

# Juliette Bruce

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Department of Mathematics  
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## 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  
– With High Honors and Distinction

## Publications

9. 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).
8. 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).
7. J. Bruce. Asymptotic Syzygies in the Setting of Semi-Ample Growth. *Submitted*. E-Print: [arXiv:1904.04944](https://arxiv.org/abs/1904.04944)
6. J. Bruce and W. Li. Effective bounds on the dimensions of Jacobians covering abelian varieties. *Submitted*. E-print: [arXiv:1804.11015](https://arxiv.org/abs/1804.11015).
5. 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).
4. 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).
3. J. Bruce and D. Erman. A probabilistic approach to systems of parameters and Noether normalization. *Submitted*. E-print: [arXiv:1604.01704](https://arxiv.org/abs/1604.01704).
2. 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).
1. 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).

## 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  
*Dept. of Mathematics - University of Wisconsin*
- **Mathematics TA Service Award** April 2018  
*Dept. of Mathematics - University of Wisconsin*
- **Teaching Assistant Award for Exceptional Service** February 2018  
*University of Wisconsin (Campus Wide)*
- **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*
- **James B. Angell Scholar (2-times)** March 2013/2014  
*University of Michigan*
- **University Honors (5-times)** 2010 – 2014  
*University of Michigan*
- **MAA Student Travel Grant** November 2012  
*Mathematics Association of America*
- **Research Travel Scholarship** November 2012  
*Honors College – University of Michigan*
- **M.S. Keeler Scholarship** April 2012  
*Dept. of Mathematics – University of Michigan*
- **William J. Branstrom Freshman Prize** February 2011  
*University of Michigan*

## Presentations

## Research Presentations

- **Semi-Ample Asymptotic Syzygies**  
*Algebraic Geometry Seminar* Stanford University  
May 2019
- **Asymptotic Syzygies for Products of Projective Space**  
*Algebra Seminar* University of Kentucky  
April 2019
- **Semi-Ample Asymptotic Syzygies**  
*Commutative Algebra Seminar* University of Minnesota  
April 2019
- **Asymptotic Syzygies for Products of Projective Space (Poster)**  
*2019 AWM Research Symposium Poster Session* Rice University  
April 2019
- **Asymptotic Syzygies for Products of Projective Space**  
*KUMUNUjr.* University of Nebraska  
March 2019
- **Asymptotic Syzygies for Products of Projective Space**  
*Spring AMS Southeastern Sectional* Auburn University  
March 2019
- **Asymptotic Syzygies for Products of Projective Space**  
*Joint Math Meetings* Baltimore, MD  
January 2019
- **Covering Abelian Varieties and Effective Bertini**  
*Algebra and Algebraic Geometry Seminar* University of Wisconsin  
October 2018
- **Asymptotic Syzygies for Products of Projective Space**  
*Fall AMS Central Sectional* University of Michigan  
November 2018
- **Asymptotic Syzygies in the Semi-Ample Setting (Poster)**  
*AGNES Poster Session* Brown University  
September 2018
- **Covering Abelian Varieties and Effective Bertini**  
*Algebraic Geometry and Number Theory Seminar* Rice University  
September 2018
- **Syzygies of Surfaces via Distributed Computing**  
*Algebra Seminar* DePaul University  
March 2018
- **Asymptotic Syzygies in the Semi-Ample Setting**  
*Algebra and Algebraic Geometry Seminar* University of Wisconsin  
February 2018
- **Asymptotic Syzygies in the Semi-Ample Setting (Poster)**  
*Joint Math Meetings AWM Poster Session* San Diego, CA  
January 2018
- **Asymptotic Syzygies in the Semi-Ample Setting**  
*Commutative Algebra Seminar* University of Michigan  
December 2017
- **Asymptotic Syzygies in the Semi-Ample Setting**  
*Structures on Free Resolutions* Texas Tech University  
October 2017
- **A Distributed Numerical Approach to Syzygies of  $\mathbb{P}^2$  (Poster)**  
*Free Resolutions and Computations* UC - Berkeley  
July 2017
- **The Degree of  $SO(n)$  and Low-rank SDP**  
*Applied Algebra Seminar* University of Wisconsin  
March 2017
- **A Probabilistic Approach to Noether Normalization (Poster)**  
*Lectures on Arithmetic Geometry* Rice University  
February 2017
- **A Probabilistic Approach to Noether Normalization (Poster)**  
*Introductory Workshop: Combinatorial Algebraic Geometry* Fields Institute  
August 2016
- **A Probabilistic Approach to Noether Normalization (Poster)**  
*Commutative Algebra and Its Interactions with Algebraic Geometry* University of Michigan  
July 2016
- **A Probabilistic Approach to Noether Normalization (Poster)**  
*Midwest Commutative Algebra and Algebraic Geometry Conference* University of Notre Dame  
May 2016

