

Professor of Mathematics  
Department of Mathematics  
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## Employment

2016–present	Professor, University of Kansas
2010–2016	Associate Professor, University of Kansas
2005–2010	Assistant Professor, University of Kansas
2002–2005	NSF Postdoctoral Fellow, <a href="#">University of Minnesota</a>
2001–2002	Instructor, <a href="#">Illinois Institute of Technology</a>
1997–2000	Teaching Assistant, <a href="#">University of California, San Diego</a>

## Education

- Ph.D. in mathematics, [University of California, San Diego](#), 2002
- M.A. in mathematics, University of California, San Diego, 1998
- A.B. in mathematics, *magna cum laude*, [Harvard University](#), 1996

## Research Grants

- [Simons Foundation Collaboration Grant](#) (2014–2019, \$35,000)
- NSA Young Investigators Grant (2012–2014, \$40,000)
- Simons Foundation Collaboration Grant (2011–2012, \$7,000; original award \$35,000 for 2011–2016; remainder declined upon receipt of NSA grant)
- University of Kansas General Research Fund (2011; \$8,000)
- NSA Young Investigators Grant (2008–2010; \$30,000)
- University of Kansas New Faculty General Research Fund (2006–2008, \$8,000)

## Awards

- G. Baley Price Award for Outstanding Teaching of Graduate Mathematics (selected by graduate students of KU Department of Mathematics), 2022
- Kansas Section of the Mathematical Association of America, Award for Distinguished College or University Teaching of Mathematics, 2019
- Don and Pat Morrison Foundation Award for Excellence in Teaching, KU, 2013
- G. Baley Price Award for Outstanding Teaching of Graduate Mathematics (selected by graduate students of KU Department of Mathematics), 2013
- ING Excellence in Teaching Award, KU, 2011

## Editorial Appointments

- Handling Editor, [Combinatorial Theory](#), starting 2025
- Section Chief Editor, [Frontiers for Young Minds: Understanding Mathematics](#), 2017–present

## Research Activities

### Research Interests

Combinatorics, algebraic geometry, discrete geometry and computational commutative algebra. Particular topics of interest include simplicial complexes, matroids, algebraic graph theory, tree enumeration, chip-firing/sandpile models, configuration spaces, Stanley-Reisner theory, combinatorial Hopf theory, parking functions, and polytopes and polyhedra.

### Research articles

#### *Articles submitted for publication*

- (1) Unbounded matroids (with J. Berggren and J.A. Samper), [arXiv:2312.02040](#), December 2023
- (2) Hopf monoids of set families (with K. Marshall), [arXiv:2205.05772](#), May 2022

#### *Articles in press*

- (1) Chromatic symmetric functions and polynomial invariants of trees (with J. Aliste-Prieto, J.D. Wagner, and J. Zamora), [arXiv:2402.10333](#), February 2024; to appear in *Bulletin of the London Mathematical Society*
- (2) Simplicial effective resistance and enumeration of spanning trees (with A.M. Duval, W. Kook, and K.-J. Lee), [arXiv:2206.02182](#), June 2022; to appear in *Israel Journal of Mathematics*

#### *Published articles*

- (1) Hopf monoids of ordered simplicial complexes (with F. Castillo and J.A. Samper), *International Mathematics Research Notices* (2024), 13312–13351; [arXiv:2011.14955](#)
- (2) Ehrhart theory of paving and panhandle matroids (with D. Hanely, D. McGinnis, D. Miyata, G. Nasr, A.R. Vindas-Meléndez, and M. Yin), *Advances in Geometry* **23** (2023), no. 4, 501–526; [arXiv:2205.05772](#)
- (3) A positivity phenomenon in Elser’s Gaussian-cluster percolation model (with G. Dorpalen-Barry, C. Hettle, D.C. Livingston, G. Nasr, J. Vega, and H. Whitlatch), *Journal of Combinatorial Theory, Series A* **179** (2021) 105364; [arXiv:1905.11330](#)
- (4) Interval parking functions (with E. Colaric, R. DeMuse, and M. Yin), *Advances in Applied Mathematics* **123** (2021) 102129; [arXiv:2006.0932](#),
- (5) Enumerating parking completions using Join and Split (with A. Adeniran, S. Butler, G. Dorpalen-Barry, P.E. Harris, C. Hettle, Q. Liang, and H. Nam), *Electronic Journal of Combinatorics* **27** (2020), no. 2, #P2.44; [arXiv:1912.01688](#)
- (6) Increasing spanning forests in graphs and simplicial complexes (with J. Hallam and B.E. Sagan), *European Journal of Combinatorics* **76** (2019), 178–198; [arXiv:1610.05093](#)
- (7) Counting arithmetical structures on paths and cycles (with B. Braun, H. Corrales, S. Corry, L.D. García Puente, D. Glass, N. Kaplan, G. Musiker, and C.E. Valencia), *Discrete Mathematics* **341** (2018), 2949–2963; [arXiv:1701.06377](#)

