

# Josh Pollitz

## Curriculum Vitae

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### Research Interests

My research interests are primarily in the homological aspects of commutative algebra. I enjoy thinking about DG homological algebra, triangulated categories, growth of resolutions and relations between commutative algebra and representation theory.

### Academic Appointments

- 2020–2023 **NSF Postdoctoral Research Fellow**, *University of Utah*.  
Postdoc Mentor: Srikanth Iyengar
- 2019–2020 **Research Assistant Professor**, *University of Utah*.  
RTG Postdoc. Postdoc Mentor: Srikanth Iyengar

### Education

- August 2019 **Ph.D. Mathematics, University of Nebraska, Lincoln**.  
Advisors: Luchezar L. Avramov and Mark E. Walker  
Thesis: *The derived category of a locally complete intersection ring*
- May 2015 **M.S. Mathematics, University of Nebraska, Lincoln**.
- June 2013 **M.S. Mathematics, Oregon State University**.
- December 2010 **B.S. Mathematics, California Polytechnic State University**.  
San Luis Obispo, CA

### Published Papers and Preprints

#### Published or accepted papers

- (6) **Constructing non-proxy small test modules**, joint with Benjamin Briggs and Eloísa Grifo. *Nagoya Mathematical Journal*
- (5) **Cohomological support over derived complete intersections and local rings**. *Mathematische Zeitschrift* (2021)
- (4) **Locally complete intersection maps and the proxy small property**, joint with Benjamin Briggs, Srikanth Iyengar, and Janina Letz. *International Mathematics Research Notices IMRN* (2021)
- (3) **Duality and symmetry of complexity over complete intersections via exterior homology**, joint with Jian Liu. *Proceedings of the American Mathematical Society* (2021)
- (2) **Equivariant isomorphisms of Ext and Tor modules**. *Journal of Algebra* (2020)
- (1) **The derived category of a locally complete intersection ring**. *Advances in Mathematics* (2019)

#### Preprints submitted for publication

- (5) **The homotopy Lie algebra of a Tor-independent tensor product** joint with Luigi Ferraro, Mohsen Gheibi, Dave Jorgensen and Nicholas Packauskas. arXiv:2109.01003
- (4) **A comparison of dg algebra resolutions with prime residual characteristic** joint with Michael DeBellevue. arXiv:2108.12512
- (3) **Exceptional complete intersection maps of local rings** joint with Srikanth Iyengar, Janina Letz, and Jian Liu. arXiv:2107.07354

- (2) **Support varieties over skew complete intersections via derived braided Hochschild cohomology**, joint with Luigi Ferraro and W. Frank Moore. arXiv:2101.12287
- (1) **A partial converse ghost lemma for the derived category of a commutative noetherian ring**, joint with Jian Liu. arXiv:2101.02829

## Grants and Awards

- 2021 **Outstanding Postdoc Award, University of Utah**, *This award is annually given to a postdoctoral scholar in recognition of their exceptional research and teaching.*
- 2020 **NSF Postdoctoral Research Fellowship (3 years)**, *Grant #2002173.*
- 2018 **NSF grant funding *Conferences on Commutative Algebra for Early Career Researchers (2 years)***, *Co-P.I. on Grant #1802088.*
- 2018 **AMS Graduate Student Travel Grant**, *Used for the Fall 2018 AMS Sectional in Fayetteville, AR.*
- 2017 **Bill Leavitt Award, University of Nebraska, Lincoln**, *This award is given each academic year to support graduate student research; scholarship is the major factor in determining who receives this award.*
- 2015 **Steven Haataja Award, University of Nebraska, Lincoln**, *This award is for outstanding exposition by a graduate student.*
- 2010 **Charles J. Hanks Excellence in Math Award, California Polytechnic State University**, *This award is given to a student who demonstrated excellence and outstanding ability.*
- 2009 **Robert P. Balles Mathematics Scholarship, California Polytechnic State University**, *The scholarship is awarded to the students with the two highest cumulative GPAs in mathematics courses during their first three years of study.*

