Dana C. Ernst

Curriculum Vitae (September 1, 2024)

Contact Information

Northern Arizona University
Department of Mathematics & Statistics
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Education

University of Colorado, Boulder, CO — Aug 2008
PhD, Mathematics, Advisor: Dr. R.M. Green
Dissertation: *A diagrammatic representation of an affine C Temperley–Lieb algebra*

Northern Arizona University, Flagstaff, AZ — May 2000
MS, Mathematics, Advisor: Dr. M. Falk
Thesis: *Cell complexes for arrangements with group actions*

George Mason University, Fairfax, VA — May 1997
BS, Mathematics

Academic Positions

The Academy of Inquiry Based Learning, Toronto, ON
Co-director — Fall 2019–Present

Northern Arizona University, Flagstaff, AZ
Associate Professor, Department of Mathematics & Statistics — Aug 2017–Present
Assistant Professor, Department of Mathematics & Statistics — Aug 2012–July 2017

Plymouth State University, Plymouth, NH
Assistant Professor, Mathematics Department — Aug 2008–May 2012

University of Colorado, Boulder, CO
Graduate Teaching Instructor, Department of Mathematics — Aug 2003–May 2008
Lead Graduate Teacher, Graduate Teacher Program — Aug 2006–May 2007

Front Range Community College, Boulder, CO
Full-time Faculty, Department of Mathematics — Aug 2001–May 2003

Northern Arizona University, Flagstaff, AZ
Instructor, Mathematics & Statistics Department — Jun 2000–May 2001
Graduate Assistant, North Learning Assistance Center — Jan 2000–May 2000
Graduate Teaching Instructor, Mathematics & Statistics Department — Jan 1998–Dec 1999
Graduate Assistant, South Learning Assistance Center — Aug 1997–Dec 1997

Research Interests

General

Interplay between combinatorics and algebraic structures; scholarship of teaching and learning (SoTL) and undergraduate mathematics education.

Specific

Combinatorics of Coxeter groups, generalized Temperley–Lieb algebras, diagram algebras; combinatorial game theory; enumerative combinatorics, combinatorics of genome rearrangements, pattern avoidance; inquiry-based learning (IBL).

Publications

In Preparation

P3. A. Claesson, G. Cerbai, **D.C. Ernst**, and H. Golab*. Pattern avoidance in Cayley permutations, Part 2 (*tentative title*).

P2. B.J. Benesh, **D.C. Ernst**, M. Meyer, S.K. Salmon*, and N. Sieben. Impartial geodetic destroying games on graphs.

P1. F. Awik*, F. Burkhart*, H. Denoncourt, **D.C. Ernst**, T. Rosenberg*, and A. Stewart*. Enumerating signed permutations by reversal distance.

Submitted/Preprints

S4. J. Barnes*, J. Breland*, **D.C. Ernst**, and R. Perry*. Braid graphs in simply-laced triangle-free Coxeter systems are median. [arXiv:2408.16839]

S3. A. Claesson, G. Cerbai, **D.C. Ernst**, and H. Golab*. Pattern-avoiding Cayley permutations via combinatorial species. [arXiv:2407.19583]

S2. B. Bašić, P. Ellis, **D.C. Ernst**, D. Popović*, N. Sieben. Categories of impartial rulegraphs and gamegraphs. [arXiv:2312.00650]

S1. B.J. Benesh, **D.C. Ernst**, M. Meyer, S.K. Salmon*, and N. Sieben. Impartial geodetic building games on graphs. [arXiv:2307.07095]

Books

B4. **D.C. Ernst** and J. Hagood. *Introduction to Discrete Mathematics*. Free undergraduate discrete mathematics textbook, 2024. [PDF]

B3. **D.C. Ernst**. *Introduction to Real Analysis*. Free undergraduate real analysis textbook, 2023. [PDF]

B2. **D.C. Ernst**. *An Inquiry-Based Approach to Abstract Algebra*. Open-source textbook for undergraduate abstract algebra, 2022. [GitHub] [PDF]

B1. **D.C. Ernst**. *An Introduction to Proof via Inquiry-Based Learning*. MAA Press, 2022. Textbook for an introduction to proof course. [Project Webpage]

Journal Articles

J21. **D.C. Ernst**, J. Slye. Using the $\text{Spin}_{3\times 3}$ virtual manipulative to introduce group theory. *PRIMUS* 34(6), 2024. [ePrint]

J20. F. Awik*, J. Breland*, Q. Cadman*, and **D.C. Ernst**. Braid graphs in simply-laced triangle-free Coxeter systems are partial cubes. *European Journal of Combinatorics* 118, 2024. [arXiv:2104.12318] [ePrint]

J19. B.J. Benesh, **D.C. Ernst**, and N. Sieben. The spectrum of nim-values for achievement games for generating finite groups. *INTEGERS* 23, 2023. [arXiv:2004.08980] [ePrint]

J18. B.J. Benesh, **D.C. Ernst**, and N. Sieben. Impartial achievement games for generating nilpotent groups. *J. Group Theory* 22(3), 515–527, 2019. [arXiv:1805.01409] [ePrint]

J17. **D.C. Ernst**. Diagram calculus for a type affine C Temperley–Lieb algebra, II. *J. Pure Appl. Alg.* 222(12), 3795–3830, 2018. [arXiv:1101.4215] [ePrint]

J16. **D.C. Ernst** and N. Sieben. Impartial achievement and avoidance games for generating finite groups. *Int. J. Game Theory* 47(2), 509–542, 2017. [arXiv:1407.0784] [ePrint]

J15. **D.C. Ernst**, T.J. Hitchman, and A. Hodge. Bringing Inquiry to the First Two Years of College Mathematics. *PRIMUS* 27(7), 641–645, 2017. [ePrint]

J14. **D.C. Ernst**, A. Hodge, and S. Yoshinobu. Doceamus: What Is Inquiry-Based Learning? *Notices of the AMS* 64(6), 2017. [ePrint]

