, and a Ford Foundation Fellowship for 2021-2022.
3. Allison Beemer, Ph.D. May 2018.
 - Currently a tenure-track assistant professor in the Department of Mathematics at the University of Wisconsin - Eau Claire.
 - Supervised her doctoral dissertation on *Design and Analysis of Graph-Based Codes using Algebraic Lifts and Decoding Networks*.
 - Received the G.C. Young and W. H. Young Research Award (\$1000) in Nov. 2016.
2. Carolyn Mayer, Ph.D. May 2018.
 - Currently a postdoctoral fellow in the Discrete Math and Optimization group at Sandia National Labs, Albuquerque.
 - Supervised her doctoral dissertation on *On Coding for Partial Erasure Channels*.
 - Received the Bill Leavitt Emeritus Faculty Research Award (\$750) in Nov. 2016.
1. Kathryn Haymaker, Ph.D. May 2014.
 - Currently a tenured associate professor at Villanova University.
 - Supervised her doctoral dissertation on *Algebraic and combinatorial coding techniques for flash memories*.

- Katie was supported by a University of Nebraska Presidential Fellowship for the 2012-2013 year. This fellowship is awarded to four graduate students annually, across all disciplines and University of Nebraska campuses.
- Received the G.C. Young and W.H. Young research Award (\$1000) in Nov. 2012.

Other Graduate Students Mentored

Michelle Haver, September 2018-December 2020.

John Murphree, September 2017-May 2018.

- Currently working in a full time position with the government.

Additional Doctoral Supervisory Committees († indicates official thesis reader)

UNL

- Austin Eide† (advisor: Xavier Perez Gimenez)
- Nikola Kuzmanovski† (advisor: Jamie Radcliffe)
- Colby Lamb (advisor: Yvonne Lai)
- Leilani Pei† (advisor: Xavier Perez Gimenez)
- Adam Volk† (advisor: Jamie Radcliffe)
- George Nasr† (graduated May 2021; advisor: Jamie Radcliffe)
- Alyssa Whittemore† (graduated August 2021; advisor: Xavier Perez Gimenez)
- J.D. Nir† (graduated May 2020; advisor: Jamie Radcliffe)
- Jessalyn Bolkema† (graduated August 2018; advisor: Judy Walker)
- Yalan Liang (Computer science; graduated August 2018; advisor: Myra Cohen)
- Jessica DeSilva† (graduated May 2018; advisor: Jamie Radcliffe)
- Corbin Groothuis† (graduated May 2018; advisors: Jamie Radcliffe and John Meakin)
- Brent McKain† (graduated August 2017, advisor: Jamie Radcliffe)
- Charles Tomlinson† (graduated May 2017, advisor: Jamie Radcliffe)
- Sarah Behrens† (graduated August 2015, advisor: Stephen Hartke)
- Lauren Keough† (graduated May 2015, advisor: Jamie Radcliffe)
- James Carraher† (graduated May 2014, advisor: Stephen Hartke)
- Elena Sherman (graduated December 2012, Computer science; advisor: Matt Dwyer)
- Katherine Morrison† (graduated August 2012, advisor: Judy Walker)
- Tyler Seacrest† (graduated May 2011, advisor: Stephen Hartke)
- Andrew Ray† (graduated May 2011, advisor: Jamie Radcliffe)
- Deanna Dreher† (graduated May 2010, advisor: Judy Walker)

International Doctoral Committees

- Official Opponent for Ferdinand Blomqvist, Aalto University, Finland. (Graduated May 2020. Advisors: Marcus Greferath and Camilla Hollanti).
 - * In addition to serving as one of the official readers of his thesis, the opponent is in charge of asking all of the questions at the formal public defense, and writing an official pre-examiner statement and summary opponent statement of the defense.

Undergraduate Research Advisor

4. Katie McKeon (graduated May 2013 with highest distinction). I co-advised Katie's 2012-2013 Honors Thesis, *Products of Voltage Graphs*, with Judy Walker. She obtained her Ph.D. in Math in 2018 from Rutgers University. Currently at Center for Communications Research.
3. Amy Been (graduated May 2013 with distinction). I oversaw her 2012-2013 Honors Thesis on *Pythagorean Triples over the Quaternions*. Amy obtained her Ph.D. at the University of Arizona in 2020 and is now a postdoctoral fellow at UNL.
2. Jessica Burow (graduated December 2012). I supervised her Fall 2012 UCARE project on graph theory and social network analysis.
1. Jonathan Jay Cummings (graduated May 2011 with highest distinction). I supervised his 2010-2011 Undergraduate Creative Activities and Research Experience (UCARE) project on invariants of graph products, and also his Honors Thesis, *On Invariants of Replacement Product Graphs*. Paper [22] is a result of this project. Graduated with his Ph.D. in mathematics from the University of California at San Diego in May 2016. Currently Assistant Professor at Sacramento State University, CA.

