

# Juliette Bruce

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Department of Mathematics  
University of Wisconsin  
480 Lincoln Dr.  
Madison, WI 53706

juliette.bruce@math.wisc.edu  
[math.wisc.edu/~juliettebruce](http://math.wisc.edu/~juliettebruce)

## Education

- **University of Wisconsin** Madison, WI  
*Ph.D. Mathematics* 2014 – Present  
– Advisor: Daniel Erman
- **University of Wisconsin** Madison, WI  
*M.A. Mathematics* 2014 – 2016
- **University of Michigan** Ann Arbor, MI  
*B.S. in Mathematics & Political Science* 2010 – 2014

## Research Interests

Algebraic Geometry, Commutative Algebra, Arithmetic Geometry, Non-linear Algebra. Specifically, homological methods in algebraic geometry, and algebraic geometry over finite fields.

## Publications

10. J. Bruce and D. Erman. A probabilistic approach to systems of parameters and Noether normalization. *Algebra and Number Theory*, Accepted. E-print: [arXiv:1604.01704](https://arxiv.org/abs/1604.01704).
9. J. Bruce and W. Li. Effective bounds on the dimensions of Jacobians covering abelian varieties. *Proc. Amer. Math. Soc.*, Accepted. E-print: [arXiv:1804.11015](https://arxiv.org/abs/1804.11015).
8. J. Bruce, D. Erman, S. Goldstein, and J. Yang. Conjectures and computations about Veronese syzygies. *Experimental Mathematics*, To Appear. E-print: [arXiv:1711.03513](https://arxiv.org/abs/1711.03513).
7. M. Brandt, J. Bruce, T. Brysiewicz, R. Krone, and E. Robeva. The degree of  $SO(n)$ . *Combinatorial Algebraic Geometry*, 207-224, Fields Inst. Commun. **80**, (2017). E-print: [arXiv:1701.03200](https://arxiv.org/abs/1701.03200).
6. J. Bruce, M. Logue, and R. Walker. Monomial valuations, cusp singularities, and continued fractions. *Journal of Commutative Algebra*, **7** (2015) no. 4, 495-522. E-print: [arXiv:1311.6493](https://arxiv.org/abs/1311.6493).
5. J. Bruce, P. Kao, E. Nash, B. Perez, and P. Vermeire. Betti tables of reducible algebraic curves. *Proc. Amer. Math. Soc.* **142** (2014) 4039-4051. E-print: [arXiv:1210.3064](https://arxiv.org/abs/1210.3064).

## Pre-Prints

4. J. Bruce. The Quantitative Behavior of Asymptotic Syzygies for Hirzebruch Surfaces. *Submitted*. E-Print: [arXiv:1906.07333](https://arxiv.org/abs/1906.07333).
3. J. Bruce, D. Erman, S. Goldstein, and J. Yang. The SchurVeronese package in Macaulay2. *Submitted*. E-print: [arXiv:1905.12661](https://arxiv.org/abs/1905.12661).
2. A. Almousa, J. Bruce, M. Loper, and M. Sayrafi. The Virtual Resolutions Package for Macaulay2. *Submitted*. E-print: [arXiv:1905.07022](https://arxiv.org/abs/1905.07022).
1. J. Bruce. Asymptotic Syzygies in the Setting of Semi-Ample Growth. *Submitted*. E-Print: [arXiv:1904.04944](https://arxiv.org/abs/1904.04944)

## Software

2. SchurVeronese, (with D. Erman, S. Goldstein, and J. Yang). Submitted for distribution with future releases of Macaulay2, a compute algebra system focused on computations in algebraic geometry and commutative algebra.
1. VirtualResolutions, (with A. Almousa, M. Loper, and M. Sayrafi). Distributed with version 1.14 of Macaulay2 (2019).

## Multimedia

1. [SyzygyData.com](https://syzygydata.com), (with D. Erman, S. Goldstein, and J. Yang). An online public database on large-scale syzygy computations.

