

JAY SCHWEIG

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EDUCATION

- Ph.D. Cornell University, Mathematics, 2008.
Advisor: Edward Swartz.
Dissertation: *Poset Convex-Ear Decompositions and Applications to the Flag h -Vector*.
- M.S. Cornell University, Mathematics, 2005.
- B.S. summa cum laude, George Mason University, Mathematics, 2001.

ADMINISTRATIVE POSITIONS

- Associate Head, Oklahoma State University Department of Mathematics, 2021–present.

ACADEMIC POSITIONS

- Associate Professor, Oklahoma State University, 2019–present.
- Assistant Professor, Oklahoma State University, 2013–2019.
- Visiting Assistant Professor, Oklahoma State University, 2012–2013.
- Robert D. Adams Visiting Assistant Professor, University of Kansas, 2008–2012.
- Ph.D. Student & Graduate Instructor, Cornell University, 2002–2008.

RESEARCH INTERESTS

- Algebraic and geometric combinatorics, specifically matroid theory, combinatorial algorithms, poset topology, graph theory, toric ideals, Stanley-Reisner complexes, Borel ideals.

PAPERS

◇ *Note: In mathematics papers, authors are usually listed alphabetically. Each paper is available for download at www.math.okstate.edu/people/jayjs/research.html* ◇

- P -shiftedness in matroids (with N. Mandlik), *preprint*.
- Calculating the Frobenius powers of a monomial ideal (with C. Francisco, M. Mastroeni, and J. Mermin), *preprint*.
- Minimally non-diatonic pc-sets (with A. Kutner), *Journal of Mathematics and Music* (2021) DOI: 10.1080/17459737.2021.1933631.
- Free and non-free multiplicities on the A_3 arrangement (with M. DiPasquale, C. Francisco, and J. Mermin), *J. Algebra* 544 (2020), 498-532.
- Asymptotic resurgence via integral closures (with M. DiPasquale, C. Francisco, and J. Mermin), *Trans. Amer. Math. Soc.* 372 (2019), 6655-6676.

- The type defect of a simplicial complex (with H. Dao), *J. Combin. Theory Ser. A* 163 (2019), 195–210.
- The Rees algebra of a two-Borel ideal is Koszul (with M. DiPasquale, C. Francisco, J. Mermin, and G. Sosa), *Proc. Amer. Math. Soc.*, 147 (2019), 467–479.
- A broad class of shellable lattices (with R. Woodroffe), *Adv. Math.*, 313 (2017), 537–563.
- Balanced non-transitive dice (with A. Schaefer), *College Math. J.* 48 (2017), no. 1, 10–16.
- Boij-Söderberg and Veronese decompositions (with C. Francisco and J. Mermin), *J. Commut. Algebra* 9 (2017), no. 3, 367–386.
- Lcm lattices supporting pure resolutions (with C. Francisco and J. Mermin), *Proc. Amer. Math. Soc.* 144 (2016), 2315–2325.
- Further applications of clutter domination parameters to projective dimension (with H. Dao), *J. Algebra* 432 (2015), 1–11.
- Catalan numbers, binary trees, and pointed pseudotriangulations (with C. Francisco and J. Mermin), *European J. Combin.* 45 (2015), 85–96.
- Bounding the projective dimension of a squarefree monomial ideal via domination in clutters (with H. Dao), *Proc. Amer. Math. Soc.* 143 (2015), 555–565.
- A survey of Stanley-Reisner theory (with C. Francisco and J. Mermin), in *Connections Between Algebra, Combinatorics, and Geometry*, Springer-Verlag (New York) 2014.
- Projective dimension, graph domination parameters, and independence complex homology (with H. Dao), *J. Combin. Theory Ser. A* 120 (2013), no. 2, 453–469.
- Generalizing the Borel property (with C. Francisco and J. Mermin), *J. Lond. Math. Soc.* 87 (2013), no. 3, 724–740.
- Bounds on the regularity and projective dimension of ideals associated to graphs (with H. Dao and C. Huneke), *J. Alg. Comb.* 38 (2013), no. 1, 37–55.
- Toric ideals of lattice path matroids and polymatroids, *J. Pure Appl. Algebra* 215 (2011), no. 11, 2660–2665.
- Convex-ear decompositions and the flag h-vector, *Electron. J. Combin.* 18 (2011), no. 1, Research Paper 4, 14 pages.
- Borel generators (with C. Francisco and J. Mermin), *J. Algebra* 332 (2011), no. 1, 522–542.
- On the h-vector of a lattice path matroid, *Electron. J. Combin.* 17 (2010), no. 1, Note 3, 6 pages.
- A convex-ear decomposition for rank-selected subsets of supersolvable lattices, *SIAM J. Discrete Math.* 23 (2009), no. 2, 1009–1022.
- Rim-finite, arc-free subsets of the plane (with J. Kulesza), *Topology Appl.* 124 (2002), no. 3, 475–485.

