

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
– With High Honors and Distinction

Research Interests

Algebraic Geometry, Commutative Algebra, Arithmetic Geometry, Non-linear Algebra

Publications

10. J. Bruce. The Quantitative Behavior of Asymptotic Syzygies for Hirzebruch Surfaces. *Submitted*. E-Print: [arXiv:1906.07333](https://arxiv.org/abs/1906.07333).
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. *Proc. Amer. Math. Soc.*, Accepted. 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. *Algebra and Number Theory*, Accepted. 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**
Dept. of Mathematics – University of Michigan
- **William J. Branstrom Freshman Prize**
University of Michigan

April 2012

February 2011

Presentations

Research Presentations

- **Asymptotic Syzygies for Products of Projective Space**
Summer School on Randomness and Learning in Non-Linear Algebra
MPI Leipzig
July 2019
- **Asymptotic Syzygies in the Semi-Ample Setting (Poster)**
Summer School on Randomness and Learning in Non-Linear Algebra
MPI Leipzig
July 2019
- **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** University of Michigan
Course Assistant Fall 2013
 - Assisted facilitating inquiry based learning in the classroom.
 - Responsible for office hours, grading, and review sessions.
- **Graph Theory** Michigan Math and Science Scholars
Course Assistant Summer 2013
- **Math 351: Principals of Analysis** University of Michigan
Course Assistant Winter 2013
- **Math 105: Data, Functions, and Graphs** University of Michigan
Course Assistant Fall 2012
- **Math Lab** University of Michigan
Tutor Fall 2011 – Winter 2013

Participation in Select Workshops

- **Explicit Methods in Arithmetic Geometry in Characteristic p** Whispering Pines, RI
Mathematics Research Community June 2019
- **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**

Advisor: Prof. Roman Vershynin

University of Michigan
Summer 2011

– Research in geometric analysis with applications to PCA.

Conference Organizing

- **GWCAWMMG**

April 12 - April 14, 2019

University of Minnesota

- **Geometry & Arithmetic of Surfaces**

February 9 - February 10, 2019

University of Wisconsin

- **M2@UW**

April 14-17, 2018

University of Wisconsin

- **Math Careers Beyond Academia**

April 14, 2017

University of Wisconsin

Outreach Activities

- **Undergrad Directed Reading Program**

Mentor

University of Wisconsin

January 2018 – Present

- **Graduate Peer Mentoring**

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
- **AMS Graduate Student Chapter**
Member
- **Committee on Inclusivity and Diversity**
Member
- **Committee on TA Pay and Performance**
Member
- **Instructor Excellence Program**
Teaching Mentor
- **Michigan Math Undergrad Seminar Lunch**
Organizer
- **Society of Undergraduate Math Students**
President and Founder

American Mathematical Society
September 2015 – September 2018

University of Wisconsin
September 2014 – September 2018

UW Dept. of Mathematics
November 2016 – August 2017

UW Dept. of Mathematics
September 2015 – August 2017

UW Dept. of Mathematics
September 2015 – May 2016

University of Michigan
Summer 2014

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