## Grants

- **Conference Grant DMS-1908799 – \$15,000** March 2019  
*National Science Foundation*
- **Graduate Research Fellowship** 2015 – 2018  
*National Science Foundation*
- **Conference Grant DMS-1812462 – \$15,000** February 2018  
*National Science Foundation*
- **Professional Development Grant – \$1000** December 2016  
*Graduate School – University of Wisconsin*

## Awards & Honors

- **Elizabeth Hirschfelder Prize** October 2018  
*Awarded to an outstanding female student who has demonstrated promise in their academic work.*

- **Mathematics TA Service Award** April 2018  
*Dept. of Mathematics - University of Wisconsin*
- **Teaching Assistant Award for Exceptional Service** February 2018  
*Campus-wide award recognizing TA's who perform exceptional service*
- **Outstanding Achievement in Mathematics** May 2014  
*Dept. of Mathematics – University of Michigan*
- **Phi Beta Kappa** April 2014  
*University of Michigan*
- **Chancellor's Opportunity Award** April 2014  
*University of Wisconsin*

### Seminar and Colloquium Talks

- University of Notre Dame - Algebraic Geometry Seminar November 2019
- DePaul University - Algebra, Combinatorics, and Number Theory Seminar October 2019
- Lawrence University - Colloquium October 2019
- University of Utah - Algebraic Geometry Seminar September 2019
- Stanford University - Algebraic Geometry Seminar May 2019
- University of Kentucky - Algebra Seminar April 2019
- University of Minnesota - Commutative Algebra Seminar April 2019
- Rice University- Algebraic Geometry and Number Theory Seminar September 2018
- DePaul University - Algebra, Combinatorics, and Number Theory Seminar March 2018
- University of Michigan - Commutative Algebra Seminar December 2017

### Conference Talks

- Foundations of Computational Mathematics - Simon Fraser University April 2020
- CA+ - Iowa State University April 2020
- Joint Math Meetings - Denver, CO January 2020
- Fall AMS Central Sectional - University of Wisconsin September 2019
- SIAM Conference on Applied Algebraic Geometry 2019 July 2019
- KUMUNUjr - University of Nebraska March 2019
- Spring AMS Southeastern Sectional - Auburn University March 2019
- Joint Math Meetings - Baltimore, MD January 2019
- Fall AMS Central Sectional - University of Michigan October 2018
- Structures on Free Resolutions - Texas Tech University October 2017
- Midwest Algebraic Geometry Graduate Conference - University of Illinois, Chicago April 2015

### Poster Talks

- Summer School on Randomness and Learning in NLA - Max Plank Institute, Leipzig July 2019
- 2019 AWM Research Symposium - Rice University April 2019
- AWM Poster Session - Joint Math Meetings January 2018
- AGNES Poster Session - Brown University September 2018
- Lectures on Arithmetic Geometry - Rice University February 2017
- Introductory Workshop: Combinatorial Algebraic Geometry - Fields Institute August 2016
- Commutative Algebra and Its Interactions with Algebraic Geometry July 2016
- Midwest Commutative Algebra and Algebraic Geometry Conference May 2016

## Conference Organizing

- **Spectra Panel: Supporting Transgender and Non-binary Students** Joint Math Meetings  
*with Christopher Goff and Greg McCarthy* January 18, 2020
- **Special Session on Combinatorial Algebraic Geometry** AMS Sectional  
*with Daniel Erman, Chris Eur, and Lily Silverstein* September 14-15, 2019
- **GWCAWMMG** University of Minnesota  
*with Christine Berkesch and Patricia Klein* April 12-14, 2019
- **Geometry & Arithmetic of Surfaces** University of Wisconsin  
*with Wanlin Li* February 9-10, 2019
- **M2@UW** University of Wisconsin  
*with Daniel Erman, Steven Sam, and Jay Yang* April 14-17, 2018

## Outreach Activities

- **qGrads** University of Wisconsin  
*Organizer* July 2017 – Present
  - Campus group for LGBTQ+ graduate and post-graduate students with > 350 members.
  - Organized a weekly coffee social hour, providing a place to relax, make friends, and discussion the challenges of being LGBTQ+.
- **Supporting Transgender and Non-binary Students** MAA Panel at the JMM  
*Panelist* January 2020
- **Undergrad Directed Reading Program** University of Wisconsin  
*Mentor* January 2018 – May 2019
  - Lead two semester long reading projects on commutative algebra and algebraic geometry.
  - Lead an undergraduate women on a two semester reading project, and provided guidance on applying for REU's and graduate school.
- **Graduate Peer Mentoring** University of Wisconsin  
*Mentor* September 2018 – December 2018
  - Mentored 5 first year graduate students from minority genders, organizing monthly dinners where the mentees could discuss issues they were facing.
- **Girls Math Night Out** University of Wisconsin  
*Mentor* September 2018 – December 2018