- (8) A weighted cellular matrix-tree theorem, with applications to complete colorful and cubical complexes (with G. Aalipour, A.M. Duval, W. Kook and K.-J. Lee), *Journal of Combinatorial Theory, Series A* **158** (2018), 362–386; [arXiv:1510.00033](#)
- (9) Oscillation estimates of eigenfunctions via the combinatorics of noncrossing partitions (with V.M. Hur and M.A. Johnson), *Discrete Analysis* 2017, Paper No. 13, 20 pp.; [arXiv:1609.02189](#)
- (10) A non-partitionable Cohen-Macaulay simplicial complex (with A.M. Duval, B. Goeckner, and C.J. Klivans), *Advances in Mathematics* **299** (2016), 381–395; [arXiv:1504.04279](#)
- (11) Pseudodeterminants and perfect square spanning tree counts (with M. Maxwell, V. Reiner, and S.O. Wilson), *Journal of Combinatorics* **6** (2015), no. 3, 295–325; [arXiv:1311.6686](#)
- (12) Cuts and flows of cell complexes (with A.M. Duval and C.J. Klivans), *Journal of Algebraic Combinatorics* **41** (2015), 969–999; [arXiv:1206.6157](#)
- (13) On the spectra of simplicial rook graphs (with J.D. Wagner), *Graphs and Combinatorics* **31** (2015), no. 5, 1589–1611; [arXiv:1209.3493](#)
- (14) Enumerating colorings, tensions and flows in cell complexes (with M. Beck, F. Breuer, and L. Godkin), *Journal of Combinatorial Theory, Series A* **122** (2014), 82–106; [arXiv:1212.6539](#).
- (15) Critical groups of simplicial complexes (with A.M. Duval and C.J. Klivans), *Annals of Combinatorics* **17** (2013), 53–70; [arXiv:1101.3981](#)
- (16) Graph varieties in high dimension (with T. Enkosky), *Beiträge zur Algebra und Geometrie* **54**, no. 1 (2013), 1–12; [arXiv:1006.5864](#)
- (17) The incidence Hopf algebra of graphs (with B. Humpert), *SIAM Journal on Discrete Mathematics* **26**, no. 2 (2012), 555–570; [arXiv:1012.4786](#)
- (18) Cellular spanning trees and Laplacians of cubical complexes (with A.M. Duval and C.J. Klivans), *Advances in Applied Mathematics* **46** (2011), 247–274; [arXiv:0908.1956](#)
- (19) Are node-based and stem-based clades equivalent? Insights from graph theory (with D.C. Blackburn and E.O. Wiley), *PLoS Currents: Tree of Life*, [published online](#) 11/18/2010.
- (20) Simplicial matrix-tree theorems (with A.M. Duval and C.J. Klivans), *Transactions of the American Mathematical Society* **361** (2009), no. 11, 6073–6114; [arXiv:0802.2576](#)
- (21) Updown numbers and the initial monomials of the slope variety (with J.D. Wagner), *Electronic Journal of Combinatorics* **16**, no. 1 (2009), Research Article #R82; [arXiv:0905.4751](#)
- (22) On distinguishing trees by their chromatic symmetric functions (with M. Morin and J.D. Wagner), *Journal of Combinatorial Theory, Series A* **115** (2008), 237–253; [arXiv:0609339](#)
- (23) Random geometric graph diameter in the unit ball (with R.B. Ellis and C. Yan), *Algorithmica* **47**, no. 4 (2007), 421–438; [arXiv:math/0501214](#)
- (24) Harmonic algebraic curves and noncrossing partitions (with D. Savitt and T. Singer), *Discrete and Computational Geometry* **37**, no. 2 (2007), 267–286; [arXiv:math/0511248](#)
- (25) Classification of Ding’s Schubert varieties: finer rook equivalence (with M. Develin and V. Reiner), *Canadian Journal of Mathematics* **59**, no. 1 (2007), 36–62; [arXiv:math/0403530](#)
- (26) Rigidity theory for matroids (with M. Develin and V. Reiner), *Commentarii Mathematici Helvetici* **82** (2007), 197–233; [arXiv:math/0503050](#)