J13. B. Benesh, **D.C. Ernst**, and N. Sieben. Impartial achievement and avoidance games for generating generalized dihedral groups. *Australas. J. Combin.* 68(3), 371-384, 2017. [arXiv:1608.00259] [ePrint]

J12. **D.C. Ernst**, M. Hastings*, and S.K. Salmon*. Factorization of Temperley–Lieb diagrams. *Involve* 10(1), 89–109, 2017. [arXiv:1509.01241] [ePrint]

J11. B.J. Benesh, **D.C. Ernst**, and N. Sieben. Impartial avoidance and achievement games for generating symmetric and alternating groups. *Int. Electron. J. Algebra* 20, 70–85, 2016. [arXiv:1508.03419] [ePrint]

J10. N. Diefenderfer, **D.C. Ernst**, M. Hastings*, L.N. Heath*, H. Prawzinsky*, B. Preston*, J. Rushall, E. White*, A. Whittemore*. Prime Vertex Labelings of Several Families of Graphs. *Involve* 9(4), 667-688, 2016. [arXiv:1503.08386] [ePrint]

J9. B.J. Benesh, **D.C. Ernst**, and N. Sieben. Impartial avoidance games for generating finite groups. *North-W. Eur. J. of Math.* 2, 83–101, 2016. [arXiv:1506.07105] [ePrint]

J8. H. Denoncourt, **D.C. Ernst**, and D. Story*. On the number of commutation classes of the longest element of the symmetric group. *Open Problems in Mathematics* Vol 4, 2016. [arXiv:1602.08328] [ePrint]

J7. E. Kennedy, B. Beaudrie, **D.C. Ernst**, and R. St. Laurent. Inverted Pedagogy in Second Semester Calculus. *PRIMUS* 25(9–10), 892–906, 2015. [ePrint]

J6. B. Love, A. Hodge, C. Corritore, and **D.C. Ernst**. Inquiry-Based Learning and the Flipped Classroom Model. *PRIMUS* 25(8), 745–762, 2015. [ePrint]

J5. **D.C. Ernst**, M. Leingang, and R. Taylor. To friend or not to friend? Facebook for professional educators. *MAA FOCUS* June/July 2015. [ePrint]

J4. **D.C. Ernst**, A. Hodge, and A. Schultz. Enhancing Proof Writing via Cross-Institutional Peer Review. *PRIMUS* 25(2), 121–130, 2015. [ePrint]

J3. **D.C. Ernst**. Diagram calculus for a type affine C Temperley–Lieb algebra, I. *J. Pure Appl. Alg.* 216(11), 2012. [arXiv:0910.0925] [ePrint]

J2. T. Boothby*, J. Burkert*, M. Eichwald*, **D.C. Ernst**, R.M. Green, and M. Macauley. On the cyclically fully commutative elements of Coxeter groups. *J. Algebraic Combin.* 36(1), 2012. [arXiv:1202.6657] [ePrint]

J1. **D.C. Ernst**. Non-cancellable elements in type affine C Coxeter groups. *Int. Electron. J. Algebra* 8, 2010. [arXiv:0910.0923] [ePrint]

Book Chapters

BC2. **D.C. Ernst** and A. Hodge. Within ϵ of Independence: An Attempt to Produce Independent Proof-Writers via IBL. In *Beyond Lecture: Resources and Pedagogical Techniques for Enhancing the Teaching of Proof-Writing Across the Curriculum*, R. Schwell, A. Steurer, & J.F. Vasquez (Eds.), MAA Notes, 2016.

BC1. **D.C. Ernst**, A. Hodge, M. Jones, and S. Yoshinobu. The many faces of IBL. In *STEM Education: An Overview of Contemporary Research, Trends, and Perspectives*, E. Ostler (Ed.), 2015.

Conference Proceedings (Peer-Reviewed)

C2. B. Beaudrie, **D.C. Ernst**, and B. Boschmans. Redesigning an Algebra for Precalculus Course. In *Proceedings of World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education*, T. Bastiaens & G. Marks (Eds.), 2013.

C1. B. Beaudrie, **D.C. Ernst**, and B. Boschmans. First Semester Experiences in Implementing a Mathematics Emporium Model. In *Proceedings of Society for Information Technology & Teacher Education International Conference*, R. McBride & M. Searson (Eds.), 2013.

Miscellaneous

M6. **D.C. Ernst**. *Instructor Guide: An Introduction to Proof via Inquiry-Based Learning.* [PDF]

M5. M. Annabel, **D.C. Ernst**, C. Howard, and W. Spalding. A Date with the Pines: Takes From the 2023 Pinyons and Pines. `Bikepacking.com`. May 2023.

M4. D. Daly et al. AIBL Handbook for Online Professional Development: Lessons Learned from PRODUCT Workshops. Ethnography & Evaluation Research, & the Academy of Inquiry Based Learning. Boulder, CO, and San Luis Obispo, CA: University of Colorado Boulder, Ethnography & Evaluation Research; and Academy of Inquiry Based Learning. [ePrint]

M3. **D.C. Ernst**. 2019 Pinyons and Pines: Event Recap. `Bikepacking.com`. Aug 2019.

M2. **D.C. Ernst**. Dana's AZT, Part 2. `Bedrock Bags Blog`. Jul 2018.

M1. **D.C. Ernst**. Dana's AZT, Part 1. `Bedrock Bags Blog`. Jun 2018.

Online Columns & Blog Posts

O18. **D.C. Ernst**. The Role of Failure and Struggle in the Mathematics Classroom. *Teaching Tidbits*. Nov 2017. [`Teaching Tidbits`]

O17. **D.C. Ernst**. Want to Give Your Teaching Style a Makeover This Summer? Here's How. *Teaching Tidbits*. Apr 2017.

O16. **D.C. Ernst**. Who generates the examples? *Teaching Tidbits*. Nov 2016.

O15. **D.C. Ernst**. Teaching Calculus 1 with a Focus on Student Presentations. *Discovering the Art of Mathematics Blog*. Oct 2015. [`artofmathematics.org`]

O14. **D.C. Ernst**. Setting the Stage. *Math Ed Matters*. Jan 2015. [`Math Ed Matters`]

O13. **D.C. Ernst**. The Twin Pillars of IBL. *Math Ed Matters*. Jan 2015.

