

Daniel P. Biebighauser

Contact Information

Mail:

Department of Mathematics
Concordia College
901 8th Street South
Moorhead, MN 56562

Office: ISC 363
Phone: (218) 299-3345
Email: biebigha@cord.edu

Education

- Ph.D., Mathematics, Vanderbilt University, 2006.
- Master of Science, Mathematics, Vanderbilt University, 2004.
- Bachelor of Arts, summa cum laude, Mathematics Honors, Concordia College, 2002.

Experience

- *Professor*, Department of Mathematics, Concordia College, 2019-present.
- *Sigurd and Pauline Prestegaard Mundhjeld Endowed Chair*, Department of Mathematics, Concordia College, 2019-present.
- *Associate Professor*, Department of Mathematics, Concordia College, 2012-2019.
- *Assistant Professor*, Department of Mathematics and Computer Science, Concordia College, 2006-2012.

Courses taught:

MATH 105 Exploring Mathematics

MATH 121 Calculus I

MATH 122 Calculus II

MATH 203 Finite Mathematics

MATH 207 Discrete Mathematics

MATH 210 Linear Algebra

MATH 215 Introduction to Probability and Statistics

MATH 220 Introduction to Geometry Concepts

MATH 315 Probability and Mathematical Statistics

MATH 320 Geometry

MATH 325 Modern Algebra I

MATH 328 Complex Analysis

BUS 460/CSC 335/MATH 335 Operations Management/Research

MATH 380 Graph Theory

MATH 380/480 Topology

MATH 402 Senior Seminar

MATH 425 Modern Algebra II

CREDO 213 Networks

PEAK 400 Habitat for Humanity

- *Graduate Teaching Assistant*, Department of Mathematics, Vanderbilt University, 2002-2006. Sole instructor for one calculus course in Fall 2003, Fall 2004, Spring 2005, and Fall 2005. In addition, supervised a teaching assistant in Fall 2005. Teaching assistant for one calculus course in Spring 2004 and Spring 2006.
- *Intern*, Director's Summer Program, National Security Agency, 2001. Analyzed a cryptographic algorithm.

Research Interests

My research interests are in topological graph theory. In particular, I am interested in finding spanning subgraphs of graphs embedded on surfaces. I also study pursuit and containment strategies in graphs.

Refereed Journal Publications

- "Application of Group Ring Algebra to Localized and Delocalized Quantum States in Periodic Potentials," with Darin J. Ulness, *Journal of Mathematical Chemistry*, **57**, (2019) 726-749.
- "One-way infinite 2-walks in planar graphs," with M. N. Ellingham, *Journal of Graph Theory*, **88**, 1 (2018) 110-130.
- "The firefighter problem for regular infinite directed grids," with L. E. Holte '11 and R. M. Wagner '11. *Involve: A Journal of Mathematics*, **5**, 4 (2012) 393-409.
- "Prism-hamiltonicity of triangulations," with M. N. Ellingham. *Journal of Graph Theory*, **57**, 3 (2008) 181-197.
- "Final digit strings of powers where the exponents end in 1, 3, 7 or 9," with G. A. Heuer. *Fibonacci Quarterly*, **43**, 4 (2005) 339-350.
- "Final digit strings of cubes," with J. Bullock and G. A. Heuer. *Mathematics Magazine*, **77**, 2 (2004) 149-155.
- "General counting formulae for factorized time correlation diagram analysis," with J. Gregoire and D. J. Ulness. *Physica A*, **320**, 1 (2003) 1-10.

- “Factorized time correlation diagram analysis of paired causal systems excited by twin stochastic driving functions,” with D. B. Turner and D. J. Ulness. *Phys. Rev. E* **65**, 026142 (2002) 1-12.

Other Papers

- “Tutte paths and cycles (extended abstract),” with M. N. Ellingham, *Abstracts of the International Workshop on Combinatorics 2007*, (2007) 13-18.
- “Generalizations of hamiltonicity for embedded graphs,” Dissertation, Vanderbilt University (2006).
- “Tutte paths and cycles,” Qualifying Paper, Vanderbilt University (2004).