- (27) The Mathieu group  $M_{12}$  and the  $M_{13}$  game (with N.D. Elkies and J.H. Conway), *Experimental Mathematics* **15**, no. 2 (2006), 223–236; [arXiv:math/0508630](#)
- (28) The slopes determined by  $n$  points in the plane, *Duke Mathematical Journal* **131**, no. 1 (2006), 119–165; [arXiv:math/0302106](#)
- (29) Cyclotomic and simplicial matroids (with V. Reiner), *Israel Journal of Mathematics* **150** (2005), 229–240; [arXiv:math/0402206](#)
- (30) Random geometric graph diameter in the unit disk with  $\ell_p$  metric (with R.B. Ellis and C. Yan), Proceedings of the 12th International Symposium on Graph Drawing (New York, October, 2004), Springer Lecture Notes in Computer Science **3383** (2005) (J. Pach, ed.), 167–172.
- (31) On the topology of graph picture spaces, *Advances in Mathematics* **191**, no. 2 (2005), 312–338; [arXiv:math/0307405](#)
- (32) Factorizations of some weighted spanning tree enumerators (with V. Reiner), *Journal of Combinatorial Theory, Series A* **104**, no. 2 (2003), 265–285; [arXiv:math/0302213](#)
- (33) Geometry of graph varieties, *Transactions of the American Mathematical Society* **355**, no. 11 (2003), 4151–4169; [arXiv:math/0302089](#)
- (34) Ruling out (160,54,18) difference sets in some nonabelian groups (with J. Alexander, R. Balasubramanian, K. Monahan, H. Pollatsek, and A. Sen), *Journal of Combinatorial Designs* **8**, no. 4 (2000), 221–231.

### Survey/expository articles

- (1) The Partitionability Conjecture (with A.M. Duval and C.J. Klivans), *Notices of the American Mathematical Society* **64**, no. 2 (2017), 117–122.
- (2) Simplicial and Cellular Trees (with A.M. Duval and C.J. Klivans), *Recent Trends in Combinatorics* (A. Beveridge, J. Griggs, L. Hogben, G. Musiker and P. Tetali, eds.), 713–752, IMA Vol. Math. Appl., 159, Springer, 2016; [arXiv:1506.06819](#)

### Book reviews

- (1) Review of *How to Bake  $\pi$*  by Eugenia Cheng (Basic Books, 2016), *Notices of the American Mathematical Society* **63**, no. 9 (2016), 1053–1054.
- (2) Review of *The Cult of Pythagoras* by Alberto A. Martínez (U. of Pittsburgh Press, 2012), *The Mathematical Intelligencer* **35**, no. 4 (2013), 81–82.
- (3) Review of *Euler’s Gem* by David S. Richeson (Princeton U. Press, 2008), *Notices of the American Mathematical Society* **57**, no. 11 (2010), 1448–1450.

### Theses

- (1) *Graph varieties*, Ph.D. dissertation, University of California, San Diego, 2002.
- (2) *The Mathieu group  $M_{12}$  and Conway’s  $M_{13}$  game*, A.B. thesis, Harvard University, 1996.

### Invited Plenary Talks at Conferences

- *Chromatic Symmetric Functions and Polynomial Invariants of Trees* CombinaTexas, Texas A&M University, April 2024
- *Unbounded matroids*, Triangle Lectures in Combinatorics, University of North Carolina–Greensboro, December 2022
- *Simplicial and cellular trees*, Great Plains Combinatorics Conference, North Dakota State University, May 2022
- *Simplicial complexes (and Sage, of course!) from a combinatorialist's point of view*, Sage Days 74, CIAS, Observatoire de Paris, Meudon, June 2016
- *A non-partitionable Cohen-Macaulay simplicial complex*, Midwest Combinatorics Conference, University of Minnesota, May 2015
- *Simplicial matrix-tree theorems*, KUMUNU VIII, Lincoln, NE, September 2007

### Invited Expository Talks

- *What Else Can You Count If You Can Count Trees?*, Math Club, Washburn University (Topeka, KS), April 4, 2019
- *What Else Can You Count If You Can Count Trees?*, Mathematics/CS Department Colloquium, Benedictine College (Atchison, KS), April 4, 2019
- *Planes, Hyperplanes, and Beyond*, plenary lecture, Missouri Section of the MAA Annual Meeting, Drury University (Springfield, MO), April 7, 2018
- The Frank S. Brenneman Lectures, Tabor College (Hillsboro, KS), March 28, 2017
  - (1) *Planes, Hyperplanes, and Beyond: Understanding Higher-Dimensional Spaces*
  - (2) *Trees and How to Count Them*

