

<b>Contact Information</b>	Northern Arizona University	<a href="mailto:dana.ernst@nau.edu">dana.ernst@nau.edu</a>
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<b>Education</b>	<b>University of Colorado</b> , Boulder, CO	Aug 2008
	PhD, Mathematics, Advisor: Dr. R.M. Green Dissertation: <i>A diagrammatic representation of an affine <math>C</math> Temperley–Lieb algebra</i>	
	<b>Northern Arizona University</b> , Flagstaff, AZ	May 2000
	MS, Mathematics, Advisor: Dr. M. Falk Thesis: <i>Cell complexes for arrangements with group actions</i>	
<b>Academic Positions</b>	<b>George Mason University</b> , Fairfax, VA	May 1997
	BS, Mathematics	
	<b>Northern Arizona University</b> , Flagstaff, AZ	
	<i>Associate Professor</i> , Department of Mathematics & Statistics <i>Assistant Professor</i> , Department of Mathematics & Statistics	Aug 2017–Present Aug 2012–July 2017
<b>Research Interests</b>	<b>Plymouth State University</b> , Plymouth, NH	
	<i>Assistant Professor</i> , Mathematics Department	Aug 2008–May 2012
	<b>University of Colorado</b> , Boulder, CO	
	<i>Graduate Teaching Instructor</i> , Department of Mathematics <i>Lead Graduate Teacher</i> , Graduate Teacher Program	Aug 2003–May 2008 Aug 2006–May 2007
<b>Publications</b>	<b>Front Range Community College</b> , Boulder, CO	
	<i>Full-time Faculty</i> , Department of Mathematics	Aug 2001–May 2003
	<b>Northern Arizona University</b> , Flagstaff, AZ	
	<i>Instructor</i> , Mathematics & Statistics Department <i>Graduate Assistant</i> , North Learning Assistance Center <i>Graduate Teaching Instructor</i> , Mathematics & Statistics Department <i>Graduate Assistant</i> , South Learning Assistance Center	Jun 2000–May 2001 Jan 2000–May 2000 Jan 1998–Dec 1999 Aug 1997–Dec 1997
<b>Research Interests</b>	<b>General</b>	
	Interplay between combinatorics and algebraic structures; scholarship of teaching and learning (SoTL) and undergraduate mathematics education.	
<b>Research Interests</b>	<b>Specific</b>	
	Combinatorics of Coxeter groups and their associated Hecke algebras, Kazhdan–Lusztig theory, generalized Temperley–Lieb algebras, diagram algebras, heaps of pieces; combinatorial game theory; inquiry-based learning (IBL).	
<b>Publications</b>	<b>In Preparation</b>	
	P2. J. Breland, Q. Cadman, <b>D.C. Ernst</b> , J. Niemi*, J. Sullivan*, J. Wright*. Structure of braid graphs for reduced words in simply-laced Coxeter systems.	
	P1. F. Awik, H. Denoncourt, <b>D.C. Ernst</b> , and T. Rosenberg*. The reversal poset of signed permutations.	

**Submitted/Preprints**

- S2. F. Awik\*, J. Breland\*, Q. Cadman\*, and **D.C. Ernst**. Braid graphs in simply-laced triangle-free Coxeter systems are cubical graphs. [[arXiv:2104.12318](#)]
- S1. B.J. Benesh, **D.C. Ernst**, and N. Sieben. The spectrum of nim-values for achievement games for generating finite groups. [[arXiv:2004.08980](#)]

**Journal Articles**

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

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

### Book Chapters

- BC2. **D.C. Ernst** and A. Hodge. Within  $\epsilon$  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.

### Open-Source Books

- B2. **D.C. Ernst**. *An Inquiry-Based Approach to Abstract Algebra*, 117 pages. IBL course materials for an abstract algebra course. [[dcernst.github.io/IBL-AbstractAlgebra](#)]
- B1. **D.C. Ernst**. *An Introduction to Proof via Inquiry-Based Learning*, 149 pages. IBL course materials for an introduction to proof course. [[dcernst.github.io/IBL-IntroToProof](#)]  
Under review at MAA/AMS.

### 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](http://artofmathematics.org)]
- O14. **D.C. Ernst.** Setting the Stage. *Math Ed Matters*. Jan 2015. [[Math Ed Matters](http://MathEdMatters.com)]
- 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](http://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](http://TheIBLBlog.com)]

#### Miscellaneous

- 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](http://ePrint.org)]
- M3. **D.C. Ernst.** 2019 Pinyons and Pines: Event Recap. [Bikepacking.com](http://Bikepacking.com). Aug 2019.
- M2. **D.C. Ernst.** Dana's AZT, Part 2. [Bedrock Bags Blog](http://BedrockBagsBlog.com). Jul 2018.
- M1. **D.C. Ernst.** Dana's AZT, Part 1. [Bedrock Bags Blog](http://BedrockBagsBlog.com). Jun 2018.