- **Noether Normalization in Families**  
*Algebraic Geometry Seminar* University of Wisconsin  
April 2016
- **Probability of Systems of Parameters**  
*Speciality Exam* University of Wisconsin  
February 2016
- **Betti Tables of Graph Curves**  
*Midwest Algebraic Geometry Graduate Conference* University of Illinois - Chicago  
April 2015
- **Counting and the Grothendieck Ring**  
*Graduate Number Theory Seminar* University of Wisconsin  
March 2015
- **Betti Diagrams of Graph Curves**  
*Algebraic Geometry Seminar* University of Wisconsin  
December 2014
- **The Resolution of Cusp Singularities and Continued Fractions**  
*Young Mathematicians Conference* Ohio State University  
August 2013
- **The Resolution of Cusp Singularities and Continued Fractions**  
*REU Seminar* University of Michigan  
July 2013
- **Betti Tables of Reducible Algebraic Curves**  
*Joint Math Meetings REU Session* San Diego, CA  
January 2013
- **Betti Tables of Reducible Algebraic Curves**  
*Joint Math Meetings Poster Session* San Diego, CA  
January 2013
- **Betti Tables of Reducible Algebraic Curves**  
*REU Seminar* University of Michigan  
August 2012
- **Betti Tables of Reducible Algebraic Curves**  
*Summer Undergrad Michigan Math Research Conference* Michigan State University  
July 2012
- **A Geometric Median in Banach Spaces and Applications to Robust PCA**  
*REU Seminar (University of Michigan)* August 2011

## Expository Presentations

- **Intro to Moduli Spaces and Group Work**  
*AG Reading Seminar* University of Wisconsin  
March 2019
- **Kissing Conics**  
*Donut Seminar* University of Wisconsin  
October 2018
- **The Hilbert and Quot Schemes**  
*Examples in Algebraic Geometry (Reading Group)* University of Wisconsin  
April 2017
- **The Many Faces of Grassmannians**  
*Examples in Algebraic Geometry (Reading Group)* University of Wisconsin  
February 2017
- **Complexity in Algebraic Geometry**  
*Positivity in Algebraic Geometry (Reading Group)* University of Wisconsin  
October 2016
- **Some Numbers Are Sometimes Bigger Than Others (Sometimes...)**  
*Donut Seminar* University of Wisconsin  
October 2016
- **Vignettes in Algebraic Geometry**  
*Graduate Algebraic Geometry Seminar* University of Wisconsin  
September 2016
- **A Crazy Way to Define Homology**  
*Donut Seminar* University of Wisconsin  
April 2016
- **Divisors and Stuff (3 Lectures)**  
*Graduate Algebraic Geometry Seminar* University of Wisconsin  
March 2016