### Conference Talks

- *Chromatic symmetric functions and polynomial invariants of trees*, SIAM Central States Section Meeting, U. Missouri, Kansas City, October 5, 2024
- *Hopf monoids of ordered simplicial complexes*, AMS Central Sectional Meeting, online, October 10, 2021
- *Simplicial effective resistance and enumeration of spanning trees*, SIAM Central States Section Meeting, KU (held online), October 2, 2021
- *A positivity phenomenon in Elser's Gaussian-cluster percolation model*. AMS sectional meeting, Gainesville, Nov. 2019
- *Oscillation estimates of eigenfunctions via the combinatorics of noncrossing partitions (a.k.a. Combinatorics and PDE: A Love Story)*, SIAM Central States Section Meeting, U. Oklahoma, October 6, 2018
- *A non-partitionable Cohen-Macaulay simplicial complex*. AMS sectional meeting, Memphis, October 2015
- *New approaches to conjectures on decompositions of simplicial complexes*. AMS sectional meeting, Las Vegas, April 2015
- *The uniqueness problem for chromatic symmetric functions of trees*. AMS sectional meeting, Las Vegas, April 2015
- *Pseudodeterminants and perfect square spanning tree counts*. AMS sectional meeting, Eau Claire, WI, September 2014

- *The cocritical group of a cell complex*. AMS sectional meeting, St. Louis, September 2013
- *Cuts and flows in cell complexes*, 25th International Conference on Formal Power Series and Algebraic Combinatorics [FPSAC XXV], Paris, June 2013 (refereed)
- *Enumerating cellular colorings, orientations, tensions and flows*. AMS sectional meeting, U. of Mississippi, March 2013
- *Enumerating cellular colorings, orientations, tensions and flows*. AMS sectional meeting, JMM, San Diego, January 2013
- *On the spectra of simplicial rook graphs*. AMS sectional meeting, New Orleans, October 2012
- *Cuts and flows in cell complexes, II: lattices and critical groups*. AMS sectional meeting, Lawrence, KS, March 2012
- *Spanning trees of shifted simplicial complexes*. AMS sectional meeting, Lincoln, NE, October 2011
- *Updown numbers and the initial monomials of the slope variety*. AMS sectional meeting, Notre Dame, November 2010
- *On distinguishing trees by their chromatic symmetric functions*, CombinaTexas, April 2008
- *A simplicial matrix-tree theorem, I: General Results*. AMS sectional meeting, Chicago, October 2007
- *Rigidity theory for matroids*. AMS sectional meeting, Storrs, CT, October 2006
- *A simplicial matrix-tree theorem (preliminary report)*. AMS sectional meeting, Cincinnati, October 2006
- *On the chromatic symmetric function of a tree*, FPSAC XVIII, San Diego, June 2006
- *Finer rook equivalence and cohomology of Ding's Schubert varieties*. AMS sectional meeting, San Francisco, April 2006
- *Harmonic algebraic curves and noncrossing partitions*. AMS sectional meeting, Notre Dame, IN, April 2006
- *Harmonic algebraic curves and noncrossing partitions*. AMS sectional meeting, Eugene, OR, November 2005
- *Poincaré meets Tutte*, FPSAC XVI, Vancouver, June 2004
- *Towards a bijective enumeration of spanning trees of the hypercube*, CombinaTexas, April 2004
- *On the topology of multigraph picture spaces*. AMS sectional meeting, Binghamton, NY, October 2003
- *Ordered planar trees and the slope variety of the complete graph*. AMS sectional meeting, Ann Arbor, MI, March 2002
- *The Stanley-Reisner simplicial complex of the slope variety*. AMS sectional meeting, JMM, San Diego, January 2002

#### Conference Poster Presentations (refereed)

- *On the spectra of simplicial rook graphs*, FPSAC XXV, Paris, France, June 2013
- *The incidence Hopf algebra of graphs*, FPSAC XXIII, Reykjavík, Iceland, June 2011
- *Rigidity theory for matroids*, FPSAC XVII, Taormina, Italy, June 2005
- *Combinatorial and geometric properties of graph varieties*, FPSAC XII, Tempe, AZ, USA, May 2001

#### Invited Seminar/Colloquium Talks (other than home department)

All talks given in combinatorics or algebra seminars unless otherwise specified.