- Lead 2 women from local high schools on a semesters long project about cryptography.
- **Madison Math Circle** University of Wisconsin  
*Lead Organizer* *January 2016 – December 2018*
  - Lead the creation of a new outreach program, which directly visits high schools around the state of Wisconsin to better serve students from underrepresented groups.
  - Expanded the total number of students reached per year from 25 to >250.
- **Madison Math Circle** University of Wisconsin  
*Student Volunteer* *January 2015 – December 2018*
- **Out in STEM (oSTEM) @ UW-Madison** University of Wisconsin  
*co-Founder* *July 2017 – Math 2018*
  - Founded, at the time, the only campus resource specifically for LGBTQ+ individuals in STEM, and grew the organization to over 50 members.
  - Secured a travel grant to help 11 members (undergraduate and graduate students) attend the national oSTEM conference.
- **Out in Math: Professional Issues Facing LGBTQ Mathematicians** MAA Panel at the JMM  
*Panelist* *January 2018*
- **Math Careers Beyond Academia** University of Wisconsin  
*Organizer* *April 14, 2017*
  - One day conference with over 50 participants.
- **Madison Mega Math Meet** University of Wisconsin  
*Graded* *May 2015*
- **Bonding Undergraduate and Graduate Students** University of Wisconsin  
*Mentor for Undergraduate* *September 2014 – December 2014*
- **Michigan Math Circle** University of Michigan  
*Organizer* *January 2013 – June 2014*

## Teaching Experience

- **Math 221: Calculus and Analytic Geometry I** University of Wisconsin  
*Teaching Assistant* *Fall 2014/2018/2019*
  - Selected as a TA coordinator in 2018 and 2019, and was responsible for overseeing all other TA's and mentoring first year TA's.
  - Average score 4.9/5.0
- **Math 228: Wisconsin Emerging Scholars** University of Wisconsin  
*Instructor* *Fall 2018*
  - Course providing students from underrepresented groups additional support.
  - Average score: 5.0/5.0
- **Math 132: Problem Solving in Algebra, Probability & Statistics** University of Wisconsin  
*Instructor* *Spring 2015*
- **Inquiry Based Learning Courses** University of Michigan  
*Course Assistant* *2012-2014*
  - Assisted with advanced undergraduate courses on topology, analysis, and probability.

- Facilitated inquiry based learning in the classroom, and responsible for office hours, grading, and review sessions.

## Service

- **AMS Graduate Student Blog**  
*Editor* American Mathematical Society  
*September 2015 – September 2018*
- **AMS Graduate Student Chapter**  
*Member* University of Wisconsin  
*September 2014 – September 2018*
- **Graduate Student Algebraic Geometry Seminar**  
*Organizer* UW Dept. of Mathematics  
*March 2015 – December 2017*
- **Committee on Inclusivity and Diversity**  
*Member* UW Dept. of Mathematics  
*November 2016 – August 2017*
  - Created policies seeking to make the department a more welcoming, inclusive, and comfortable place. This included drafting the department's statement on inclusivity, and creating similar statements for syllabi to be used throughout the department.
- **Committee on TA Pay and Performance**  
*Member* UW Dept. of Mathematics  
*September 2015 – August 2017*
  - Developed and implemented a new system to evaluate TA performance, with the goal of creating a more transparent, useful, and non-biased system.
- **Instructor Excellence Program**  
*Teaching Mentor* UW Dept. of Mathematics  
*September 2015 – May 2016*
- **Society of Undergraduate Math Students**  
*President and Founder* University of Michigan  
*December 2012 – June 2014*

## Memberships

- Society of Industrial and Applied Mathematics January 2017 – Present
- Association for Women in Mathematics January 2016 – Present
- American Mathematical Society September 2014 – Present