Professional Development

- Active member of ParaDIGMS working group for diversity in graduate mathematical sciences: I meet monthly with four other faculty at research institutions to discuss DEI issues at the graduate and professional level. November 2020 - present.
- MAA Workshop on *Increasing Engagement in and Support for Equity Work*, National AMS math meeting, January 2021.
- *AMS ParaDIGMS Fall Conference: Diversity in Graduate Mathematical Sciences*, November 2020, 2021.
- Participated in Math Department's 21-day diversity challenge reading and discussion group, Fall 2020.
- *Teaching Online Upper Level Math Courses* Workshop, Math Association of America, July 2020.
- *Fostering Inclusivity in Online Classrooms* Workshop, Center for Transformative Teaching, July 2020.
- MAA META Math workshop *Mathematical Education of Teachers as an Application of Undergraduate Mathematics*, Joint Math Meeting, Denver, CO, Jan. 2020.
- *Cultivating an Inclusive Environment: Recognizing and Responding to Implicit Bias* Workshop, UNL, September 2019.
- Preparation for Industrial Careers (PIC) Math *Workshop on Data Analytics*, Brigham Young University, Provo, UT May 2017. (Limited attendance, by application only. Received full funding to participate.) Learned about data analytics, statistical learning, and machine learning, and software for solving problems in these areas. One main focus of the workshop was to learn how to teach undergraduates how to approach and solve these problems.
- *Sage: Using Open-Source Mathematics Software with Undergraduates*, an MAA Professional Enhancement Program (PREP) course, Summer 2010.
- Project NExT activities at Mathfest (August 2008), Joint Mathematics Meeting (January 2009), Mathfest (August 2009).

- UNL Math Department Teaching Mentoring Program Fall 2008 - Fall 2012.
- Second Annual Mini-Conference on Great Teaching, Ohio State University, April 2008.
- *Teaching Linear Algebra and Its Applications* Minicourse, Joint Math Meeting, San Antonio TX, 2006.
- *Getting Undergraduate Students Involved in Research* Minicourse, Joint Math Meeting, San Antonio, TX, 2006.
- *Teaching Well Using Technology Certificate*, University of Notre Dame, 2005 - 2006.
- *Striving for Excellence in Teaching Certificate*, University of Notre Dame, 2005 - 2006.
- Teaching Seminar, Mathematics Department, University of Notre Dame, Spring 2001, 2002.

SERVICE

Department Service (All are at UNL unless otherwise indicated)

- Co-Chair of the organizing committee for the Nebraska Conference for Undergraduate Women in Mathematics (NCUWM), 2013 -present.
 - NCUWM is the premier undergraduate conference for women in mathematics. We host 260 undergraduate math majors from around the country along with invited women plenary speakers and professional mathematicians. The goal of the conference is to encourage women to pursue graduate study in mathematics or math-related careers, and to help prepare them to succeed.
 - Each conference typically features 2-3 plenary talks, 48 undergraduate research talks, 60-70 posters, three panels, three rounds of breakout sessions on 12-14 different topics, a networking dinner, and a banquet. In total, the event has around 300+ participants.
 - Special attention is made to recruit underrepresented minorities to NCUWM, and we also actively seek diversity among our panelists and plenaries in all aspects. Several breakout sessions are designed to help underrepresented groups be successful in mathematics, including “Being a woman mathematician from an underrepresented group”, “Identifying microaggressions in the mathematical community”, “Being a graduate student and a parent”, and “Being a nontraditional graduate student”.
- Executive Committee elected member, 2020-2022.
- Organizer/Co-organizer of Job Search Seminar for graduate students on the job market, 2018 - 2020
 - I organize materials for the participants to help them prepare their applications, and hold meetings weekly the first half of the semester, often with one mid-summer meeting to answer questions before the semester starts. I coordinate peer review and faculty review of application components (CV, teaching statements, research statements, and cover letters), and organize at least one or two panels on the job search process and interviewing. Over the course of the semester, I personally meet with each graduate student and give feedback on all of their materials. I also end up mentoring several of the students later in the year as they navigate interviews and negotiate offers.
- Diversity Committee Member, Fall 2020-present.
- Helped with the UNL Department of Mathematics grad fair booth, Joint Mathematics Meeting, January 2020.