- *¿Cuántos árboles tiene un red?* [How many trees does a network have?], [Santiago Number Theory and Algebra Seminar](#), Pontificia U. Católica de Chile, October 2023 (research audience)
- *¿Cuántos árboles tiene un red?* [How many trees does a network have?], Colloquium, Pontificia U. Católica de Chile, September 2023 (undergraduate audience)
- *Simplicial effective resistance and tree enumeration*, U. Delaware (online), December 2021
- *Simplicial and cellular trees*, Kansas State University, November 2018
- *A non-partitionable Cohen-Macaulay simplicial complex*, Michigan State University, March 2016
- *A non-partitionable Cohen-Macaulay simplicial complex*, Kansas State University, February 2016
- *A non-partitionable Cohen-Macaulay simplicial complex*, U. of Washington, Seattle, July 2015
- *Simplicial and cellular spanning trees: an overview*, UCLA, February 2014
- *Eigenvalues of simplicial rook graphs*, UC Davis, November 2013
- *Cellular cuts, flows, critical groups, and cocritical groups*, U. of Minnesota, April 2012
- *Cellular cuts, flows, critical groups, and cocritical groups*, Georgia Tech, April 2012
- *The Incidence Hopf Algebra of Graphs*, San Francisco State U., March 2012
- *Simplicial and Cellular Spanning Trees* (3 lectures), UC Davis, March 2012
- *Poincaré Meets Tutte*, Student Geometry/Topology Seminar, UC Davis, March 2012
- *Points, Lines, Vectors, Lengths, Slopes, Graphs, Pictures, and Rigidity, Not Necessarily In That Order*, Colloquium, U. of Texas, El Paso, February 2012
- *Critical groups of simplicial complexes*, U. of Miami, April 2011
- *Critical groups of simplicial complexes*, Washington U., February 2011
- *Graph theory and geometry*, Colloquium, Washington U. in St. Louis, February 2011
- *Graph varieties*, U. of Nebraska, April 2010
- *Simplicial, cubical and cellular spanning trees*, U. of Kentucky, April 2009
- *Counting simplicial and cubical spanning trees*, Texas A&M, October 2008
- *Simplicial and cellular matrix-tree theorems*, U. of Minnesota, May 2008
- *When is a tree determined by its chromatic symmetric function?*, MIT, March 2007
- *Graph varieties*, Algebra Seminar, U. of Missouri, September 2006
- *Harmonic algebraic curves and noncrossing partitions*, UQAM (Montréal), March 2006
- *Harmonic algebraic curves and noncrossing partitions*, Indiana U., December 2005
- *Rigidity theory for matroids*, U. of Pennsylvania, April 2005
- *Rigidity theory for matroids*, Ohio State U. January 2005
- *Combinatorics and geometry of graph varieties*, Mount Holyoke College, October 2004
- *Finer rook equivalence: classifying Ding's Schubert varieties*, U. of Washington, May 2004
- *Finer rook equivalence: classifying Ding's Schubert varieties*, UC Berkeley, May 2004
- *Pictures of graphs*, MIT, March 2003
- *Combinatorics and geometry of graph varieties*, York U., October 2002
- *Calculating the degree of the slope variety*, U. of Illinois, Chicago, November 2001
- *Graph varieties*, Combinatorics/Geometry Seminar, U. of Washington, October 2001
- *Graph varieties*, U. of Minnesota, June 2001
- *Graph varieties*, Algebraic Geometry Seminar, U. of Illinois, Chicago, October 2000

### Research Workshops Attended

- CIAS, Observatoire de Paris (Meudon): Sage Days 74, June 2016
- Casa Matemática Oaxaca: Workshop on Sandpile Groups, November 2015

- Institute for Mathematics and its Applications: Workshop on Geometric and Enumerative Combinatorics, November 2014
- American Institute of Mathematics: Workshop on Generalizations of Chip-Firing and the Critical Group, July 2013 (co-organizer)
- Institute for Mathematics and its Applications: Sage-Combinat Days 40, July 2012
- Rocky Mountain Mathematics Consortium: Summer School on Polyhedral Geometry and Algebraic Combinatorics, June 2011
- Institute for Pure and Applied Mathematics: Workshop on Combinatorial Geometry, October 2009
- American Institute of Mathematics: Workshop on Rigidity and Polyhedra, December 2007
- Institute for Advanced City/Park City Mathematics Institute: Summer Session on Geometric Combinatorics, July 2004

## Teaching and Advising Activities

### Courses at University of Kansas

- Math 105, Topics in Mathematics (F'11, F'14) [large lecture]
- Math 125, Calculus I (S'17) [large lecture]
- Math 127, Calculus III (F'19, S'24) [large lecture]
- Math 141, Honors Calculus I (F'05, F'07, F'09)
- Math 147, Honors Calculus III (F'17, F'18)
- Math 223, Vector Calculus (S'07, F'10, F'12)
- Math 243, Honors Vector Calculus (F'15)
- Math 290, Elementary Linear Algebra (F'06)
- Math 409, Geometry for Secondary/Middle School Teachers (S'09, S'13, S'23)
- Math 410, History of Math for Secondary/Middle School Teachers (S'09, S'13, S'23)
- Math 500, Intermediate Analysis (F'24)
- Math 696, Topics in Topology (S'21)
- Math 724, Combinatorial Mathematics (F'13, F'17, F'21)
- Math 725, Graph Theory (S'06, S'10, S'16, S'20)
- Math 791, Abstract Algebra (S'25)
- Math 796, Topics in Algebraic Combinatorics (S'08)
- Math 821, Algebraic Topology (S'11, S'14, S'18, S'22)
- Math 824, Algebraic Combinatorics (F'10, F'12, S'15, F'16, F'18, F'20, F'22)
- Math 996, Topics in Algebraic Combinatorics [Coxeter Groups] (F'08, S'19)
- Math 996, Topics in Combinatorial Commutative Algebra (F'06, F'13)