## Teaching & Mentorship

### Instructor of Record

Fall 2021	Math 4400: Introduction to Number Theory	University of Utah
Spring 2020	Math 3210: Foundations of Analysis	University of Utah
Fall 2019	Math 2200: Discrete Mathematics	University of Utah
Spring 2019	Math 314: Linear Algebra	University of Nebraska
Fall 2018	Math 208: Calculus III	University of Nebraska
Fall 2017	Math 208: Calculus III	University of Nebraska
Summer 2017	Math 802P: Numbers, Geometry and Algebraic Thinking II*	University of Nebraska
Spring 2017	Math 302: Mathematical Modeling*	University of Nebraska
Fall 2016	Math 301: Mathematics Matters*	University of Nebraska
Spring 2016	Math 104: Applied Calculus (Thompson Scholars)	University of Nebraska
Fall 2015	Math 203: Contemporary Mathematics	University of Nebraska
Summer 2015	Math 104: Applied Calculus	University of Nebraska
Spring 2015	Math 101: College Algebra	University of Nebraska
Fall 2014	Math 101: College Algebra	University of Nebraska
Spring 2012	Math 111: College Algebra	Oregon State University
Summer 2012	Math 111: College Algebra	Oregon State University
Spring 2012	Math 251: Differential Calculus	Oregon State University

## Teaching Assistant

I have served as a graduate teaching assistant at University of Nebraska and Oregon State University; also, I was an undergraduate teaching assistant at California Polytechnic State University SLO. Here are the following courses I have been supervised in this role:

- University of Nebraska: Math 808T: Concepts of Calculus\*, Math 106: Calculus I.
- Oregon State University: Math 256: Differential Equations, Math 254: Vector Calculus, Math 245: Calculus for Management and Social Sciences, Math 241: Differential Calculus.
- California Polytechnic SLO: Math 413: Introduction to Analysis II, Math 412: Introduction to Analysis I, Math 248: Methods of Proof.

\*: These courses were for current and future K-12 educators in the Lincoln and Omaha area.

## Undergraduate Mentoring/Reading Courses

- Fall 2020 **"Cohen-Macaulay Rings" by Bruns and Herzog and "Infinite Free Resolutions" by Avramov**, mentoring undergraduate Taylor Murray at the University of Utah: currently a graduate student at University of Nebraska-Lincoln.
- Fall 2020–Spring 2022 **"Introduction to Commutative Algebra" by Atiyah and MacDonald, "Cohen-Macaulay Rings" by Bruns and Herzog, and "Infinite Free Resolutions" by Avramov**, mentoring undergraduate Mason Hart at the University of Utah, (Serving as Mason's honor's thesis advisor).
- Spring 2021 **"Introduction to Commutative Algebra" by Atiyah and MacDonald**, mentoring undergraduate Annie Giokas at the University of Utah.

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## Presentations

### Invited Talks

October 2021	TBA	<i>Commutative Algebra Seminar, University of Arkansas</i>
October 2021	TBA	<i>IIT Bombay Virtual Commutative Algebra Seminar</i>
October 2021	TBA	<i>Commutative Algebra Seminar, University of Nebraska</i>
October 2021	A comparison of dg algebra resolutions with prime...	<i>AMS Sectional, Creighton University</i>
May 2021	The derived category of a complete intersection ring	<i>Commutative Algebra Seminar, UC Riverside</i>
March 2021	Homological algebra of exceptional complete intersections	<i>AMS Sectional, Georgia Tech University</i>
March 2021	Homological algebra of exceptional complete intersections	<i>Algebra &amp; Number Theory Seminar, Texas Tech University</i>
October 2020	<i>A characterization of relative complete intersections</i>	<i>AMS Sectional, Univ of Tennessee</i>
November 2019	<i>Cohomological support of a local ring</i>	<i>AMS Sectional, University of Florida</i>
July 2019	<i>The derived category of a complete intersection</i>	<i>Algebra Seminar, University of Genova (Italy)</i>
March 2019	<i>Cohomological support over derived complete int...</i>	<i>AMS Sectional, Auburn University</i>
November 2018	<i>The derived category of a complete intersection</i>	<i>Algebra Seminar, University of Michigan</i>
November 2018	<i>The derived category of a complete intersection</i>	<i>AMS Sectional, University of Arkansas</i>
October 2018	<i>The derived category of a complete intersection</i>	<i>AMS Sectional, SF State University</i>
February 2018	<i>A characterization of complete intersections...</i>	<i>Algebra Seminar, University of Utah</i>

## Local Talks

September 2019	<i>Cohomological support of a local ring</i>	<i>Algebra Seminar, University of Utah</i>
October 2018	<i>The derived category of a complete intersection</i>	<i>Algebra Seminar, University of Nebraska</i>
February 2018	<i>A characterization of complete intersections...</i>	<i>Algebra Seminar, University of Nebraska</i>
October 2017	<i>Koszul varieties and a derived category application</i>	<i>Algebra Seminar, University of Nebraska</i>
October 2017	<i>Cohomological properties of the Koszul DGA</i>	<i>Algebra Seminar, University of Nebraska</i>
March 2015	Hilbert's third problem and the Dehn invariant	<i>Graduate Student Seminar, Univ of Nebraska</i>