**Grant  
Activity**

*Enumeration of signed permutations by reversal distance with applications to genome rearrangements* (Funded: \$3,350) 2021–2022

**Co-PI**, Hooper Undergraduate Research Award (HURA). Awarded funds to support John (Frank) Burkhardt and Alex Stewart to on undergraduate research project during 2021–2022 academic year.

*Impartial achievement & avoidance games for generating finite groups* (Pending) Fall 2019  
**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.

*Impartial achievement & avoidance games for generating finite groups* (Unfunded) 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.

*Impartial achievement & avoidance games for generating finite groups* (Unfunded) 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.

*Active Learning in Calculus* (Unfunded) 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.

*A Pragmatic Design for Informal STEM Learning about Scientific Reasoning: Drawing on Diagrams, Models and Citizen Science* (Unfunded) 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.

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

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

*SPIGOT* (Funded: \$540,000) 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. A comprehensive follow-up program is also provided after the workshop that includes mentoring, course materials, and continued interaction at upcoming conferences.

*ROPE: Resource of Open Problems for Education* (Unfunded) 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).

*Applets for Calculus* (Funded: \$1,296) 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.

*Prime labelings of graphs* (Funded: \$33,100) 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).

*Toward's a Cyclic Version of Matsumoto's Theorem* (Unfunded) 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.

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

*An open problem library for mathematics* (Funded: \$7,500) 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.

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

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

*An Open Problem Library for Mathematics* (Unfunded) 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).

*IBL course materials for group theory* (Funded: \$2,500) 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.

*Conjugacy and reducibility in Coxeter groups* (Unfunded) 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).



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

*The conjugacy problem for Coxeter groups* (Unfunded) 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).

**Teaching  
Experience**

**Summary**

Over 20 years of teaching experience; recipient of several teaching awards (most recent: 2021 NAU President's Distinguished Teaching Fellow, 2016 MAA Southwest Section Teaching Award).

**Courses Taught**

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

**Advising &  
Mentoring**

**Masters Theses**

*Structure of braid graphs for reduced words in Coxeter systems* (tentative) Current  
 Jillian Barnes (NAU).

*Structure of braid graphs in simply-laced Coxeter systems* Summer 2021  
 Quentin Cadmanm (NAU).

*The reversal poset of signed permutations* Spring 2021  
 Fadi Awik (NAU).

*On the maximum cardinality of braid classes* Summer 2017  
 Zach Parker (NAU).

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

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

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

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

**Undergrad Research Projects**

*Enumeration of signed permutations by reversal distance* (tentative) Fall 2021–Spring 2022  
 John (Frank) Burkhart, Alex Stewart (NAU). Funded by Hooper Undergraduate Research Award (HURA).

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

- Architecture of braid classes in simply-laced Coxeter systems* Fall 2018–Spring 2019  
Fadi Awik, Jadyn Breland, Quentin Cadman (NAU). 3 presentations, 1 submission.
- 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, paper in progress.
- 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 publications. 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 for Gold Axe* Fall 2015, Spring 2018, Spring 2019  
Named by graduating seniors 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**

- 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**
- 8 presentations (see webpage for details) Spring 2000, 2008, Fall 2012–Present  
Mathematics & Statistics Colloquium, NAU.
- 25 presentations (see webpage for details) Fall 2012–Present  
Algebra, Combinatorics, Geometry, & Topology Seminar, NAU.
- 18 presentations (see webpage for details) Fall 2012–Present  
Friday Afternoon Mathematics Undergrad Seminar, NAU.

- 3 presentations (see webpage for details) Fall 2013–Spring 2015  
Mathematics and Statistics Teaching Showcase, 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  $\epsilon$  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

- 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’s mission is to improve Mathematics Education. To achieve our mission, we primarily focus on improving undergraduate math education, by training and supporting math instructors to implement active, student-centered methods of instruction.
- 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–Present  
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**

<i>Member</i> , Editorial Board for <i>Math Horizons</i>	Spring 2014–Spring 2021
<i>Member</i> , MAA Social Media Taskforce	Spring 2016–Summer 2016
<i>Member</i> , ArizMATYC/MAA-Southwest Section Organizing Committee	Spring 2016
<i>Volunteer</i> , Navajo Math Festival at Diné College	Spring 2015
<i>Member</i> , Planning Committee of Legacy of R.L. Moore Conference	Summer 2013
<i>Judge</i> , JMM Undergraduate Student Poster Session	Jan 2012