### Graduate Students Advised

- May Bee Trist (current M.A. student; degree expected Spring 2025)
- Mark Denker (current Ph.D. student; degree expected Spring 2025)
- Dania Morales (Ph.D., 2024)  
Dissertation: *Lattice path matroids: base polytopes & Ehrhart theory*



- Enrique Salcido (M.A., 2023)  
Master's project: *Counting subtrees using the chromatic symmetric function*
- Kevin Marshall (Ph.D., 2022)  
Dissertation: *A Hopf monoid on set families*
- Emma Colaric (M.A., 2020)  
Master's project: *Scheduling polynomials and Ehrhart theory*
- Ken Duna (Ph.D., 2019)  
Dissertation: *Matroid independence polytopes and their Ehrhart theory*
- Bennet Goeckner (Ph.D., 2018)  
Dissertation: *Decompositions of simplicial complexes*
- Alex Lazar (M.A., 2014)  
Master's project: *Tropical simplicial complexes and the tropical Picard group*
- Tom Enkosky (Ph.D., 2011)  
Dissertation: *Enumerative and algebraic aspects of slope varieties*
- Brandon Humpert (Ph.D., 2011)  
Dissertation: *Polynomials associated with graph coloring and orientations*
- Jonathan Hemphill (M.A., 2011)  
Master's project: *Algorithms for single-source, single-destination optimal paths on directed weighted graphs*
- Jenny Buontempo (M.A., 2008)  
Master's project: *Matroid theory and the Tutte polynomial*

### Undergraduate Students Mentored

- Juan Diego Ezcurra: reading course in algebraic topology, Fall 2021
- Jonah Berggren: Undergraduate Research Award in Mathematics, Spring 2021 (project title: Unbounded Matroids)
- Brandon Caudell: Departmental Honors, 2017; joint advisor with A. Gill, EECS (reading course on the mathematics of Rubik's Cube)
- Peter Bradshaw: published a paper entitled "[Triangle Packing on Tripartite Graphs Is Hard](#)" in the Rose-Hulman Undergraduate Journal of Mathematics. The paper began as a final project for my Math 725 class in Spring 2016.
- Joseph Cummings: Departmental Honors, 2016 (reading course on hyperplane arrangements)
- Robert Winslow: Departmental Honors, 2016 (reading course in rigidity theory)
- Keeler Russell: Undergraduate Research Award, Summer/Fall 2012; Honors Research Development Program, Summer 2010 (computation of chromatic symmetric functions)
- Justin Smith: Honors Research Development Program, Summer 2008
- Nick Tobaben: Undergraduate Research Award, Summer/Fall 2008
- Tom Whipple: University of Minnesota senior project, Spring 2005

## Outreach and Professional Development

- Member, Steering Committee, Jayhawk Math Teachers Circle (with J. Niknejad, KU, and high school teachers W. Dunn and C. Rood), 2018–2020
- Hands-on workshop on the game of Nim for Katherine Johnson Scholar Sisters (STEM group for African-American girls, Wichita, KS), KU, March 2018
- Guest lecture, *Inspired by Math* program for middle schoolers at Emporia State University: “Amazing Patterns in the Game of Nim,” October 2016
- Hands-on workshop on polyhedra and Euler’s formula for seven Lawrence elementary school students, KU, February 2016
- Science On Tap (sponsored by KU Natural History Museum and Free State Brewing Co.): Presenter/discussion leader, “Math, Fairness and Social Choice”, March 2014
- KU Mini College: Lecture on “The Notorious Four-Color Problem,” June 2013
- KU Mini College: Lecture on “Planes, Hyperplanes and Beyond,” June 2012
- KU Department of Chemical and Petroleum Engineering Graduate Seminar: Lecture on “Graph Theory and Discrete Geometry,” November 2010
- Duke Talent Identification Program Scholar Weekend: Developed and taught minicourse “Mathematics, Games and Strategy”, November 2008 and March 2010
- Presenter, KU Math Awareness Day, April 2007
- [Canada/USA Mathcamp](#): Visiting faculty (’03, ’04, ’06); Co-organizer (’98); Mentor (’97, ’98)
- University of Minnesota Institute of Technology Center for Educational Programs: Guest lecturer and workshop leader (’04, ’05)
- [Project NExT](#) Fellow, 2006–2007

## Department, University and Professional Service

### Departmental Offices

- Director of Graduate Studies, 2020–present
- Director of Graduate Admissions, 2012–2017

