

MATTHEW N. MASTROENI

Contact Info

Department of Mathematics – Iowa State University
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Employment

Postdoc Research Associate, Iowa State University, August 2021 – present.

Postdoctoral Fellow, Oklahoma State University, August 2018 – May 2021.

Education

Ph.D. in Mathematics, University of Illinois at Urbana-Champaign, 2018.

Thesis: *Betti Numbers of Koszul Algebras and Codimension Two Matrix Factorizations*

Advisor: Hal Schenck

M.S. in Mathematics, Syracuse University, 2012.

B.A. in Mathematics, Ithaca College, 2009.

Research

Interests: Computational, combinatorial, and homological aspects of commutative algebra, especially the structure of free resolutions, Koszul algebras, linkage, and Rees algebras.

Publications:

- (1) M. Mastroeni, J. McCullough, A. Osborne, J. Rice, and C. Willis. *Depth and singular varieties of exterior edge ideals*. Submitted.
- (2) M. Mastroeni and J. McCullough. *Chow rings of matroids are Koszul*. To appear in Math. Ann.
- (3) C. Francisco, M. Mastroeni, J. Mermin, and J. Schweig. *Computing generalized Frobenius powers of monomial ideals*. Submitted.

- (4) L. Ferraro, F. Galetto, F. Gandini, H. Huang, M. Mastroeni, and X. Ni. *The InvariantRing package for Macaulay2*. Submitted.
- (5) P. Mantero and M. Mastroeni. *The structure of Koszul algebras defined by four quadrics*. J. Algebra 601 (2022), 280–311.
- (6) M. Mastroeni, H. Schenck, and M. Stillman. *Quadratic Gorenstein rings and the Koszul property II*. To appear in Int. Math. Res. Not.
- (7) P. Mantero and M. Mastroeni. *Betti numbers of Koszul algebras defined by four quadrics*. J. Pure Appl. Algebra 225 (2021), no. 2, Paper No. 106504.
- (8) M. Mastroeni, H. Schenck, and M. Stillman. *Quadratic Gorenstein rings and the Koszul property I*. Trans. Amer. Math. Soc. 374 (2021), no. 2, 1077–1093.
- (9) M. Mastroeni. *Koszul almost complete intersections*. J. Algebra 501 (2018), 285–302.
- (10) M. Mastroeni. *Matrix factorizations and singularity categories in codimension two*. Proc. Amer. Math. Soc. 136 (2018), no. 11, 4605–4617.

Invited Talks:

January 2023	<ul style="list-style-type: none"> AMS Special Session on Topological and Combinatorial Methods in Commutative Algebra – Boston, MA
September 2022	<ul style="list-style-type: none"> AMS Special Session on Interactions between Combinatorics and Commutative Algebra – El Paso, TX
May 2022	<ul style="list-style-type: none"> AMS Special Session on Commutative Algebra (virtual)
April 2022	<ul style="list-style-type: none"> Algebra and Geometry Seminar – Queen’s University
March 2022	<ul style="list-style-type: none"> Algebra Seminar – University of Arkansas AMS Special Session on Combinatorial Methods in Commutative Algebra (virtual)
October 2021	<ul style="list-style-type: none"> CA+ invited plenary talk – Minneapolis, MN AMS Special Session on Commutative Algebra (virtual)
April 2021	<ul style="list-style-type: none"> AMS Special Session on Commutative Algebra (virtual)
March 2021	<ul style="list-style-type: none"> AMS Special Session on Commutative Algebra and its Interaction with Algebraic Geometry and Combinatorics (virtual)

