Juliette Bruce

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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*

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.

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.

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.

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.

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.

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.

Pre-Prints

4. J. Bruce. The Quantitative Behavior of Asymptotic Syzygies for Hirzebruch Surfaces. *Submitted.* E-Print: arXiv:1906.07333.

3. J. Bruce, D. Erman, S. Goldstein, and J. Yang. The SchurVeronese package in Macaulay2. *Submitted.* E-print: arXiv:1905.12661.

2. A. Almousa, J. Bruce, M. Loper, and M. Sayrafi. The Virtual Resolutions Package for Macaulay2. *Submitted.* E-print: arXiv:1905.07022.

1. J. Bruce. Asymptotic Syzygies in the Setting of Semi-Ample Growth. *Submitted.* E-Print: arXiv: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, (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 Michigan - Commutative Algebra Seminar December 2019
- University of Notre Dame - Algebraic Geometry Seminar November 2019
- DePaul University - Algebra, Combinatorics, and Number Theory Seminar October 2019
- Lawerence 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

- LGBTQ+Math - Fields Institute July 2020
- Foundations of Computational Mathematics - Simon Fraser University June 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**   American Mathematical Society
  Editor   *September 2015 – September 2018*
- **AMS Graduate Student Chapter**   University of Wisconsin
  Member   *September 2014 – September 2018*
- **Graduate Student Algebraic Geometry Seminar**   UW Dept. of Mathematics
  Organizer   *March 2015 – December 2017*
- **Committee on Inclusivity and Diversity**   UW Dept. of Mathematics
  Member   *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**   UW Dept. of Mathematics
  Member   *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**   UW Dept. of Mathematics
  Teaching Mentor   *September 2015 – May 2016*
- **Society of Undergraduate Math Students**   University of Michigan
  President and Founder   *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