**Community**

<i>Member</i> , Board of Directors for Arizona Trail Association	Fall 2021–Present
<i>Regional Advisor</i> , Bikepacking Roots	Fall 2019–Present

**Northern Arizona University, Flagstaff, AZ**

<i>Coordinator</i> , MAT 136	Fall 2018–Present
<i>Member</i> , Steering Committee for NASA Space Grant	Fall 2015–Present
<i>Co-organizer</i> , ACGT Seminar	Fall 2014–Present
<i>Faculty Advisor</i> , NAU Cycling Club	Fall 2000–Spring 2001, Fall 2018–Present
<i>Member</i> , Department Webpage Committee	Fall 2015–Present
<i>Chair</i> , Tenure Track Assistant Professor Hiring Committee	Fall 2019–Spring 2020
<i>Member</i> , Faculty Status Committee	Fall 2017–Spring 2019
<i>Member</i> , Instructor Screening Committee	Spring 2013, 2015, 2019
<i>Member</i> , Scholarship Annual Review Committee	Fall 2014, 2015, 2018, 2019, 2020
<i>Member</i> , Teaching Annual Review Committee	Fall 2017
<i>Member</i> , Honors Week Committee	Fall 2015–Spring 2016, Fall 2017–Spring 2018
<i>Member</i> , Tenure Track Assistant Professor Hiring Committee	Fall 2016–Spring 2017
<i>Faculty Fellow</i> , University College	Fall 2012–Spring 2016
<i>Coordinator</i> , FAMUS	Fall 2015–Spring 2016
<i>Coordinator</i> , NAU Mathematics Undergraduate Research	Fall 2015–Spring 2016
<i>Faculty Advisor</i> , NAU Math Club	Fall 2015–Spring 2016
<i>Member</i> , Calculus Textbook Committee	Fall 2015–Spring 2016
<i>Co-coordinator</i> , MAT 136/137	Fall 2014–Spring 2015
<i>Member</i> , Department Scholarships Committee	Fall 2014–Spring 2015
<i>Member</i> , Interns 2 Scholars (I2S) Ranking Committee	Fall 2014
<i>Member</i> , LMC Assessment Committee	Fall 2012–Summer 2014
<i>Member</i> , Department Graduate Operations Committee	Fall 2013–Spring 2014
<i>Member</i> , Department Assessment Committee	Fall 2012–Spring 2013
<i>Co-organizer</i> , Yavapai County Math Contest	Spring 2001
<i>Member</i> , Lecturer Hiring Committee	Spring 2001
<i>Co-organizer</i> , High School Math Day	Fall 2000, 1999
<i>Member</i> , GTA Training Committee	Fall 2000–Spring 2001

**Plymouth State University, Plymouth, NH**

<i>Organizer</i> , PSU Mathematics Seminars	Spring 2009–Spring 2012
<i>Member</i> , Academic Technology Committee	Fall 2011–Spring 2012
<i>Chair</i> , Online/Blended Learning in Mathematics Policy Committee	Fall 2011–Spring 2012
<i>Member</i> , Learning Technology Online Education Director Hiring Committee	Fall 2011
<i>Member</i> , Academic Technology Advisory Group	Fall 2010–Spring 2011
<i>Member</i> , Contract Faculty Hiring Committee	Summer 2010
<i>Advisor</i> , PSU Cycling Club	Spring 2010–Spring 2012

<i>Co-organizer</i> , 2010 Plymouth Bike/Walk to Work Day	Spring 2010
<i>Coauthor</i> , PSU Carbon Action Plan	Spring 2010
<i>Member</i> , Wellness Works Committee	Fall 2009–Spring 2012
<i>Co-organizer</i> , New Faculty Orientation	Summer 2009
<i>Member</i> , President’s Commission on Environmental Sustainability	Spring 2009–Fall 2011
<i>Member</i> , Mathematics Curriculum Committee	Spring 2009
<b>University of Colorado</b> , Boulder, CO	
<i>Co-organizer</i> , Workshop on Inquiry-Driven Learning	Spring 2007
<i>Co-organizer</i> , Graduate Student Orientation	Summers 2006–2007
<b>Front Range Community College</b> , Boulder, CO	
<i>Advisor</i> , STEM Club	Fall 2002–Spring 2003
<i>Co-organizer</i> , $\pi$ Day	Spring 2002
<i>Co-organizer</i> , FRCC Fun Run	Spring 2002