AWARDS & GRANTS

- Mentor for Koslow Undergraduate Mathematics Research Experience Scholarship (with Aurian Kutner), 2020.
- Regents Distinguished Teaching Award, 2019.
- Mentor for Koslow Undergraduate Mathematics Research Experience Scholarship (with Nicole Heon), 2018.
- Oklahoma State University ASR + 1 Summer Research Grant, 2017.

- NSF OK LSAMP Award (Senior Scientist), 2016.
- Koslow Undergraduate Mathematics Research Experience Scholarship, honorable mention (with Trevor Fancher), 2016.
- Oklahoma State University FY16 travel grant, 2015.
- Oklahoma State University Dean's incentive grant, 2015.
- NSF conference grant (Co-PI with L. Christensen, L. Fouli, C. Francisco, D. Jorgensen, and J. Mermin), 2014.
- Oklahoma State University FY15 travel grant, 2014.
- Oklahoma State University Dean's incentive grant, 2014.
- Robert J. Battig graduate prize, 2006.
- Cornell University VIGRE graduate fellowship, 2002.
- Mary K. Cabell Award to the outstanding mathematics student, 2001.
- George Mason University award for academic achievement in mathematics, 2001.

TALKS

- *Some combinatorial ways to look at toric ideals*, AMS Special Session on Current Trends in Combinatorial Commutative Algebra, online, 2021.
- *Poset-Borel ideals and poset-shifted complexes*, AMS Special Session on Free Resolutions, Combinatorics, and Geometry, online, 2020.
- *Toric ideals, Gröbner bases, and Borel ideals, from a combinatorial perspective*, University of Kansas Combinatorics Seminar, Lawrence, KS, 2018.
- *Order partition lattices*, AMS Special Session on Interactions Between Combinatorics and Commutative Algebra, Fayetteville, AR, 2018.
- *The type defect of a simplicial complex*, AMS Special Session on Geometric Combinatorics and Combinatorial Commutative Algebra, Denton, TX, 2017.
- *Old and new results on flag h -vectors*, AMS Special Session on Commutative Algebra, Denton, TX, 2017.
- *Combinatorial properties of Borel ideals*, Southwest Local Algebra Meeting, Albuquerque, NM, 2017.
- *The type of a simplicial complex*, Mathematical Congress of the Americas, Montreal, Canada, 2017.
- *LCM lattices and pure resolutions*, AMS Special Session on Combinatorial and Computational Algebra, Athens, GA, 2016.
- *The order partition and subposet lattices*, AMS Special Session on Combinatorial and Computational Algebra, Chicago, IL, 2015.
- *LCM lattices of pure resolutions*, AMS Special Session on Topological Combinatorics, Memphis, TN, 2015.
- *Projective dimension and domination*, AMS Special Session on Topological Combinatorics and Combinatorial Commutative Algebra, San Francisco, CA, 2014.
- *Domination parameters in graphs and clutters*, AARMS Summer School on Algebra and Statistics at Dalhousie University, Halifax, Nova Scotia, Canada, 2014.
- *Projective Dimension and Domination Parameters*, Great Plains Combinatorics Conference, Lawrence, KS, 2014.

- *More Than You Wanted to Know About Borel Ideals*, Cornell University Combinatorics Seminar, Ithaca, NY, 2014.
- *Borel Ideals, Catalan Numbers, and Pointed Pseudotriangulations*, AMS Special Session on Combinatorial Commutative Algebra, Philadelphia, PA, 2013.
- *The Projective Dimension of a Simplicial Complex*, Texas State University Colloquium, San Marcos, TX, 2013.
- *Domination parameters, simplicial homology, and projective dimension*, Central Michigan University Colloquium, Mount Pleasant, MI, 2013.
- *Projective Dimension and Domination Parameters*, AMS Special Session on Combinatorial Commutative Algebra, New Orleans, LA, 2012.
- *Poset-Borel Ideals*, AMS Special Session on Algebraic and Topological Combinatorics, New Orleans, LA, 2012.
- *Graph Domination Parameters, Projective Dimension, and Independence Complexes*, Cornell University Combinatorics Seminar, Ithaca, NY, 2012.
- *Algebraic Properties of Lattice Path Polymatroids*, AMS Special Session on Algebraic Aspects of Matroids, Wake Forest, NC, 2011.
- *Borel Ideals via Borel Generators II*, AMS Special Session on Hilbert Functions in Commutative Algebra and Algebraic Combinatorics, South Bend, IN, 2010.
- *Toric Ideals of Lattice Path Matroids*, AMS Special Session on Combinatorial Algebra, Lexington, KY, 2010.
- *Lattice Path Matroids and Polymatroids*, Washington University Combinatorics Seminar, St. Louis, MO, 2010.
- *Lattice Path Matroids: h -Vectors and Toric Ideals*, University of Miami Combinatorics Seminar, Miami, FL, 2010.
- *The Skeleta of a Shellable Complex*, Ulam Centennial Session on Combinatorics, Gainesville, FL, 2009.
- *The h -Vector of a Lattice Path Matroid*, AMS Special Session on Geometric Combinatorics, Chicago, IL, 2008.
- *Several Convex-Ear Decompositions*, AMS Special Session on Geometric Combinatorics, Cincinnati, OH, 2006.
- *Convex-Ear Decompositions and Connections to the Flag h -Vector*, University of Washington Combinatorics Seminar, 2006.

