

## Reid Buchanan Curriculum Vitae

Department of Mathematics  
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### Education

- Ph.D. student, Mathematics, Oklahoma State University, since January 2019.  
*Expected graduation: Spring 2026.*  
*Advisor: Jeffrey Mermin.*
- B.S., Mathematics, Southeastern Oklahoma State University, December 2018.  
Graduated *summa cum laude*.  
*Senior Thesis: Sums of Sums' Indices.*  
*Honors Thesis: A Summary of Contributions to the Permutation Project.*

### Employment

- Graduate Student in Mathematics, Oklahoma State University, 2019–present.
- Teaching Associate of Mathematics, Oklahoma State University, 2019–present.
- Mathematics Tutor, Southeastern Oklahoma State University, 2016–2018.

### Research Interests

- Combinatorial commutative algebra.

### Publications and Preprints

- “DG-resolutions via Morse theory” (with T. Chau and J. Mermin), in preparation.
- “A Duality between Hilbert Functions of Lex Ideals and Quotients,” preprint. [arxiv.org/abs/2405.17632](https://arxiv.org/abs/2405.17632)

### Seminar and Colloquium Talks

- “Free Resolutions of Monomial Ideals” at the OSU Graduate Math Conference, April 2025.
- “A Duality between Hilbert Functions of Lex Ideals and Quotients” at the AMS Spring Central Sectional Meeting (Session: Algebraic and Homological Perspectives with a view towards Geometry), March 2025.
- “A Duality between Hilbert Functions of Lex Ideals and Quotients” at the New Mexico State University Algebra seminar, March 2025.

- “A Duality between Hilbert Functions of Lex Ideals and Quotients” at the AMS Fall Central Sectional Meeting (Session: Commutative algebra and connections to combinatorics), September 2024.
- “A Duality between Hilbert Functions of Lex Ideals and Quotients” at the Oklahoma State Combinatorial and Commutative Algebra seminar, September 2024.
- “On the Correspondence between Hilbert Functions of Lex Ideals and Quotients” at the OSU Graduate Math Conference, March 2023.
- “On the Correspondence between Hilbert Functions of Lex Ideals and Quotients,” preliminary research project defense, December 2022.
- “Macaulay Coefficients relating to Lex Ideals and Quotients” at the Oklahoma State Combinatorial and Commutative Algebra seminar, March 2022.
- “Hilbert Functions and Lex Ideals” at the OSU Graduate Math Conference, March 2022.
- “Hilbert Functions and Lex Ideals” at the Oklahoma State Combinatorial and Commutative Algebra seminar, October 2021.

### Conference Presentations

- “Macaulay Coefficients and Decomposing Lex Segments,” poster presentation at the Southwest Local Algebra Meeting (SLAM), March 2025.
- “Macaulay Coefficients and Decomposing Lex Segments,” poster presentation at the Commutative Algebra meets Algebraic Combinatorics (CAAC) conference, January 2025.
- “Macaulay Coefficients and Decomposing Lex Segments,” poster presentation at the Conference on Commutative Algebra and its Interaction with Algebraic Geometry and Algebraic Combinatorics (Uwe Fest), August 2024.
- “Macaulay Coefficients and Decomposing Lex Segments,” poster presentation at the Southwest Local Algebra Meeting (SLAM), February 2024.
- “Macaulay Coefficients and Decomposing Lex Segments,” poster presentation at KUMUNU, October 2023.
- “Macaulay Coefficients and Decomposing Lex Segments,” poster presentation at the Conference on Unexpected and Asymptotic Properties of Algebraic Varieties (BrianFest), August 2023.
- “Macaulay Coefficients and Decomposing Lex Segments,” poster presentation at the Southwest Local Algebra Meeting (SLAM), March 2023.
- “Macaulay Coefficients and Decomposing Lex Segments,” poster presentation at KUMUNU, October 2022.

## Awards

- Hazel Bucy Endowment Fund, 2025.
- Jeanne LeCaine Agnew Endowed Fellowship, 2023.
- O.H. Hamilton Endowed Fellowship, 2020.

## Teaching and Grading Experience

- Oklahoma State University
  - Fall 2025–present: Grader for MATH 4023, an undergraduate analysis course with emphasis on proofs.
  - Fall 2024–present: Instructor of record for MATH 2144, a first-semester calculus course.
  - Spring 2024: Instructor of record for MATH 1813, a precalculus course.
  - Spring 2023–Fall 2023: Instructor of record for MATH 2144.
  - Fall 2020–Fall 2022: Instructor of record for MATH 1813.
  - Spring 2020: Recitation instructor for MATH 2103, a business calculus course.

Duties as an instructor of record include lecturing, designing lecture notes and assignments, grading assignments and exams, and coordinating with supplemental instruction opportunities such as the tutoring center and guided study groups.

## Service and Outreach activities

- Vice president of the Mathematics Graduate Student Society at Oklahoma State University, 2025–present.

Duties include organizing and inviting speakers for a weekly seminar, coordinating with the faculty and other organizations, and co-organizing the annual OSU Graduate Math Conference.