- **Counting Categorically**  
*Graduate Number Theory Seminar*  
University of Wisconsin  
*January 2016*
- **The Ring**  
*Graduate Algebraic Geometry Seminar*  
University of Wisconsin  
*September 2015*
- **The Important Questions**  
*Graduate Number Theory Seminar*  
University of Wisconsin  
*September 2015*
- **Bertini Theorems In Different Settings**  
*Graduate Algebraic Geometry Seminar*  
University of Wisconsin  
*April 2015*
- **Mean, Median, Mode - Well Actually Just Median**  
*Donut Seminar*  
University of Wisconsin  
*February 2015*
- **Rational Varieties and Rational Points**  
*Graduate Number Theory Seminar*  
University of Wisconsin  
*February 2015*
- **Topics in Resolutions of Singularities**  
*Graduate Algebraic Geometry Seminar*  
University of Wisconsin  
*October 2014*
- **Complex Dynamics and Number Theory**  
*Graduate Number Theory Seminar*  
University of Wisconsin  
*October 2014*
- **Hex on the Beach**  
*Donut Seminar*  
University of Wisconsin  
*September 2014*
- **Complex Dynamics: A Primer**  
*Michigan Math Undergrad Seminar Lunch (MMUSSL)*  
University of Michigan  
*May 2014*
- **Resolving Singularities**  
*Math Club*  
University of Michigan  
*January 2014*

## Outreach Presentations

- **To Infinity and Beyond**  
*Madison Math Circle*  
East High School  
*October 2018*
- **The Best Slide**  
*Madison Math Circle*  
East High School  
*October 2018*
- **Building the Shortest Road**  
*Madison Math Circle*  
University of Wisconsin  
*April 2018*
- **Doodling Daydreams**  
*Madison Math Circle*  
Whitewater High School  
*November 2017*
- **Doodling Daydreams**  
*Madison Math Circle*  
East High School  
*March 2017*
- **Shhh, This Message is Secret**  
*Madison Math Circle*  
East High School  
*October 2016*
- **Shhh, This Message is Secret**  
*Madison Math Circle*  
West High School  
*October 2016*
- **Is any knot not the unknot?**  
*Madison Math Circle*  
University of Wisconsin  
*September 2016*
- **Game Busters**  
*Madison Math Circle*  
Science Saturday  
*August 2016*
- **Is any knot not the unknot?**  
*Madison Math Circle*  
Madison East High School  
*May 2016*

- **To Infinity and Beyond!**  
*Madison Math Circle* James Madison Memorial High School  
*April 2016*
- **Can you untie a knot with a knot?**  
*Madison Math Circle* Madison West High School  
*April 2016*
- **To Infinity and Beyond!**  
*Madison Math Circle* University of Wisconsin  
*November 2015*
- **Finding the Right Questions**  
*Madison Math Circle* University of Wisconsin  
*April 2015*
- **Is Any Knot Not the Unknot**  
*Madison Math Circle* University of Wisconsin  
*September 2014*
- **How Big is Infinity?**  
*Guest Lecture* Brighton High School  
*May 2013*

## Teaching Experience

- **Math 228: Wisconsin Emerging Scholars**  
*Instructor* University of Wisconsin  
*Fall 2018*
- **Math 221: Calculus and Analytic Geometry I**  
*Teaching Assistant & Course Coordinator* University of Wisconsin  
*Fall 2018*
- **Math 132: Problem Solving in Algebra, Statistics, & Probability**  
*Instructor* University of Wisconsin  
*Spring 2015*
- **Math 221: Calculus and Analytic Geometry I**  
*Teaching Assistant* University of Wisconsin  
*Fall 2014*
- **Hex and the 4 C's**  
*Course Assistant* Michigan Math and Science Scholars  
*Summer 2014*
- **Math 310: Explorations in Randomness**  
*Course Assistant* University of Michigan  
*Winter 2014*
  - Assisted facilitating inquiry based learning in the classroom.
  - Responsible for office hours, grading, and review sessions.
- **Math 490: Introduction to Topology**  
*Course Assistant* University of Michigan  
*Fall 2013*
  - Assisted facilitating inquiry based learning in the classroom.
  - Responsible for office hours, grading, and review sessions.
- **Graph Theory**  
*Course Assistant* Michigan Math and Science Scholars  
*Summer 2013*
- **Math 351: Principals of Analysis**  
*Course Assistant* University of Michigan  
*Winter 2013*
- **Math 105: Data, Functions, and Graphs**  
*Course Assistant* University of Michigan  
*Fall 2012*
- **Math Lab**  
*Tutor* University of Michigan  
*Fall 2011 – Winter 2013*