O12. **D.C. Ernst**. Fear is the mind-killer. *Math Ed Matters*. Jun 2014.

O11. **D.C. Ernst**. Encouraging Students to Tinker. *Math Ed Matters*. Aug 2014.

O10. **D.C. Ernst**, A. Hodge, and T.J. Hitchman. Engaging in Inquiry-Based Learning. *Math Ed Matters*. Feb 2014.

O9. **D.C. Ernst** and A. Hodge. Math Ed Mania at the JMM. *Math Ed Matters*. Jan 2014.

O8. **D.C. Ernst** and A. Hodge. The JMM: What's Mathematics Education Got to Do with It? *Math Ed Matters*. Dec 2013.

O7. **D.C. Ernst**. Give the Students the Colored Pen. *Math Ed Matters*. Aug 2013.

O6. **D.C. Ernst** and R. Talbert. 4+1 interview with Dana Ernst. *Casting Out Nines*, The Chronicle Blog Network. Aug 2013. [chronicle.com/blognetwork/castingoutnines]

O5. **D.C. Ernst**. Personality Matters? *Math Ed Matters*. Jul 2013.

O4. **D.C. Ernst**. Grade School Utopia? *Math Ed Matters*. Jul 2013.

O3. **D.C. Ernst** and A. Hodge. Try, Fail, Understand, Win. *Math Ed Matters*. Jun 2013.

O2. **D.C. Ernst**. What the Heck Is IBL? *Math Ed Matters*. May 2013.

O1. **D.C. Ernst** and S. Yoshinobu. IBL Instructor Perspectives: Professor Dana Ernst. *The IBL Blog*. Feb 2012. [TheIBLBlog.com]

Grant Activity

G25. *Impartial Geodetic Destroying Games on Graphs* Fall 2023
Co-PI, AIM SQuaREs. SQuaREs (Structured Quartet Research Ensembles) allow a dedicated group of four to six mathematicians to spend a week at American Institute of Mathematics (AIM) in San Jose, California. AIM provides both the research facilities and the financial support for each SQuaRE group. Joint with B.J. Benesh, M. Meyer, S. Salmon, N. Sieben. (Unfunded)

G24. *Conversion of OER textbook to PreTeXt* Summer 2023
PI, Elevating Excellence award for Affordable Learning Materials. Support the conversion of OER textbook from LaTeX to PreTeXt. (Funded: $1,000)

G23. *MAA OPEN Math* 2022–2025
Senior Personnel, NSF-DUE. Participate in the development of facilitators for a variety of online pedagogy workshops, assist in the delivery of workshops. (Funded: $1,685,867)

G22. *Enumeration of signed permutations under the action of reversals* 2021–2022
Co-PI, Hooper Undergraduate Research Award (HURA). Awarded funds to support John (Frank) Burkhart and Alex Stewart to work on undergraduate research project during 2021–2022 academic year. (Funded: $3,350)

G21. *Impartial achievement & avoidance games for generating finite groups* Summer 2022
Co-PI, Collaborate@ICERM. Program offers teams of 3–6 researchers the opportunity to spend five days at The Institute for Computational and Experimental Research in Mathematics (ICERM) during the summer or in the month of January. ICERM provides both the research facilities and the financial support for each research group. Joint with B.J. Benesh, M. Meyer, S. Salmon, N. Sieben. (Funded: $9,000)

G20. *Impartial achievement & avoidance games for generating finite groups* Fall 2019
Co-PI, AIM SQuaREs. SQuaREs (Structured Quartet Research Ensembles) allow a dedicated group of four to six mathematicians to spend a week at American Institute of Mathematics (AIM) in San Jose, California. AIM provides both the research facilities and the financial support for each SQuaRE group. Joint with B.J. Benesh, M. Meyer, S. Salmon, N. Sieben. (Unfunded)

G19. *Impartial achievement & avoidance games for generating finite groups* Fall 2018
Co-PI, AIM SQuaREs. SQuaREs (Structured Quartet Research Ensembles) allow a dedicated group of four to six mathematicians to spend a week at American Institute of Mathematics (AIM) in San Jose, California. AIM provides both the research facilities and the financial support for each SQuaRE group. Joint with B.J. Benesh, M. Meyer, S. Salmon, N. Sieben. (Unfunded)

G18. *Active Learning in Calculus* Fall 2017
Co-PI, SEMINAL. Requested funds to support an increase in the amount of active learning instruction in Calculus I and II. Joint with A. Hodge and E. Kennedy. (Unfunded)

G17. *A Pragmatic Design for Informal STEM Learning about Scientific Reasoning: Drawing on Diagrams, Models and Citizen Science* Fall 2017
Senior Personnel, NSF-STEM-AISL. Project aims to develop an integrated set of learning tools and collaborative research activities that will engage the public in the exploration and use of diagrams in scientific reasoning as citizen-scientists. (Unfunded)

G16. *Computing maximal sorting length of signed permutations* 2017–2018
Co-PI, Hooper Undergraduate Research Award (HURA) and NASA Space Grant. Awarded funds to support Tanner Rosenberg to work 10 hours per week on undergraduate research project during 2017–2018 academic year. (Funded: $3,350)

G15. *PRODUCT* 2015–2020
Senior Personnel, NSF-IUSE. Participate in the development of facilitators for Inquiry-Based Learning workshops and assist in the delivery of workshops. (Funded: $2,800,000)

G14. *SPIGOT* 2012–2015
Senior Personnel, NSF-TUES II. The IBL Workshop provides an intensive four-day program for math instructors interested in learning to implement IBL in college-level mathematics courses. (Funded: $540,000)

G13. *ROPE: Resource of Open Problems for Education* Fall 2014 & Spring 2014
Co-PI, NSF-IUSE. Requested funds to develop an online, electronic library that provides a large number of innovative, well-tested, and documented problems that instructors and students may use in a wide range of courses and for a wide range of assignment types. Joint with G. LaRose (University of Michigan) and S. Hamblen (McDaniel College). (Unfunded)