October 2020	<ul style="list-style-type: none"> • Algebra and Geometry Seminar – Iowa State University • AMS Special Session on Commutative Algebra and Connections to Algebraic Geometry and Combinatorics (virtual)
April 2020	<ul style="list-style-type: none"> • AMS Special Session on Combinatorial Techniques in Commutative Algebra – West Lafayette, IN (canceled)
April 2019	<ul style="list-style-type: none"> • Algebra Seminar – University of Arkansas
November 2018	<ul style="list-style-type: none"> • AMS Special Session on Interactions Between Combinatorics and Commutative Algebra – Fayetteville, AR
October 2018	<ul style="list-style-type: none"> • AMS Special Session on Commutative Algebra and Complexity – Ann Arbor, MI • Math Department Colloquium – Oklahoma State University
April 2018	<ul style="list-style-type: none"> • Algebra Seminar – University of Arkansas • Combinatorial and Commutative Algebra Seminar – Oklahoma State University • Commutative Algebra Seminar – University of Nebraska–Lincoln
March 2018	<ul style="list-style-type: none"> • AMS Special Session on Commutative and Combinatorial Algebra – Columbus, OH
January 2018	<ul style="list-style-type: none"> • AMS Special Session on Commutative Algebra in All Characteristics – San Diego, CA
October 2017	<ul style="list-style-type: none"> • Structures on Free Resolutions – Lubbock, TX

Honors and Awards

Postdoctoral Scholar Excellence Award for Teaching/Mentoring, Iowa State University, 2022.

- One of only two university-wide awards based on a teaching statement, CV, student evaluations, and letter of support from postdoctoral mentor based on classroom observation.

AMS-Simons Travel Grant, 2021.

Departmental TA Instructional Award, University of Illinois Math Department, 2017.

- Annual departmental award based on a teaching portfolio, student evaluations, an interview, and classroom observation.

REGS Day Award, University of Illinois Math Department, 2013.

- Award for the best summer research project on higher codimension matrix factorizations.

Donald E. Kibbey Prize, Syracuse University Math Department, 2010.

University Fellowship, Syracuse University, 2009.

Teaching Experience

Large Lecture Instructor (Iowa State University)

Math 151 Calculus for Business and Social Sciences	Fall 2021
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Math 165 Calculus 1	Spring 2022
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Recitation Instructor (Iowa State University)

Math 166 Calculus 2	Fall 2022
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Math 267 Elementary Differential Equations and Laplace Transforms	Fall 2021
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Instructor (Oklahoma State University)

Math 2144 Calculus 1	Spring 2021, Fall 2020, Fall 2018
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Math 2153 Calculus 2	Fall 2019
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Math 3013 Linear Algebra	Spring 2020
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Math 3613 Intro to Abstract Algebra	Spring 2020, Fall 2019, Spring 2019
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Instructor (University of Illinois)

Math 124 Finite Mathematics	Spring 2018
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Grader (University of Illinois)

Math 416 Abstract Linear Algebra	Spring 2018
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Teaching Assistant (University of Illinois)

Math 221 Calculus 1	Fall 2016, Fall 2015
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Math 231 Calculus 2	Fall 2017, Spring 2016, Spring 2015, Fall 2014, Spring 2014, Spring 2013, Fall 2012
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Math 241 Calculus 3	Fall 2013
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Instructor (Syracuse University)

MAT 221 Elementary Probability and Statistics 1	Fall 2011, Spring 2011
MAT 286 Calculus for the Life Sciences	Spring 2012

Teaching Assistant (Syracuse University)

MAT 121 Probability and Statistics for the Liberal Arts 1	Fall 2010
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Service, Mentoring, and Outreach

Iowa State Mathematics Research Teams Mentor, Iowa State University, Spring 2022.

Stillwater High School Math Seminar, Stillwater, OK, April 2020 (canceled), November 2019.

Graduate Affairs Committee Member, University of Illinois Math Department, Fall 2017 – Spring 2018.

TA Teaching Awards Committee Member, University of Illinois Math Department, Fall 2017.

Illinois Geometry Lab Graduate Student Mentor, University of Illinois, June 2017.

Commutative Ring Theory Seminar Organizer, University of Illinois, Fall 2014 – Spring 2018.

Professional Development

Macaulay2 Workshop – Cleveland State University (online workshop)	May 2020
CIME Recent Developments in Commutative Algebra Workshop	July 2019
CBMS Conference on Applications of Polynomial Systems – Texas Christian University	June 2018
Macaulay2 Workshop – University of Wisconsin Madison	April 2018
MSRI Homological Conjectures Workshop	March 2018
Stillman's Conjecture and other Progress on Free Resolutions – UC Berkeley	July 2017
RTG Homological Conjectures in Commutative Algebra Workshop – University of Illinois Chicago	November 2016
Macaulay2 Workshop – University of Utah	May 2016
RTG Local Cohomology Workshop – University of Illinois Chicago	February 2015