

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

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
January 18, 2020
- **Special Session on Combinatorial Algebraic Geometry** AMS Sectional
September 14 - September 15, 2019
- **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

- **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**
Mentor University of Wisconsin
September 2018 – December 2018
 - Lead 2 women from local high schools on a semesters long project about cryptography.
- **Madison Math Circle**
Lead Organizer University of Wisconsin
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**
Student Volunteer University of Wisconsin
January 2015 – December 2018
- **Out in STEM (oSTEM) @ UW-Madison**
co-Founder University of Wisconsin
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**
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

Teaching Experience

- **Math 221: Calculus and Analytic Geometry I**
Teaching Assistant University of Wisconsin
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**
Instructor University of Wisconsin
Fall 2018
 - Course providing students from underrepresented groups additional support.
 - Average score: 5.0/5.0, 100% amongst all TA's
- **Math 132: Wisconsin Emerging Scholars**
Instructor University of Wisconsin
Spring 2015
 - Responsible for all aspects of the course.
- **Inquiry Based Learning Courses**
Course Assistant University of Michigan
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