## Posters

April 2019	The derived category of a complete intersection	<i>Morgantown Algebra Days, WVU</i>
October 2018	The derived category of a complete intersection	<i>KUMUNU, Kansas University</i>
October 2017	Koszul varieties and a derived category application	<i>KUMUNU, Kansas University</i>

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## Funded Conferences, Workshops and Summer Schools

- 2019 **Recent Developments in Commutative Algebra.**  
A workshop for graduate students and postdocs in commutative algebra. There were four lecture series that ran July 1-5 in Levico Terme, Trento, Italy.
- 2019 **Morgantown Algebra Days.**  
A two-day Commutative Algebra conference which was held at the West Virginia University in Morgantown, WV during April 13-14 (Saturday-Sunday).
- 2018 **Derived Categories, MSRI Summer School.**  
MSRI 2018 A two week summer school held at the MSRI June 25-July 6. This consisted of four week long courses building towards Orlov's theorem.
- 2018 **Stable Cohomology: Foundations and Applications.**  
The workshop was supported by the National Science Foundation and the Department of Mathematics at the University of Nebraska. Took place in Snowbird, Utah May 28-June 1.
- 2018 **RTG Graduate Summer School: Topics in commutative algebra.**  
Took place at the University of Utah May 7-11. There were fourteen lectures and problems sessions, covering aspects of the following: limits in positive characteristic, symbolic powers and differential operators, and syzygies and free resolutions
- 2017 **Structures on Free Resolutions.**  
A workshop-style conference on "Structures on Free Resolutions" held at Texas Tech University from October 26-28
- 2017 **Local Cohomology in Commutative Algebra and Algebraic Geometry, Minnesota.**  
A week long conference focused on recent advances in commutative algebra centered around topics influenced by the contributions of Gennady Lyubeznik.
- 2017 **Commutative Algebra and Related Topics, MSRI Summer School, OIST.**  
A two week summer school held at the Okinawa Institute of Science and Technology from May 22-June 2. This consisted of four week long courses
- 2017 **Stillman's Conjecture and other Progress on Free Resolutions.**  
A conference and workshop at UC Berkeley, July 17-21, on regularity and Stillman's problem.
- 2016 **RTG Workshop on the Homological Conjectures in Commutative Algebra.**  
The University of Illinois at Chicago hosted an RTG Workshop, November 18-20, consisting of three mini-courses on the Homological Conjectures.

## Other Conferences

- 2015-2019 **KUMUNU.**  
An annual NSF-funded conference for commutative algebraists in the Great Plains region since 1999.

2015-2019 **KUMUNU JR.**

An annual NSF-funded conference for graduate students and postdocs in commutative algebra in the Midwest that is held each Spring at UNL.

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## Leadership and Service

Fall 2022 **AMS Sectional Organizers.**

Title TBA. To be co-organized with Benjamin Briggs.

Summer 2020 **Online course.**

I organized a course where I lectured on the singularity category of Gorenstein rings; there were twelve participants.

May 2020 **Online Conference Organizer.**

Organized *DG Methods in Commutative Algebra and Representation Theory* with Benjamin Briggs and Janina Letz.

Fall 2018 **Math 106 Recitation Coordinator** , *University of Nebraska.*

One of the major duties involved observing recitation instructors for Math 106 and meeting with them to discuss their observation and ways to improve their classrooms. Also, would lead a weekly meeting for all recitation instructors.

2017-2019 **Conference Co-Organizer (Co-P.I.).**

Served as a co-organizer and co-P.I. for the annual conference for graduate students and postdocs KUMUNU JR.

2017-2018 **Commutative Algebra Reading Seminar Co-Organizers.**

I helped organize this graduate student seminar devoted to a wide range of talks in commutative algebra and related areas.

2017-2020 **Panelist for graduate students.**

I have served on several panels for graduate students at both the University of Nebraska and the University of Utah for topics including: choosing a research area and advisor, applying for academic jobs, applying for the NSF postdoc, and teaching.

Summer 2016 **WebWork development.**

I wrote 80 hours of WebWork code for the math department at the University of Nebraska during the Summer of 2016; these are homework problems for Math 106 and 107 (calculus I & II).

2013-2019 **Math Day Volunteer.**

For Math Day, held annually at the University of Nebraska Lincoln, I held positions such as proctor, head proctor, local command center leader, and score keeper.