### Departmental Service

- Chair, Combinatorics Assistant Professor Recruiting Committee, 2022–2023
- Member, Teaching Assistant Professor Recruiting Committee, Summer 2021
- Chair, Bylaws Committee, 2019–2021
- Member, Algebra VAP Recruiting Committee, 2019–2020
- Member, Upper-Division Committee, 2019–2020
- Chair, Sabbatical Committee, 2017–2018, 2018–2019
- Member, Graduate Committee, 2010–2019
- Member, Florence Black GTA Award Selection Committee, 2014–2017
- Member, Bylaws Committee, 2017–2019
- Chair, Algebra/Combinatorics VAP Recruiting Committee, 2016–2017
- Member, Sabbatical Committee, 2016–2017
- Member (elected), Executive Committee, 2015–2016
- Member, Algebra VAP Recruiting Committee, 2014–2015
- Member, Algebra/Combinatorics Recruiting Committee, 2013–2014

- Member, Long Range Planning Committee, 2010–2011
- Member, Mathematics Education Committee, 2010–2011
- Center for Teaching Excellence Ambassador, 2009–2011
- Member, Computer Committee, 2009–2011
- Coach, KU Putnam Exam team, 2005–2011
- Member, Honors Committee, 2005–2010
- Director, KU Undergraduate Mathematics Competition, 2006–2010
- Co-organizer, Kansas Collegiate Mathematics Competition, 2008–2010
- Member, Chair Search Committee, 2008–2009
- Member, Combinatorics VAP Recruiting Committee, 2007–08
- Member, Algebra Recruiting Committee, 2006–07

#### **Dissertation and Thesis Committees (KU Mathematics)**

- John Portin (Ph.D., 2024)
- Kathryn Cole (M.A., 2023)
- Xinyun Yu (M.A., 2023)
- Dylan Beck (Ph.D., 2022)
- Grace McMonagle (M.A., 2021)
- Joseph Doolittle (Ph.D., 2019)
- Brent Holmes (Ph.D., 2018)
- Grant Serio (Ph.D., 2016)
- Marcus Gubanyi (M.A., 2016)
- Leonard Huang (Ph.D., 2016)
- John Reynolds (Ph.D., 2016)
- Billy Sanders (Ph.D., 2015)
- Kevin Adams (M.A., 2015)
- Joshua Fenton (M.A., 2015)
- William Espenschied (Ph.D., 2014)
- Nick Packauskas (M.A., 2013)
- Isaac Lambert (M.A., 2012)
- Alex Schaefer (M.A., 2011)
- Jonathan Delgado (M.A., 2010)
- Manoj Kummini (Ph.D., 2007)
- Bridget Franklin (B.S. with departmental honors, Mathematics, 2006)

#### **Dissertation and Thesis Committees (outside KU Mathematics)**

- Jacob Hegna (Ph.D., Mathematics, University of Minnesota, 2024)
- Bada Kim (Ph.D., Philosophy, KU, 2024)
- Ralihe Raúl Villagrán Olivas (Ph.D., Mathematics, CINVESTAV, México, 2021)
- Alex McDonough (Ph.D., Applied Mathematics, Brown University, 2021)
- Howida Al Fran (Ph.D., Mathematics, Massey University, New Zealand, 2017)
- Peidi Gu (Ph.D., School of Education, KU, 2017)
- Logan Godkin (M.A., Mathematics, San Francisco State University, 2012)
- Mark Snyder (Ph.D., Electrical Engineering/CS, KU, 2011)
- Bridget Reagan (M.A., School of Education, KU, 2011)

- David Dehoogh-Kliwer (D.M.A., School of Music, KU, 2010)
- Ryan Fox (D.M.A., School of Music, KU, 2010)
- Tod Fish (D.M.A., School of Music, KU, 2009)

### Seminars Organized

- [Combinatorics Seminar](#), KU, Spring 2006–present
- [Numerical PDE/Geometry/Topology study seminar](#), KU, Fall 2014 (with M. Johnson)
- Study seminar on systems of polynomial equations, University of Minnesota, Spring 2003
- Study seminar on Stanley-Reisner theory, University of Minnesota, Fall 2002

### College/University Service

- Member, College of Liberal Arts and Sciences [CLAS] Committee on Graduate Studies [CGS], F'2018, 2019–2021; Chair, Subcommittee on Policies and Student Petitions, 2019–2020
- Member, CGS Committee on Assessment of New Graduate Program Proposals, Spring 2017
- CLAS Faculty Mentorship Program, 2016
- Member, KU Faculty Senate, 2012–2015 (Executive Committee, 2014–2015)
- Consultant to KU Theatre production of *Proof*, Fall 2014
- University Senate representative, Committee on Academic Computing and Electronic Communications, 2013–2014