## Participation in Select Workshops

- **AMS Short Course in Sums of Squares** Baltimore, MD  
*Joint Math Meetings* January 2019
- **Arizona Winter School: Perfectoid Spaces** Tucson, AZ  
*Southwest Center for Arithmetic Geometry* March 2017
- **Apprenticeship Weeks** Toronto, ON  
*Fields Institute* August 2016
- **Macaulay2 Workshop 2016** Salt Lake City, UT  
*University of Utah* May 2016
- **Summer Institute in Algebraic Geometry** Salt Lake City, UT  
*University of Utah* July 2015
- **Macaulay2 Workshop 2015** Boise, ID  
*Boise State University* May 2015
- **Arizona Winter School: Arithmetic and Higher-Dimensional Varieties** Tucson, AZ  
*Southwest Center for Arithmetic Geometry* March 2015
- **AMS Short Course in Random Matrix Theory** San Diego, CA  
*Joint Math Meetings* January 2013
- **Intro to Topological Invariants in Low Dimensions** South Bend, IN  
*Undergrad Summer School at Notre Dame University* May 2012

## Research Experiences

- **Research Experience for Undergraduates** University of Michigan  
*Advisor: Prof. Karen Smith* Summer 2013  
– Research in algebraic geometry and commutative algebra.
- **Research Experience for Undergraduates** Central Michigan University  
*Advisor: Prof. Pete Vermeire* Summer 2012  
– Research in algebraic geometry.
- **Research Experience for Undergraduates** University of Michigan  
*Advisor: Prof. Roman Vershynin* Summer 2011  
– Research in geometric analysis with applications to PCA.

## Conference Organizing

- **GWCAWMMG** University of Minnesota  
*April 12 - April 14, 2019*
- **Geometry & Arithmetic of Surfaces** University of Wisconsin  
*February 9 - February 10, 2019*
- **M2@UW** University of Wisconsin  
*April 14-17, 2018*
- **Math Careers Beyond Academia** University of Wisconsin  
*April 14, 2017*

## Outreach Activities

- **Undergrad Directed Reading Program**  
*Mentor* University of Wisconsin  
*January 2018 – Present*
- **Graduate Peer Mentoringt**  
*Mentor* University of Wisconsin  
*September 2018 – December 2018*
- **Girls Math Night Out**  
*Mentor* University of Wisconsin  
*September 2018 – December 2018*
- **Madison Math Circle**  
*Lead Organizer* University of Wisconsin  
*January 2016 – December 2018*
- **Madison Math Circle**  
*Student Volunteer* University of Wisconsin  
*January 2015 – December 2018*
- **Out in STEM (oSTEM) @ UW-Madison**  
*co-Founder* University of Wisconsin  
*July 2017 – Math 2018*
- **Out in Math: Professional Issues Facing LGBTQ Mathematicians**  
*Panelist* MAA Panel at the JMM  
*January 2018*
- **Madison Mega Math Meet**  
*Graded* University of Wisconsin  
*May 2015*
- **Bonding Undergraduate and Graduate Students**  
*Mentor for Undergraduate* University of Wisconsin  
*September 2014 – December 2014*
- **Michigan Math Circle**  
*Organizer* University of Michigan  
*January 2013 – June 2014*

## 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*
- **Committee on Inclusivity and Diversity**  
*Member* UW Dept. of Mathematics  
*November 2016 – August 2017*
- **Committee on TA Pay and Performance**  
*Member* UW Dept. of Mathematics  
*September 2015 – August 2017*
- **Instructor Excellence Program**  
*Teaching Mentor* UW Dept. of Mathematics  
*September 2015 – May 2016*
- **Michigan Math Undergrad Seminar Lunch**  
*Organizer* University of Michigan  
*Summer 2014*
- **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