

# MATTHEW N. MASTROENI

## Contact Info

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Department of Mathematics – Iowa State University  
396 Carver Hall  
411 Morrill Rd  
Ames, IA 50011

`mmastro@iastate.edu`  
`mnastro/github.io`

## Employment

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

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

## Education

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**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

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**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*. Int. Math. Res. Not. IMRN 2023, no. 2, 1461–1482.
- (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:

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

April 2021	<ul style="list-style-type: none"> <li>• AMS Special Session on Commutative Algebra (virtual)</li> </ul>
March 2021	<ul style="list-style-type: none"> <li>• AMS Special Session on Commutative Algebra and its Interaction with Algebraic Geometry and Combinatorics (virtual)</li> </ul>
October 2020	<ul style="list-style-type: none"> <li>• Algebra and Geometry Seminar – Iowa State University</li> <li>• AMS Special Session on Commutative Algebra and Connections to Algebraic Geometry and Combinatorics (virtual)</li> </ul>
April 2020	<ul style="list-style-type: none"> <li>• AMS Special Session on Combinatorial Techniques in Commutative Algebra – West Lafayette, IN (canceled)</li> </ul>
April 2019	<ul style="list-style-type: none"> <li>• Algebra Seminar – University of Arkansas</li> </ul>
November 2018	<ul style="list-style-type: none"> <li>• AMS Special Session on Interactions Between Combinatorics and Commutative Algebra – Fayetteville, AR</li> </ul>
October 2018	<ul style="list-style-type: none"> <li>• AMS Special Session on Commutative Algebra and Complexity – Ann Arbor, MI</li> <li>• Math Department Colloquium – Oklahoma State University</li> </ul>
April 2018	<ul style="list-style-type: none"> <li>• Algebra Seminar – University of Arkansas</li> <li>• Combinatorial and Commutative Algebra Seminar – Oklahoma State University</li> <li>• Commutative Algebra Seminar – University of Nebraska–Lincoln</li> </ul>
March 2018	<ul style="list-style-type: none"> <li>• AMS Special Session on Commutative and Combinatorial Algebra – Columbus, OH</li> </ul>
January 2018	<ul style="list-style-type: none"> <li>• AMS Special Session on Commutative Algebra in All Characteristics – San Diego, CA</li> </ul>
October 2017	<ul style="list-style-type: none"> <li>• Structures on Free Resolutions – Lubbock, TX</li> </ul>

## Honors and Awards

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**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

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### Large Lecture Instructor (Iowa State University)

Math 151 Calculus for Business and Social Sciences	Fall 2021
Math 165 Calculus 1	Spring 2022

### Recitation Instructor (Iowa State University)

Math 166 Calculus 2	Fall 2022
Math 267 Elementary Differential Equations and Laplace Transforms	Fall 2021

### Instructor (Oklahoma State University)

Math 2144 Calculus 1	Spring 2021, Fall 2020, Fall 2018
Math 2153 Calculus 2	Fall 2019
Math 3013 Linear Algebra	Spring 2020
Math 3613 Intro to Abstract Algebra	Spring 2020, Fall 2019, Spring 2019

### 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
Math 231 Calculus 2	Fall 2017, Spring 2016, Spring 2015, Fall 2014, Spring 2014, Spring 2013, Fall 2012
Math 241 Calculus 3	Fall 2013

## 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

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**AWM Graduate Student Poster Session Judge**, Joint Math Meetings, January 2023.

**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

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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