ADVISING

- PhD advisor, Oklahoma State University:
 - Nishad Mandlik, 2015–2021.
- PhD committee member, Oklahoma State University:
 - Travis Grigsby, 2020–present.
 - S.M. Faquuddin Ali Azam, 2019–present.
 - Ashwini Bhat, 2016–2019.
 - Yajun Lu, 2016–2019.
 - Hamidreza Validi, 2016–2020.

Guillermo Alesandroni, 2013–2015.

Zhuqi Miao, 2013–2016.

- Master's degree advisor, Oklahoma State University:

Mark Denker, 2017–2018.

Travis Grigsby, 2015–2016.

Heather Ranney, 2013–2014.

- Master's degree committee member, Oklahoma State University:

Nicholas Laurenti, 2013–2014.

- Master's degree advisor, University of Kansas:

Isaac Lambert, 2011–2012.

Alex Schaefer, 2010–2011.

- Honors Thesis advisor, Oklahoma State University:

Wyatt McCoy, 2020–present

Nicole Heon, 2018–2019.

INSTRUCTION

- Oklahoma State University, 2012–present:

Algebraic Combinatorics II

Enumerative Combinatorics

Advanced Linear Algebra

Combinatorial Mathematics

Seminar and Practicum in the Teaching of College Mathematics

Introduction to Abstract Algebra

Linear Algebra

Calculus I

Calculus II

Differential Equations

Honors Calculus I

Honors Calculus II

Honors add-on courses:

* Sets and Infinity

* Counting and Enumeration

* Math and Music

- University of Kansas, 2008–2012:

Calculus I

Calculus II

Calculus II (online)

Honors Calculus II

Elementary Linear Algebra

Linear Algebra
Special Topics in Mathematics: Advanced Combinatorics
Graduate Combinatorics

- Cornell University, 2002–2008:

Calculus I
Calculus II
Finite Mathematics

- Teaching Assistant, Cornell University Research Experience for Undergraduates program, 2006.

- Instructor, Ithaca High School Senior Mathematics Seminar, 2006-2007:

Graph Theory and Simplicial Complexes
Game Theory

- Recitation Instructor, Park City Mathematics Institute, 2004:

Short Course: *From Polytopes to Enumeration.*

- Teacher, Fairfax County Public Schools, 2001:

Algebra
Geometry
Precalculus

SERVICE & OUTREACH

- Referee: Journal of Combinatorial Theory Series A, Journal of Algebra, European Journal of Combinatorics, Journal of the London Mathematical Society, Journal of Algebraic Combinatorics, Annals of Combinatorics, Journal of Combinatorics, Algebraic Combinatorics, Graphs and Combinatorics, Discrete Mathematics, International Journal of Algebra and Computation, INVOLVE, Rocky Mountain Journal of Mathematics, ORDER.
- Co-organizer, AMS Special Session on Combinatorial Techniques in Commutative Algebra, Purdue University, 2022.
- Co-organizer, AMS Special Session on Combinatorial Techniques in Commutative Algebra, Purdue University, 2020.
- Co-organizer and instructor, OK-LSAMP Bridge to the Doctorate course, 2017.
- Co-organizer and instructor, OK-LSAMP Summer program, 2017, 2018.
- Co-organizer, Southwest Local Algebra Meeting 2015, Oklahoma State University.
- Founder and organizer, Stillwater High School Mathematics Seminars, 2013 – present.
- Co-organizer, AMS Special Session on Combinatorial Algebra, University of Kansas, 2012.
- Curriculum Coordinator, Ithaca High School Senior Mathematics Seminar, 2006–2007.
- Participant, Preparing Future Faculty Program, Cornell University, 2006.