G12. *Applets for Calculus* Fall 2013
PI, Interns to Scholars (I2S) Program at NAU. Awarded funds to support one undergraduate intern during the Spring 2014 and Fall 2014 semesters to work 6 hours per week for 10 weeks on creating applets for first semester calculus. (Funded: $1,296)

G11. *Prime labelings of graphs* Fall 2013
Co-PI, Center for Undergraduate Research in Mathematics (CURM). Awarded funds to support seven undergraduate students to conduct research for 2014–2015 academic year. Joint with J. Rushall (NAU). (Funded: $33,100)

G10. *Toward's a Cyclic Version of Matsumoto's Theorem* Fall 2013
PI, Faculty Grants Program at NAU. Requested one month of summer salary to support my research program in the combinatorics of Coxeter groups. (Unfunded)

G9. *Undergraduate Research Program in Mathematics* Fall 2013
Senior Personnel, NSF-DMS: Workforce Division. Requested support for REU program at NAU for summers of 2014–2016. (Unfunded)

G8. *An open problem library for mathematics* Summer 2013–Spring 2014
PI, Faculty Grants Program at NAU. Awarded summer salary to support development of an online open problem library for undergraduate mathematics courses. (Funded: $7,500)

G7. *Toward a factorization of Temperley–Lieb diagrams* Spring 2013
PI, NAU NASA Space Grant Program. Requested support for two undergraduate research students for the 2013–2014 academic year. (Unfunded)

G6. *Combinatorics of the CFC elements of Coxeter groups* Fall 2012
PI, Center for Undergraduate Research in Mathematics (CURM). Requested funds to support three undergraduate students to conduct research for academic year. (Unfunded)

G5. *An Open Problem Library for Mathematics* Spring 2012
Co-PI, NSF-TUES. Proposal seeks to develop an online, electronic library that will provide a large number of innovative, well-tested, and documented problems that instructors and students may use in a wide range of courses and for a wide range of assignment types. Joint with G. LaRose (University of Michigan) and S. Hamblen (McDaniel College). (Unfunded)

G4. *IBL course materials for group theory* Summer 2013
PI, Academy of Inquiry-Based Learning. Awarded Category 2 Small Grant to fund development of course materials for an IBL abstract algebra course that emphasizes visualization and incorporates technology. (Funded: $2,500)

G3. *Conjugacy and reducibility in Coxeter groups* Fall 2010
Co-PI, NSF-DMS: Number Theory, Algebra, and Combinatorics. Requested funds to support summer research and travel for PIs and full-year support for undergraduate research assistants. Joint with R.M. Green (CU Boulder) and M. Macauley (Clemson). (Unfunded)

G2. *Combinatorics of the CFC-finite Coxeter groups* Spring 2010
PI, Center for Undergraduate Research in Mathematics (CURM). Requested funds to support two undergraduate students to conduct research for academic year. (Unfunded)

G1. *The conjugacy problem for Coxeter groups* Fall 2009
Co-PI, NSF-DMS: Number Theory, Algebra, and Combinatorics. Requested funds to support summer research and travel for PIs and full-year support for undergraduate research assistants. Joint with R.M. Green (CU Boulder) and M. Macauley (Clemson). (Unfunded)

Teaching Experience

Summary
Over 25 years of teaching experience; recipient of several teaching awards (most recent: 2024 Educator of Influence, 2021 NAU President's Distinguished Teaching Fellow, 2016 MAA Southwest Section Teaching Award).

Courses Taught
Combinatorial Game Theory (graduate), Enumerative Combinatorics (graduate), Reflection Groups and Coxeter Groups (graduate), Combinatorics of Genome Rearrangements (graduate), Topology, Real Analysis, Abstract Algebra (graduate and undergraduate), Number Theory, Linear Algebra, Introduction to Proof, Discrete Mathematics, Problem Solving, Calculus I–III, Precalculus, Trigonometry, College Algebra, Survey of Algebra, Finite Mathematics, Quantitative Reasoning, College Math with Applications, Mathematics for Elementary School Teachers I.

Advising & Mentoring

Masters Theses

Braid Graphs in Coxeter systems of type Λ are median Fall 2023–Spring 2024
Ruth Perry (NAU).

Pattern avoidance in Cayley permutations Fall 2023–Spring 2024
Hannah Golab (NAU).

Structural properties of braid graphs in simply-laced Coxeter systems Fall 2021–Spring 2022
Jillian Barnes (NAU).

Structure of braid graphs in simply-laced Coxeter systems Fall 2020–Summer 2021
Quentin Cadman (NAU).

The reversal poset of signed permutations Fall 2020–Spring 2021
Fadi Awik (NAU).

On the maximum cardinality of braid classes Fall 2016–Summer 2017
Zach Parker (NAU).

A Study of T-Avoiding Elements of Coxeter Groups Fall 2015–Spring 2016
Taryn Laird (NAU).

Exploration of the type $\widetilde{C}$ Temperley–Lieb algebra Fall 2015–Spring 2016
Kevin Salmon (NAU).

Conjugacy classes of CFC elements in Coxeter groups of type A Fall2013–Spring 2014
Brooke Fox (NAU).

A cellular quotient of the Temperley–Lieb algebra of type D Fall 2013–Spring 2014
Kirsten Davis (NAU).

Undergrad Research Projects

Enumeration of signed permutations under the action of reversals Fall 2021–Spring 2022

John (Frank) Burkhart, Alex Stewart (NAU). Funded by Hooper Undergraduate Research Award (HURA). 2 presentations, paper in progress.

Structure of braid graphs for reduced words in Coxeter systems Fall 2019–Spring 2020
Jens Niemi, Jack Sullivan, Jordan Wright (NAU).

Architecture of braid classes in simply-laced Coxeter systems Fall 2018–Spring 2019
Fadi Awik, Jadyn Breland, Quentin Cadman (NAU). 3 presentations, 1 article.