Conference Presentations

- “Moveable firefighters in the firefighter problem,” Joint Mathematics Meetings, San Diego, January 2013.
- “The firefighter problem for directed grids,” Joint Mathematics Meetings, Boston, January 2012.
- “Burnside’s lemma and color cycling,” MAA-NCS Fall Meeting, Concordia College, October 2008.
- “Infinite 2-walks in 3-connected planar graphs,” Joint Mathematics Meetings, SIAM Minisymposium on Structure and Topology in Graph Theory, New Orleans, January 2007. Invited.
- “Infinite 2-walks in planar graphs with radial nets,” 19th Annual Cumberland Conference on Graph Theory, Combinatorics, and Computing, East Tennessee State University, May 2006.
- “Prism-hamiltonicity of triangulations,” Graduate Student Combinatorics Conference, University of Wisconsin-Madison, April 2006.
- “Prism-hamiltonicity of triangulations,” 41st Midwest Graph Theory Conference, Middle Tennessee State University, September 2005.
- “Ending digit sequences of cubes,” with J. D. Bullock, Mathfest, August 2001.

Other Presentations

- “Tutte subgraphs,” Combinatorics Seminar, North Dakota State University, December 2015.
- “Prism-hamiltonicity of graphs,” Combinatorics Seminar, North Dakota State University, October 2015.

- “A survey of the firefighter problem,” Graph Theory and Combinatorics Seminar, Vanderbilt University, March 2014. Invited.
- “A survey of the firefighter problem,” Tri-College Mathematics Colloquium, North Dakota State University, April 2011.
- “Prism-hamiltonicity of graphs,” Tri-College Mathematics Colloquium, North Dakota State University, November 2006.
- “Knots and links in spatial graphs,” Graph Theory and Combinatorics Seminar, Vanderbilt University, April 2006.
- “Prism-hamiltonicity of triangulations,” Graduate Student Research Day, Vanderbilt University, March 2006.
- “Prism-hamiltonicity of triangulations,” Graph Theory and Combinatorics Seminar, Vanderbilt University, September 2005.
- “2-walks in 3-connected graphs,” Graph Theory and Combinatorics Seminar, Vanderbilt University, February 2005.
- “Tutte paths and Tutte cycles in planar graphs,” Graph Theory and Combinatorics Seminar, Vanderbilt University, October 2004.
- “Homology of graphs on surfaces and pseudosurfaces,” Graph Theory and Combinatorics Seminar, Vanderbilt University, April 2004.
- “Initial and final digit sequences of integer powers,” with J. D. Bullock, Student Lecture Series, Concordia College, October 2001.

Conferences/Workshops Attended (Non-speaker)

- National Council of Teachers of Mathematics, Chicago, September 2024.
- Vocation of a Lutheran College, Augsburg University, Minneapolis, July 2018.
- Geometry for Secondary Teachers, University of Michigan, Ann Arbor, June 2018 (presented the poster “Geometry at Concordia College, Moorhead, MN”).
- Mathematics of Various Entertaining Subjects, National Museum of Mathematics, New York, August 2017.
- Canadian Discrete and Algorithmic Mathematics Conference, University of Victoria, British Columbia, May 2011.
- Mathematical Association of America PREP Workshop on Inquiry Based Learning, University of Texas, Austin, May 2010.

Undergraduate Research

- Along with Sonja Wentling, History, I supervised the research of Matthew Lillehaugen '17 through the SGA Summer Research Program. The project focused on developing network and collective action models to explain patronal politics in general, and specifically the political structures in Turkey. Matthew presented his research at the

Private College Scholars Showcase at the State Capitol (St. Paul, MN) in February, 2017, at NCUR (Memphis, TN) in April, 2017, and at the Concordia College Celebration of Student Scholarship in April, 2017.