### Professional societies

- Kansas Section of the Mathematical Association of America: Vice-Chair-Elect, 2015–2016; Vice-Chair, 2016–2017; Chair, 2017–2018; Nominating Committee; 2020–2021

### Professional mentoring

- Consultant for Project NExT 2012, 2013 and 2014 Fellows (ongoing)

### Conference organizing

- Co-organizer (with M. Bayer and P.E. Harris), Special Session on Algebraic, Geometric and Topological Combinatorics, AMS Central Sectional Meeting, Lawrence, KS, March 2025
- Co-organizer (with A. Duval and C. Klivans), Special Session on Algebraic, Geometric and Topological Combinatorics, AMS Central Sectional Meeting, El Paso, TX, September 2022
- Organizing committee member, [Graduate Research Workshop in Combinatorics](#), 2016, 2018, 2019 (chief local organizer at KU), 2020 (cancelled due to COVID-19), 2021 (online), 2022, 2023
- Organizer (with S. Butler, M. Mazin, and J. Striker), [2022 Great Plains Combinatorics Conference](#) (North Dakota State University, April 2022)
- Co-organizer (with A. Duval and C. Klivans), Special Session on Algebraic, Geometric and Topological Combinatorics, AMS Sectional Meeting (held online, September 12–13, 2020)
- Organizer (with S. Butler and M. Mazin), 2018 Great Plains Combinatorics Conference (Kansas State University, April 2018) (supported by NSF Grant DMS-1801246, \$10,000)
- Member, Program Committee, 29th International Conference on Formal Power Series and Algebraic Combinatorics [FPSAC] (London, July 2017)

- Organizer, 2017 Annual Meeting, Kansas Section of the MAA (KU, April 2017)
- Faculty advisor to Organizing Committee, 2017 Graduate Student Combinatorics Conference (KU, April 2017) (supported by NSF Grant DMS-1700464, \$17,000)
- Organizer (with S. Butler), 2016 Great Plains Combinatorics Conference (KU, May 2016; supported by IMA and Combinatorics Foundation, \$5,000)
- Organizer, 2014 Great Plans Combinatorics Conference (KU, April 2014)
- Member, Organizing Committee, 26th FPSAC (Chicago, 2014)
- Organizer (with L. Levine, D. Perkinson, and J. Propp), *Workshop on Generalizations of Chip-Firing and the Critical Group* (American Institute of Mathematics, July 2013)
- Member, Program Committee, 24th FPSAC (Nagano, Japan, June 2012)
- Co-organizer (with A. Duval), Special Session on Geometric Combinatorics, AMS Sectional Meeting (Albuquerque, NM, April 2010)
- Member, Program Committee, 20th FPSAC (Valparaiso, Chile, June 2008)
- Co-organizer (with J. Bergner and T. Holm), *Mentoring Graduate Students*, panel discussion (JMM, New Orleans, January 2007)

### Reviewing and refereeing

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| • Advances in Applied Mathematics (x4) | • J. Combinatorial Theory Series A (x7)        |
| • Advances in Mathematics (x2)         | • J. Combinatorial Theory Series B (x2)        |
| • Algebraic Combinatorics              | • J. Combinatorics                             |
| • American Mathematical Monthly        | • J. Graph Theory                              |
| • Annals of Combinatorics (x2)         | • J. Math. Analysis and Applications           |
| • Australasian J. Combinatorics (x2)   | • Mathematical Research Letters                |
| • Ars Combinatoria                     | • Miskolc Math. Notes                          |
| • Computational Geometry               | • Pacific J. Mathematics                       |
| • Discrete & Computational Geometry    | • Periodica Mathematica Hungarica              |
| • Discrete Mathematics (x9)            | • PRIMUS                                       |
| • Electronic J. Combinatorics (x8)     | • Proceedings of the AMS                       |
| • European J. Combinatorics (x2)       | • Rocky Mountain J. Math. (x2)                 |
| • Graphs and Combinatorics (x3)        | • Rose-Hulman Undergraduate Math. J.           |
| • International Math. Research Notices | • SIAM J. Discrete Mathematics (x3)            |
| • J. Algebraic Combinatorics (x3)      | • Transactions of the AMS                      |
| • J. Applied & Comput. Topology (x2)   | • <i>Mathematical Reviews</i> (total 42 items) |

### Grant and other external reviewing

- AMS–Simons Research Enhancement Grants for PUI Faculty (2023–2025)
- External referee for 11 tenure/promotion/reappointment cases (2017–present)
- National Science Foundation panelist (2019)
- Fonds de la Recherche Scientifique, Belgium (2016)
- Comisión Nacional de Investigación Científica y Tecnológica, Chile (2015)
- Simons Foundation Collaboration Grants (2016)
- National Security Agency Mathematical Sciences Grant Program (2015, 2016)