Switch: An impartial game for generating graphs Fall 2018–Spring 2019
Ryan Davis, Adeline Moll (NAU). 4 presentations.

On signed permutations of maximal reversal length Fall 2017–Fall 2018
Rebecca Fix, Tanner Rosenberg (NAU). Rosenberg funded by Hooper Undergraduate Research Award (HURA) and NASA Space Grant during 2017–2018 academic year. 3 presentations.

Braid graphs for reduced words in Coxeter groups of types A and B Fall 2017–Spring 2018
Emalina Bidari, Brandon Samz (NAU). 3 presentations.

Exploration of combinatorial games on closure systems Fall 2017
Peter Brosten, Brandon Samz (NAU). Joint with N. Sieben. 1 presentation.

Star reduction graphs for elements of Coxeter groups of type B Spring 2017
Emalina Bidari (NAU). 2 presentations.

Star reduction graphs for elements of Coxeter groups of type A Fall 2016
Brittany Carr (NAU). 3 presentations.

Cominuscule elements of Coxeter groups of type affine C Spring 2016
Joni Hazelman, Parker Montfort, Robert Voinescu, Ryan Wood (NAU). 2 presentations.

A simplified version of Conway's Sylver Coinage Fall 2015–Spring 2016
Joni Hazelman, Parker Montfort, Robert Voinescu, Ryan Wood (NAU). 4 presentations.

Commutation classes of the longest element in the symmetric group Fall 2015–Spring 2016
Dustin Story (NAU). 2 presentations, 1 publication.

Prime vertex labelings of graphs Fall 2014–Spring 2015
Nathan Diefenderfer, Michael Hastings, Levi Heath, Hannah Prawzinsky, Briahna Preston, Emily White, and Alyssa Whittemore (NAU). 5 presentations, 2 articles. Joint with J. Rushall (NAU). Funded by a mini-grant from the Center for Undergraduate Research in Mathematics (CURM).

Diagrammatic representation of the canonical basis for a TL-algebra Spring 2014
Molly Green (NAU). 2 presentations.

Factorization of Temperley–Lieb diagrams Fall 2013–Spring 2014
Michael Hastings and Sarah Salmon (NAU). 5 presentations, 1 publication.

Exploration of T-avoiding elements in Coxeter groups of type F Spring 2013
Selina Gilbertson (NAU). 2 presentations.

Mathematics of Spinpossible Spring 2013–Spring 2014
Dane Jacobson and Michael Woodward. 4 presentations.

Exploration of T-avoiding elements in Coxeter groups of type F Fall 2011–Spring 2012
Ryan Cross, Katie Hills-Kimball, and Christie Quaranta (PSU). 2 presentations.

T-avoiding permutations in Coxeter groups of types A and B Fall 2010–Spring 2011
Joseph Cormier, Zachariah Goldenberg, Jessica Kelly, and Christopher Malbon (PSU). 3 presentations.

Counting generators in Temperley–Lieb algebras of types A and B Spring 2010
Sarah Otis and Leal Rivanis (PSU). 1 presentation.

Honors & Awards

NAU President's Distinguished Teaching Fellow Fall 2021–Present
Awarded annually to outstanding teaching scholars who have made a significant impact on undergraduate learning at NAU.

Educator of Influence Fall 2015, Spring 2018, Spring 2019, Spring 2024
Named by Gold Axe recipients as most influential educator.

MAA Southwest Section Teaching Award Spring 2016
Recipient of 2016 MAA Southwest Section Award for Distinguished College or University Teaching of Mathematics.

University College Faculty Fellow Fall 2012–Spring 2016
Chosen as a Faculty Fellow of the NAU University College via a selection process. Includes annual stipend.

Chair's Award for Research Spring 2015
Awarded by chair of Department of Mathematics and Statistics at NAU.

Provost's Award for Excellence in Undergraduate Inquiry & Creativity Spring 2014
Award honors a faculty mentor at NAU who has demonstrated initiative, productivity, and dedication in contributing to the university community in the areas of research, scholarly, and/or creative activities.

Finalist for NH Excellence in Education Award Spring 2012
PSU's sole nominee for this statewide teaching award.

Distinguished Professor of Mathematics May 2009 & 2011
Teaching award determined by mathematics majors at PSU.

Project NExT Fellow Fall 2008–Spring 2009
Mathematical Association of America professional development and mentoring program for new PhDs in mathematics.

Graduate Part-Time Instructor Teaching Excellence Award Spring 2008
University-wide award given to outstanding graduate teaching instructors at CU.

Burton W. Jones Teaching Excellence Award May 2007
Recognizes outstanding accomplishments in teaching by CU grad students in mathematics.

Thron Fellowship Summer 2007
Financial award to support summer research, given to most outstanding graduate student in mathematics at CU.

Best Should Teach Award Fall 2006
Awarded to outstanding Lead Graduate Teachers at CU.

Honorable Mention for Burton W. Jones Teaching Excellence Award May 2006
Recognizes outstanding accomplishments in teaching by CU grad students in mathematics.

CU Mathematics Department Summer Fellowship Summer 2006
Financial award to support summer research.

Residence Life Academic Teaching Award Dec 2003
Awarded to instructors at CU based on nominations from students.

Finalist for Master Teacher Award May 2002 & 2003
Awarded to instructors at FRCC based on nominations from students.

Mary K. Cabell Award May 1997
Awarded to the most outstanding graduating mathematics major at GMU.

Presentations

Invited

Braid graphs in simply-laced triangle-free Coxeter systems are median Mar 2024
CU Lie Theory Seminar. CU Boulder, Boulder, CO.

Adopting, Adapting and Creating Open Education Resources (panel discussion) Oct 2023
NAU Teaching and Learning Center, NAU.

Enumerating signed permutations by reversal distance Jun 2023
University of Iceland Mathematics Seminar, Reykjavik, Iceland.

Morphisms of impartial combinatorial games Apr 2023
Virtual Combinatorial Game Theory Seminar.