- Co-wrote comprehensive exam (Information Theory portion), 2019, 2020; Facilitated comprehensive exams in coding theory for 5 of my students.
- NCUWM organizing committee member 2008-2012: In charge of talk and abstract review, abstract booklets, poster session, and brochure.
- Chair of Professor of Practice Search Committee, Department of Mathematics, 2017-2018.
- First Year Mathematics Task Force member, 2015-2016
This committee is dedicated to analyzing and reforming the lower-level first year mathematics courses, from College Algebra (Math 100A) to Calculus II (Math 107).
- Executive Committee elected member, 2011-2013.
- Math Education Search Committee member, 2012-2013
- Algebra Search Committee member, 2011-2012.
- Co-writer and grader for the graduate discrete math qualifying exam, June 2011, 2012, and 2021; Jan 2015.
- Undergraduate Advisory Committee member, 2010-2011.
- Organizer for the weekly Discrete Mathematics Seminar, Fall 2009, 2010 and Spring 2010.
- Volunteer for Math Day, an annual Department sponsored event for roughly 1500 high school students from across Nebraska. 2008-2010, 2012, 2014-2015, 2017-2019.
- Zürich Graduate Colloquium in Mathematics Co-organizer, University of Zürich and Swiss Federal Institute of Technology (ETH), Zürich, Switzerland. (August 2004 - July 2005)

University Service, UNL

- Co-Chair of the College of Arts & Sciences Inclusion, Diversity, Equity, and Access (IDEA) committee, August 2021- present. Committee member since January 2021.
- Member of the Nebraska Council for Inclusive Excellence and Diversity since November 2021.
- Reviewer for Edgerton Junior Faculty Awards, Spring 2020.
- UNL College of Arts and Sciences Committee on Student Academic Distinction, Awards and Appeals Member, August 2015-2016, 2017-2018.
- Led Breakout Session for Incoming Math/Statistics GTAs at UNL Graduate Student Orientation, August 2017. (90 minutes)
- Reviewer for 2015 UNL Outstanding Graduate Research Assistant Award.

Professional Service

- Member of the Technical Program Committee (TPC) for the IEEE International Symposium on Information Theory. In charge of overseeing papers (assigning reviewers for each paper, and writing a meta-review for each) and participating final decisions for the ISIT 2021, 2022 Conferences.
- Co-organizer of the reunion for NCWUM alumni and supporters of NCUWM (JMM 2020, 2021, 2022).

- Women in Graph Theory and Applications (WIGA) Steering Committee, since Fall 2019.
- NSF reviewer 2018 (panel) and 2019 (external).
- 2015: On local organizing committee for MOSAIC Conference, a conference on the Mathematics of Science, Art, Industry, and Culture, sponsored and funded by MSRI and administered by the Bridges Foundation. MoSAIC was held November 14-15, 2015 at UNL.
- Associate Editor for the *International Journal of Information and Coding Theory* (IJICoT), Inderscience, U.K. (November 2011 - April 2013).
- On NSA review panel, 2012.
- Judge for the Ohio State University Young Mathematicians Conference, 2011.
- Referee for:
 - *IEEE Transactions on Information Theory*
 - *IEEE Transactions on Communications*
 - *IEEE Communications Letters*
 - *Journal of Applied Algebra*
 - *Advances in Mathematics of Communications*
 - *Designs, Codes, and Cryptography*
 - *IEEE Transactions on Information Forensics & Security*
 - *J. on Selected Areas in Communications*, special issue on capacity-approaching codes
 - *Int'l Journal on Information and Coding Theory*, special issue in honour of Vera Pless
 - *Central European Journal of Mathematics*
 - *EURASIP Journal on Wireless Communications and Networking*
- Referee for the following conferences:
 - IEEE International Symposium on Information Theory: 2007, 2008, 2010, 2012, 2013, 2015, 2016, 2018, 2019, 2021, 2022.
 - IEEE Information Theory Workshop: 2006, 2014, 2015, 2018, 2019
 - International ITG Conference on Systems, Communications, and Coding: 2017
 - Workshop on Mathematics in Communications: 2016
 - Mathematical Theory of Networks and Systems: 2010
 - Military Communications Conference: 2010
 - International Symposium on Turbo Codes and Iterative Information Processing: 2010
 - Applied Algebra, Algebraic Algorithms, and Error-Correcting Codes: 2009
 - IMA International Conference on Cryptography and Coding: 2009
 - Turbo Codes Conference 2008
 - International Symposium on Information Theory and its Applications: 2008

Additional Outreach

- 2012: Worked with Girl Scouts troop leader, Daneyelle Schneider, and graduate student Haymaker to design coding and cryptography activities for a Lincoln Girl Scouts troop. We facilitated the activities with the troop in October 2012.

- 2012: Consulted with the Sheldon Art Museum on the special exhibit “The Geometric Unconscious”. Designed and facilitated a 75 minute interactive presentation for 40 docents to teach them relevant mathematics that they could present in their tours for elementary school groups. Also designed a bookmark to accompany the exhibit. Docent training was in October 2012.
- Served on Careers panel for a Girl Scout Troop in Lincoln, NE in December 2011.
- 2009-2010: Partnered with a Lincoln Public School (LPS) math coach and LPS teachers to design and facilitate lessons for local sixth grade math classes that incorporate coding and cryptography. Three lessons were piloted at Culler Middle School in October 2009 and April 2010. Culler is one of the lower economic level schools in Lincoln. (Aug 2009 - May 2010)