- Along with Darin Ulness, Chemistry, I supervised the research of Carena Daniels '16, Kurt Haag '15, Isaac Heath '14, Meghan Knudtzon '15, and Bobby Spoja '14 that led to a poster and the presentation "A Graph Theory Representation of Factorized Time Correlation Diagrams: Elucidation of Indirect Correlation" at the Concordia College Celebration of Student Scholarship, April 9, 2014, and the same presentation at the Pi Mu Epsilon Conference at St. John's University on April 12, 2014.
- I supervised the research Megan Menth '14 did to automate the scheduling process for student managers in Concordia College Dining Services. Megan presented this research in her talk, "Optimizing the Work Schedule of Dining Service Workers," which was one of four Spotlight Session presentations at the Concordia College Celebration of Student Scholarship, April 9, 2014. Megan's software was used for a while by Dining Services.
- I supervised the research John Bye '13, Brad McConn '13, and Megan Menth '14 did reducing, by more than half, the number of hours worked by crews at Alluring Landscapes, Houston, TX, during the Spring 2013 semester.
- I supervised the research Shannon Goetz '15 and Kristen Solbrack '15 presented in their poster "Spanning Trees with the Maximum Number of Leaves in Graphs" at the Concordia College Celebration of Student Scholarship, April 19, 2013.
- I supervised the research Laura Farnam '12 and Joanna Sink '14 presented in their talk "The Watchman's Walk Problem on Grids" at the Pi Mu Epsilon Conference at St. John's University on April 14, 2012.
- I supervised the research Michael Dyrud '14 and Nicole Rutt '12 presented in their talk "The Firefighter Problem for Directed Triangular Grids" at the Pi Mu Epsilon Conference at St. John's University on April 9, 2011.
- I supervised two student co-inquirers, Lise Holte '11 and Ryan Wagner '11, in the Centennial Scholars project "Using Containment Strategies in Networks to Fight Fires and Control Viruses" in the summer of 2010. This project led to a poster presentation for the Private College Scholars at the Capitol event on February 28, 2011, and the Concordia College Celebration of Student Scholarship on April 8, 2011. The students presented on campus in the Math/CS Colloquium series on February 8, 2011, and at the Pi Mu Epsilon Conference at St. John's University on April 9, 2011. The three of us gave a Centennial lecture on campus on March 3, 2011. We wrote a paper, "The Firefighter Problem for Regular Infinite Directed Grids," which appeared in *Involve: A Journal of Mathematics* in 2012.
- I supervised the research Alicia Adams '11, Tracie Bristol '11, and Katie Peske '12 presented in their talk "A Generalization of the Firefighter Problem for Trees," on April 17, 2010, at the Pi Mu Epsilon Conference at St. John's University.

- I supervised the research Rachel Pedersen '11 presented in her talk "Strategic Containment of Fires on Networks," on April 18, 2009, at the Pi Mu Epsilon Conference at St. John's University.
- I was the faculty sponsor for the following paper written by Lucas Wagner '08: "Beyond Burnside's Lemma," Lucas O. Wagner. *Rose-Hulman Undergraduate Mathematics Journal*, **9**, 2 (2008) 8 pages.

Professional Activities

- *Faculty Advisor*, 2007-present (currently 15 advisees).
- *Member*, Council on Undergraduate Research, 2010-present.
- *Member*, Mathematical Association of America, 2007-2013, 2019-2024.
- *Advisor*, Pi Mu Epsilon Math Club, 2011-present.
- *Co-advisor*, Pi Mu Epsilon Math Club, 2006-2011.
- *Advisor*, Concordia College Habitat for Humanity, 2012-present.

Trips led:

- Athens, Georgia, Fall Break 2025.
- Fergus Falls, Minnesota, September 2025.
- Athens, Georgia, Spring Break 2025.
- Fergus Falls, Minnesota, November 2024.
- Fargo, North Dakota, Fall Break 2024.
- Athens, Georgia, Spring Break 2024.
- Fergus Falls, Minnesota, November 2023.
- Athens, Georgia, Spring Break 2023.
- Fergus Falls, Minnesota, October 2022.
- Athens, Georgia, Spring Break 2022.
- Laredo, Texas, Spring Break 2020.
- Battle Lake, Minnesota, October 2019.
- Nashville, Tennessee, Spring Break 2019.
- Fergus Falls, Minnesota, October 2018.
- Charleston, South Carolina, Spring Break 2018.
- Fergus Falls, Minnesota, October 2017.
- Lucedale, Mississippi, Spring Break 2017.
- Brookings, South Dakota, October 2016.
- Oklahoma City, Oklahoma, Spring Break 2016.
- Cottage Grove, Minnesota, October 2015.
- Durham, North Carolina, Spring Break 2015.
- St. Paul, Minnesota, November 2014.
- Durbin, West Virginia, Spring Break 2014.
- Brainerd, Minnesota, October 2013.