Some enumeration results for sorting signed permutations by reversals Mar 2022
ASU Discrete Mathematics Seminar, ASU, Tempe, AZ.

Rights of the Learner (plenary address) Apr 2020 (Cancelled)
ArizMATYC/MAA-Southwest Section, Grand Canyon University, Phoenix, AZ

Architecture of braid classes in Coxeter systems Jan 2020
AMS Special Session on Interactions between Combinatorics, Representation Theory, and Coding Theory, 2020 Joint Mathematics Meetings, Denver, CO.

Pennies and Paperclips Sep 2019
Flagstaff Festival of Science Math Circles, Coconino High School, Flagstaff, AZ.

What is mathematical inquiry? (plenary address) Jun 2019
2019 IBL Workshop, Portland, OR.

Enhancing Student Engagement and Understanding via Inquiry-Based Learning Feb 2019
The Good Teaching Round Table, Boise State University, Boise, ID.

What is mathematical inquiry? (plenary address) Jun 2018
2018 IBL Workshop, DePaul University, Chicago, IL.

Experiencing IBL (plenary address) Jun 2018
2018 IBL Workshop, DePaul University, Chicago, IL.

Enhancing Student Engagement & Understanding via Inquiry-Based Learning Jan 2018
Creating Meaningful Classroom Activities to Deepen Student Learning, Project NExT Panel Discussion, 2018 Joint Mathematics Meetings, San Diego, CA.

The Futurama Theorem Sep 2017
DePaul Math Club, DePaul University, Chicago, IL.

Impartial achievement and avoidance games for generating finite groups Sep 2017
DePaul Mathematical Sciences Colloquium, DePaul University, Chicago, IL.

What is mathematical inquiry? (plenary address) Jun 2017
2017 IBL Workshop, Cal Poly, San Luis Obispo, CA.

Transitioning students from consumers to producers (opening address) Apr 2016
ArizMATYC/MAA-Southwest Section, Coconino Community College, Flagstaff, AZ.

Student presentations in calculus Jan 2016
Increasing Student Engagement & Understanding through Active Learning Strategies in Calculus I minicourse, 2016 Joint Mathematics Meetings, Seattle, WA.

Open problems with monetary rewards Oct 2014
2014 NAU High School Math Day, NAU.

Soup to Nuts: My Approach to IBL (plenary address) Aug 2014
2014 IBL Workshop, Portland, OR.

Inquiry-Based Education in Mathematics: Models, Methods, & Effectiveness Jul 2014
Workshop on Innovations in Higher Education Mathematics Teaching, Cardiff University, Cardiff, Wales.

Tried & True Practices for IBL & Active Learning Jan 2014
Project NExT Panel Discussion, 2014 Joint Mathematics Meetings, Baltimore, MD.

Teaching Strategies for Improving Student Learning May 2013
Michigan Project NExT Panel Discussion, 2013 Spring MAA Michigan Section Meeting, Lake Superior State University, Sault Ste. Marie, MI.

Games on Groups Apr 2013
Omaha Area Math Teachers Circle, University of Nebraska at Omaha, Omaha, NE.

Impartial games for generating groups Apr 2013
Cool Math Talks, University of Nebraska at Omaha, Omaha, NE.

Using IBL as an assessment strategy Jan 2013
Project NExT Alternative Assessment Panel Discussion, 2013 Joint Mathematics Meetings, San Diego, CA.

Inquiry-Based Learning Panel Discussion Oct 2012
Indiana MAA Section Meeting, Butler University, Indianapolis, IN.

Inquiry-Based Learning: What, Why, and How? Oct 2012
UA Mathematics Instructional Colloquium, University of Arizona, Tucson, AZ.

Permutation Puzzles Feb 2012
Math Teachers' Circle at University of Nebraska at Omaha, Omaha, NE.

The Futurama Theorem Feb 2012
UNO Mathematics Colloquium, University of Nebraska at Omaha, Omaha, NE.

The prisoner of Benda and the Futurama Theorem Nov 2011
Mathematics Forum, Gordon College, Wenham, MA.

Technology Sampler Aug 2010
Issues for Early Career Mathematicians in Academia, 2010 MathFest, Pittsburgh, PA.

On an open problem of the symmetric group Feb 2009
Mathematics Seminar, Keene State College, Keene, NH.

Other

Topics in combinatorics Nov 2023
Mathematics and Statistics Putnam Exam Preparation, NAU.

Impartial geodetic convexity achievement & avoidance games on graphs Jan 2023
Combinatorial Game Theory Colloquium IV, S. Miguel, Azores.

10 presentations (see webpage for details) Spring 2000, 2008, Fall 2012–Present
Mathematics & Statistics Colloquium, NAU

35 presentations (see webpage for details) Fall 2012–Present
Algebra, Combinatorics, Geometry, & Topology (ACGT) Seminar, NAU.

18 presentations (see webpage for details) Fall 2012–Present
Friday Afternoon Mathematics Undergrad Seminar (FAMUS), NAU.

4 presentations (see webpage for details) Fall 2013–Present
NAU Mathematics and Statistics Teaching Seminar, NAU.

Open-source course materials for an inquiry-based approach to an introduction to proof course and abstract algebra Jan 2018
Advancement of Open Educational Resources, 2018 Joint Math Meetings, San Diego, CA.

A guide-on-the-side approach to calculus Jan 2015
First-Year Calculus: Fresh Approaches for Jaded Students, 2015 Joint Mathematics Meetings, San Antonio, TX.

Transitioning students from consumers to producers Jan 2015
Teaching Inquiry, 2015 Joint Mathematics Meetings, San Antonio, TX.

Mathematics as a Creative Endeavor: Is Mathematics Communication? Sep 2014
Liberal Studies Town Hall, NAU. Joint with T. Blows (NAU).

Creating Independent Learners Aug 2014
Fall 2014 Tutor Training, NAU. Joint with E. Kennedy (NAU).

A Pentagon of Assessments Apr 2014
12th Annual Assessment Fair, NAU. Joint with B. Beaudrie and B. Boschmans (NAU).

