Professor 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, University of Minnesota
2001–2002	Instructor, Illinois Institute of Technology
1997–2000	Teaching Assistant, University of California, San Diego

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

- 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, and polytopes.

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

(3) Hopf monoids of ordered simplicial complexes (with F. Castillo and J.A. Samper), arXiv:2011.14955, November 2020

Articles in press

(1) Simplicial effective resistance and enumeration of spanning trees (with A.M. Duval, W. Kook, and K.-J. Lee), preprint, arXiv:2206.02182, June 2022; to appear in *Israel Journal of Mathematics*

(2) Ehrhart theory of paving and panhandle matroids (with D. Hanely, D. McGinnis, D. Miyata, G. Nasr, A.R. Vindas-Meléndez, and M. Yin), preprint, arXiv:2205.05772, January 2022; to appear in *Advances in Geometry*

Published articles

(1) 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

(2) Interval parking functions (with E. Colaric, R. DeMuse, and M. Yin), *Advances in Applied Mathematics* **123** (2021) 102129; arXiv:2006.0932,

(3) 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

(4) 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

(5) 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

(6) 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

(7) 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

(8) 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

(9) 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

(10) 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

(11) On the spectra of simplicial rook graphs (with J.D. Wagner), *Graphs and Combinatorics* **31** (2015), no. 5, 1589–1611; arXiv:1209.3493

(12) 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.

(13) Critical groups of simplicial complexes (with A.M. Duval and C.J. Klivans), *Annals of Combinatorics* **17** (2013), 53–70; arXiv:1101.3981

(14) Graph varieties in high dimension (with T. Enkosky), *Beiträge zur Algebra und Geometrie* **54**, no. 1 (2013), 1–12; arXiv:1006.5864

(15) The incidence Hopf algebra of graphs (with B. Humpert), *SIAM Journal on Discrete Mathematics* **26**, no. 2 (2012), 555–570; arXiv:1012.4786

(16) 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

(17) 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.

(18) 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

(19) 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

(20) 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

(21) 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

(22) 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

(23) 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

(24) Rigidity theory for matroids (with M. Develin and V. Reiner), *Commentarii Mathematici Helvetici* **82** (2007), 197–233; arXiv:math/0503050

(25) 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

(26) The slopes determined by n points in the plane, *Duke Mathematical Journal* **131**, no. 1 (2006), 119–165; arXiv:math/0302106

(27) Cyclotomic and simplicial matroids (with V. Reiner), *Israel Journal of Mathematics* **150** (2005), 229–240; arXiv:math/0402206

(28) Random geometric graph diameter in the unit disk with ℓ_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.

(29) On the topology of graph picture spaces, *Advances in Mathematics* **191**, no. 2 (2005), 312–338; arXiv:math/0307405

(30) 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

(31) Geometry of graph varieties, *Transactions of the American Mathematical Society* **355**, no. 11 (2003), 4151–4169; arXiv:math/0302089

(32) 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.

Book reviews and 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) Review of *How to Bake π* by Eugenia Cheng (Basic Books, 2016), *Notices of the American Mathematical Society* **63**, no. 9 (2016), 1053–1054.

(3) 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

(4) Review of *The Cult of Pythagoras* by Alberto A. Martínez (U. of Pittsburgh Press, 2012), *The Mathematical Intelligencer* **35**, no. 4 (2013), 81–82.

(5) 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 Blog Posts

- *Communicating Advanced Mathematics to Kids*, AMS Blog on Teaching and Learning (Ben Braun, ed.), December 11, 2017

Invited Plenary Talks at Conferences

- Title TBA, 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

- *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
- *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 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. pf 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) [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, Topics in Geometry for Secondary/Middle School Teachers (S'09, S'13, S'23)
- Math 410, Topics in History of Math for Secondary/Middle School Teachers (S'09, S'13, S'23)
- 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 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)

Courses at Previous Institutions

- *U. of Minnesota*: Combinatorial Optimization; Graph Theory; Excursions in Mathematics
- *Illinois Institute of Technology*: Discrete Mathematics; Calculus I
- *UC San Diego*: Calculus I

Graduate Students Advised

- Mark Denker (current Ph.D. student; PhD expected 2024)

- Dania Morales (current Ph.D. student; PhD expected 2024)

- 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. expected 2023)
- 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)

- Bada Kim (Ph.D., Philosophy, KU, in progress)
- 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-Kliewer (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 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) (postponed from 2020 due to COVID-19)
- 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 Mathematical Association of America (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

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

- *Mathematical Reviews* (total 42 items)

Grant and other external reviewing

- AMS–Simons Research Enhancement Grants for PUI Faculty (2023–2025)
- External referee for 10 tenure/promotion/reappointment cases (2017–present)
- National Science Foundation panelist (2019)
- Fonds de la Recherche Scientifique, Belgium (2016)
- Comisión Nacional de Investigación Cientifica y Tecnológica, Chile (2015)
- Simons Foundation Collaboration Grants (2016)
- National Security Agency Mathematical Sciences Grant Program (2015, 2016)