- Denver, Colorado, Spring Break 2013.
- Montgomery, Alabama, Spring Break 2011.
- Santa Fe, New Mexico, Spring Break 2010.
- Naples, Florida, Spring Break 2009.
- *Principal Investigator*, Noyce Mathematics Education grant, 2024-present.
- *Math Day Advisor*, Noyce Mathematics Education grant, 2022-present.
- *Contact Person*, Concordia Science Academy mathematics programs, 2007-2015.
- *Summer Advisor*, New student registration, 2009, 2011, 2012, 2014, 2015.
- *Faculty Mentor*, New student orientation, Fall: 2012-2019, Spring: 2015, 2018-2022.
- *Faculty Advisor*, Pi Mu Epsilon Conference at St. John's University in 2009, 2010, 2011, 2012, 2013, 2014, 2015.
- *Secretary of the Faculty*, 2020-2023.
- *Member*, Faculty Senate, 2008, 2009-2010, 2012-2023, 2025-present.
- *Member*, Faculty Executive Committee, 2016-2019, 2020-2023.
- *Member and Chair*, Honorary Degrees Committee, 2024-present.
- *Member*, Benefits Committee, 2026-present.
- *Member*, Student Affairs Committee, 2015-2018.
- *Member*, Academic Advisement and Student Development Committee, 2010-2013.
- *Member*, Special Awards Committee, 2007-2008.
- *Member*, ISC Building Users Group, 2018-2020.
- *Member*, Higher Learning Commission Year 4 Assurance Task Force, 2017-2018.
- *Member*, Faculty, Staff, Retiree Giving Committee, 2010-2016.
- *Member*, STEP grant internal advisory board, 2011-2016.
- *Member*, Worship, Faith, and Spiritual Practice Task Force, 2014.
- *Member*, Strategic Investment Initiative Planning Task Force, Division of Sciences and Mathematics, 2009.
- *Chair*, Evaluation Committee:
 - Dan Willoughby, Spring 2026.
 - Greg Tanner, Spring 2023.
 - Julia Walk, Fall 2021 (Tenure and Promotion).
 - Sarah Seger, Spring 2021.
 - Luiz Manzoni, Fall 2020 (Promotion).
 - Julia Walk, Spring 2020.
 - Nathan Axvig, Fall 2018 (Tenure and Promotion).
 - Nathan Axvig, Spring 2017.
 - Oksana Bihun, Fall 2014 (Tenure and Promotion).

- Oksana Bihun, Spring 2013.
- *Member*, Evaluation Committee:
 - Robin Griffeath, Spring 2025.
 - Greg Tanner, Fall 2024 (Tenure and Promotion).
 - Sarah Seger, Fall 2024 (Tenure and Promotion).
 - Kelley Tracz, Fall 2024.
 - Sarah Seger, Spring 2023.
 - Mark Causapin, Spring 2022.
 - Kira Knutson, Spring 2022.
 - Greg Tanner, Spring 2021.
 - Mark Causapin, Spring 2020.
 - Jason Askvig, Fall 2018 (Tenure and Promotion).
 - Graeme Wyllie, Spring 2017.
 - Michael Mangini, Fall 2013 (Tenure and Promotion).
 - John Reber, Spring 2010.
- *Outside Member*, Thesis Committee, M.S. in Agribusiness and Applied Economics, NDSU, for Regina Laufmann, Fall 2014.
- *Member*, Music Search Committee, 2026.
- *Member*, Music Education Search Committee, 2024.
- *Member*, Nutrition and Dietetics Search Committee, 2024.
- *Member*, Presidential Transition Committee, 2023.
- *Member*, Presidential Search Committee, 2022-2023.
- *Member*, Dean of Arts and Sciences Search Committee, 2022.
- *Member*, Minister for Faith and Spirituality in Action Call Committee, 2015-2016.
- *Member*, Director of Bands Search Committee, 2012.
- *Member*, Accounting Search Committee (hiring for two positions), 2008-2009.
- *Session Chair*, MAA-NCS Fall Meeting, Concordia College, October 2008.
- *Director*, Tri-College Mathematics Contest, 2007.
- *Referee*, Discrete Mathematics, 2018-present.
- *Referee*, Discrete Applied Mathematics, 2017-present.
- *Referee*, Involve: A Journal of Mathematics, 2012-present.
- *Referee*, Journal of Graph Theory, 2004-2007, 2014-present.
- *Co-organizer and Presenter*, Undergraduate Seminar in Mathematics, Vanderbilt University, 2004-2006.

Honors

- Flaot Distinguished Teaching Award, 2024-2027.
- Omicron Delta Kappa Faculty Representative (Elected by ODK class of 2014), 2014-2018.
- Sabbatical leave, Spring 2014.
- Centennial Scholars grant, 2010.
- 2007-2008 Project NExT Fellow.
- B. F. Bryant Prize for Excellence in Teaching, Vanderbilt University, 2006.
- University Graduate Fellowship and Teaching Assistantship, Vanderbilt University.
- Summer Research Award, Vanderbilt University, 2005.
- Barry M. Goldwater Scholarship.