Lumberjack Mathematics Center Poster Sep 2013
Showcase at the President and Provost Speaker Series, NAU. Joint with B. Beaudrie and B. Boschmans (NAU).

Implementing IBL in an Introduction to Proof Course Jun 2013
Legacy of R.L. Moore Conference, Austin, TX.

Designing Inquiry-Based Learning Experiences Oct 2012
Faculty Development Workshop, NAU.

Inquiry-Based Learning: What, Why, and How? Oct 2012
ArizMATYC Conference, Yavapai College, Prescott, AZ.

Effective and efficient grading for an IBL course Jun 2012
Legacy of R.L. Moore Conference, Austin, TX.

Collaborative peer review between two IBL number theory courses Jan 2012
Scholarship of Teaching and Learning in Collegiate Mathematics, 2012 Joint Mathematics Meetings, Boston, MA.

3 presentations (see webpage for details) Spring 2010–Fall 2011
Mathematics Seminar, PSU.

Diagram algebras as combinatorial tools for exploring Kazhdan–Lusztig theory Oct 2011
Dartmouth Combinatorics Seminar, Dartmouth College, Hanover, NH.

Mendeley: Reference manager meets social networking Aug 2011
Faculty Workshop Days, PSU.

Within ϵ of independence: An attempt to produce independent proof-writers via an IBL approach in a real analysis course Jan 2011
Getting Students Involved in Writing Proofs, 2011 Joint Mathematics Meetings, New Orleans, LA.

A diagrammatic representation of the Temperley–Lieb algebra Apr 2010
Hudson River Undergraduate Mathematics Conference, Keene State College, Keene, NH.

Using wikis to enhance collaboration Apr 2010
2010 Spotlight on Faculty Using Technology, PSU.

On the cyclically fully commutative elements of Coxeter groups Jan 2010
AMS Session on Discrete Mathematics, 2010 Joint Math Meetings, San Francisco, CA.

A diagrammatic representation of an affine C Temperley–Lieb algebra Jan 2009
MAA Project NExT-YMN Poster Session, 2009 Joint Math Meetings, Washington, DC.

Diagram calculus for the Temperley–Lieb algebra Nov 2008
MAA Northeastern Section Meeting, Bentley University, Waltham, MA.

Weak star reducibility in Coxeter groups Nov 2007
Algebraic Lie Theory Seminar, CU Boulder.

3 presentations (see webpage for details) Fall 2006–Fall 2007
Slow Pitch Colloquium, CU Boulder.

Diagram calculus for the Temperley–Lieb algebra Apr 2007
Graduate Student Combinatorics Conference, University of Washington, Seattle, WA.

10 Things I Wish I Would Have Known Before I Started Teaching Nov 2006
Graduate Teacher Program, CU Boulder.

Introduction to finite reflection groups Oct 2006
Coxeter Groups Seminar, CU Boulder.

A cell complex for configuration space Apr 2000
MAA Southwest Section Meeting, Arizona State University, Tempe, AZ.

Synergistic Activities

Facilitator for OPEN Math Pre-Workshops Planning Fall 2021-Present
The OPEN Math project serves the national interest to advance implementation and understanding of effective practices in delivering online professional development focused on teaching and learning to undergraduate mathematics instructors. My role was to train the facilitators that would be running the various summer workshops. Funded by NSF.

Co-director of Academy of Inquiry-Based Learning Fall 2019–Present
The Academy of Inquiry Based Learning (AIBL) is an association of professors, instructors, teachers, and non-teaching supporters (such as retired professors or teachers having IBL experience, administrators, foundation personnel). AIBL is focused on supporting the math community through building community to address the ongoing challenge of equitable and inclusive teaching via IBL and alternative grading methods.

Member of NAU Teaching Academy Fall 2021–Present
The Academy's members have been recognized by their colleges as instructional leaders and are appointed for three-year terms.

Facilitator for IBL Workshops Summers 2013–2020
The IBL Workshop provides an intensive four-day program for math instructors interested in learning to implement IBL in college-level mathematics courses. A comprehensive follow-up program is also provided after the workshop that includes mentoring, course materials, and continued interaction at upcoming conferences. Funded by NSF.

Special Projects Coordinator for Academy of Inquiry-Based Learning Fall 2012–Spring 2021
Help organize, promote, and run IBL-related events including workshops, special sessions, and conferences.

IBL Mentor for Academy of Inquiry-Based Learning Fall 2011–Present
Mentor for small cohort of mathematics instructors that are new to IBL.

Faculty Mentor for Project NExT Fellows Fall 2019–Present
Project NExT (New Experiences in Teaching) is a professional development program for new or recent Ph.D.s in the mathematical sciences. I am currently a mentor for two fellows.

Co-editor for `MathBlogging.org` Summer 2013–Spring 2022
`Mathblogging.org` is devoted to aggregating math-related blogs and news sources across the Internet. My job as editor is to select blog posts to be included in the Editors' Picks list.

Co-organizer & Facilitator for Problem Solving via Inquiry-Based Learning Summer 2018
Ran eight-day workshop on problem solving for middle and high school teachers in the Western Regional Noyce Alliance. Joint with E. Kennedy.

Co-organizer & Facilitator for SSU IBL Workshop Spring 2018
Ran two-day workshop at the Savannah State University on nuts and bolts of how to effectively implement an inquiry-based learning approach in mathematics and other STEM fields. Joint with G. Karakok.

Co-author/Editor for *Teaching Tidbits* Summer 2016–Spring 2018
Teaching Tidbits is an online column sponsored by the Mathematical Association of America. Column explores topics and current events related to undergraduate mathematics education.

Guest Editor for *PRIMUS* Spring 2015–Fall 2017
One of three guest editors for *PRIMUS* Special Issue on Inquiry-Based Learning in First and Second Year Courses. Joint with A. Hodge and T.J. Hitchman.

Co-author/Editor for *Math Ed Matters* Spring 2013–Spring 2016
Math Ed Matters is an online column sponsored by the Mathematical Association of America. Column explores topics and current events related to undergraduate mathematics education. Joint with A. Hodge.

Co-organizer for session on IBL in 1st and 2nd Year Courses Fall 2014–Spring 2015
2015 Joint Mathematics Meetings, San Antonio, TX. Associated with a special issue of *PRIMUS*.

Co-organizer for session on IBL Best Practices Summers 2012–2014
2014 MathFest, Portland, OR.
2013 MathFest, Hartford, CT.
2012 MathFest, University of Wisconsin, Madison, WI.

Co-organizer & Facilitator for UNO IBL Workshop Summer 2012
Ran three-day workshop at the University of Nebraska at Omaha on nuts and bolts of how to effectively implement an inquiry-based learning approach in mathematics and other STEM fields. Joint with S. Yoshinobu and A. Hodge. Funded by Kelly Foundation, Educational Advancement Foundation, and Haddix Initiatives.

Co-organizer of AMS Special Session on Combinatorics of Coxeter groups Spring 2011
AMS Spring Eastern Sectional Meeting, College of the Holy Cross, Worcester, MA.

Service

Professional

Web Master, MAA Southwest Section Summer 2023–Present
Member, Mathematics Teacher Education Partnership (MTEP) Fall 2023–Present
Member, Editorial Board for *Math Horizons* Spring 2014–Spring 2021
Member, MAA Social Media Taskforce Spring 2016–Summer 2016
Member, ArizMATYC/MAA-Southwest Section Organizing Committee Spring 2016
Volunteer, Navajo Math Festival at Diné College Spring 2015
Member, Planning Committee of Legacy of R.L. Moore Conference Summer 2013
Judge, JMM Undergraduate Student Poster Session Jan 2012

Community

Member, Board of Directors for Arizona Trail Association Fall 2021–Present
Regional Advisor, Bikepacking Roots Fall 2019–Summer 2023

Northern Arizona University, Flagstaff, AZ
Mentor, Faculty Mentor Program Spring 2024–Present
Chair, Department Curriculum Committee Fall 2021–Spring 2022, Fall 2023–Present
Member, NAU's team for AAC&U Institute on OER Summer 2023–Present
Member, Department Webpage Committee Fall 2015–Present
Co-organizer, ACGT/Mathematics Seminar Fall 2014–Present

Observer, 12 distinct classroom observations — Fall 2013–Present
Member, CEFNS College Promotion & Tenure Committee — Fall 2022–Spring 2024
Faculty Advisor, NAU Cycling Club — Fall 2000–Spring 2001, Fall 2018–Spring 2024
Member, Department Curriculum Committee — Fall 2022
Co-chair, Tenure Track Assistant Professor Hiring Committee — Fall 2021–Spring 2022
Coordinator, MAT 136 — Fall 2018–Spring 2022
Member, Steering Committee for NASA Space Grant — Fall 2015–Spring 2022
Member, Teaching Annual Review Subcommittee — Falls 2017, 2021
Co-chair, Calculus Textbook Committee — Fall 2019–Spring 2020
Chair, Tenure Track Assistant Professor Hiring Committee — Fall 2019–Spring 2020
Member, Scholarship Annual Review Subcommittee — Falls 2014, 2015, 2018, 2019, 2020
Member, Faculty Status Committee — Fall 2017–Spring 2019
Member, Instructor Screening Committee — Springs 2013, 2015, 2019
Member, Honors Week Committee — Fall 2015–Spring 2016, Fall 2017–Spring 2018
Member, Tenure Track Assistant Professor Hiring Committee — Fall 2016–Spring 2017
Coordinator, FAMUS — Fall 2015–Spring 2016
Coordinator, NAU Mathematics Undergraduate Research — Fall 2015–Spring 2016
Faculty Advisor, NAU Math Club — Fall 2015–Spring 2016
Member, Calculus Textbook Committee — Fall 2015–Spring 2016
Faculty Fellow, University College — Fall 2012–Spring 2016
Co-coordinator, MAT 136/137 — Fall 2014–Spring 2015
Member, Department Scholarships Committee — Fall 2014–Spring 2015
Member, Interns 2 Scholars (I2S) Ranking Committee — Fall 2014
Member, LMC Assessment Committee — Fall 2012–Summer 2014
Member, Department Graduate Operations Committee — Fall 2013–Spring 2014
Member, Department Assessment Committee — Fall 2012–Spring 2013
Co-organizer, Yavapai County Math Contest — Spring 2001
Member, Lecturer Hiring Committee — Spring 2001
Member, GTA Training Committee — Fall 2000–Spring 2001
Co-organizer, High School Math Day — Falls 2000, 1999

Plymouth State University, Plymouth, NH
Organizer, PSU Mathematics Seminars — Spring 2009–Spring 2012
Member, Academic Technology Committee — Fall 2011–Spring 2012
Chair, Online/Blended Learning in Mathematics Policy Committee — Fall 2011–Spring 2012
Member, Learning Technology Online Education Director Hiring Committee — Fall 2011
Member, Academic Technology Advisory Group — Fall 2010–Spring 2011
Member, Contract Faculty Hiring Committee — Summer 2010
Advisor, PSU Cycling Club — Spring 2010–Spring 2012
Co-organizer, 2010 Plymouth Bike/Walk to Work Day — Spring 2010
Coauthor, PSU Carbon Action Plan — Spring 2010
Member, Wellness Works Committee — Fall 2009–Spring 2012
Co-organizer, New Faculty Orientation — Summer 2009
Member, President's Commission on Environmental Sustainability — Spring 2009–Fall 2011
Member, Mathematics Curriculum Committee — Spring 2009

University of Colorado, Boulder, CO
Co-organizer, Workshop on Inquiry-Driven Learning — Spring 2007
Co-organizer, Graduate Student Orientation — Summers 2006–2007

Front Range Community College, Boulder, CO

Advisor, STEM Club	Fall 2002–Spring 2003
Co-organizer, π Day	Spring 2002
Co-organizer, FRCC Fun Run	Spring 2002