

# Corey Brooke

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Department of Mathematics  
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## EDUCATION

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2017- **University of Oregon**, Eugene, OR  
Ph.D. in Mathematics, expected June 2023  
Advisor: Dr. Nicolas Addington

2013-2017 **St. Olaf College**, Northfield, MN  
B.A. in Mathematics, May 2017  
Graduated Summa Cum Laude

## RESEARCH INTERESTS

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I am generally interested in algebraic geometry and arithmetic geometry. I use classical methods and the perspective of the derived category. My current research revolves around cubic fourfolds and their connections to K3 surfaces, hyperkähler varieties, and abelian varieties.

## PUBLICATIONS

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Abelian surface fibrations from Fano varieties of cubic fourfolds. *In preparation.*

Associated primes of  $h$ -wheels. With Molly Hoch, Sabrina Lato, Janet Striuli, and Brian Wang. *Involve*, 12(3): 411-425, 2019.

## TEACHING EXPERIENCE

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### Graduate Teaching Fellow

Department of Mathematics, University of Oregon

I served as instructor for the following courses:

Math 111	College Algebra	Fall 2017, Winter 2018, Spring 2018
Math 112	Elementary Functions	Fall 2018, Fall 2019
Math 243	Introduction to Probability and Statistics	Summer 2018
Math 251	Calculus I	Spring 2019, Fall 2020, Spring 2021
Math 246	Calculus I for the Biological Sciences	Winter 2021
Math 252	Calculus II	Winter 2020, Fall 2022
Math 341	Elementary Linear Algebra	Summer 2021

I served as teaching assistant for the following courses:

Math 205	Programming Math Lab	Fall 2021
Math 207	Geometry Math Lab	Fall 2021
Math 243	Introduction to Probability and Statistics	Winter 2019, Spring 2020

In Winter 2022, I produced written and videotaped educational content through the University of Oregon Prison Education Program.

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 UNDERGRADUATE MENTORING
 

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I organized and led the following undergraduate reading projects through the University of Oregon Directed Reading Program. Both projects involved selecting reading material, supporting students' progress in weekly meetings, and preparing students to deliver a presentation to their peers at the end of Winter term.

2022 **Introduction to Elliptic Curves.** Nat Milnes read from Silverman's books *The Arithmetic of Elliptic Curves* and *Advanced Topics in the Arithmetic of Elliptic Curves*.

2021 **Projective Plane Conics.** Nick Gilbert read from Reid's *Undergraduate Algebraic Geometry*.

I was involved with the following projects through the University of Oregon Math Department's summer undergraduate research program, supporting students in weekly meetings through the summer term. Nicolas Addington was the faculty advisor for both projects. No students had previous exposure to algebraic geometry.

2022 **Videos of algebraic surfaces.** Izzy Harker animated a conic fibration coming from intersecting a family of planes with a cubic surface. Karl Richter animated a quartic surface as it deformed through time, emphasizing how seldom quartic surfaces contain lines or conics. More can be found here: <https://pages.uoregon.edu/adding/videos/>.

2022 **Eckardt points and cubic surfaces.** Makenna Greenwalt described a technique for detecting whether a cubic surface contains an Eckardt point.

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 UNIVERSITY SERVICE, MEMBERSHIP, AND ACTIVITIES
 

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2020-2022	Organizer of the student algebraic geometry seminar (Ring-op)
2021	Member of the UO Math Department Climate Committee
2021, 2022	Mentor, UO directed reading program for undergraduates
2020-	Member of the American Mathematics Society, University of Oregon chapter
2020-2021	Co-founder and organizer of the UO Antiracism Learning Seminar
2018-2022	Graduate Teaching Fellows Federation math department union steward

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 TALKS AND PRESENTATIONS
 

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**Invited**

2022 (Upcoming) *Fano varieties of cubic fourfolds containing a plane*, Simon Fraser University Algebra Seminar

**Contributed**

2022 (Upcoming) *Fano varieties of cubic fourfolds containing a plane*, Western Algebraic Geometry Symposium poster session, University of California Riverside

2022 *Fano varieties of cubic fourfolds containing a plane*, Simon Fraser University Algebra Seminar

2019 *Associated Primes of  $h$ -Wheels and other Graphs*, Joint Mathematics Meetings, Baltimore

**Expository talks in University of Oregon student seminars**

2021 *The Classification of del Pezzo Surfaces*, Ring-op seminar

2021 *Elliptic Curves*, Graduate showcase for the UO math club

2021 *Cubic Fourfolds Containing a Plane*, Student number theory seminar

2020 *The Weil Conjectures for Elliptic Curves*, Student number theory seminar

2020 *Brauer Groups and Severi Brauer Varieties*, Student number theory seminar

SELECTED CONFERENCES AND WORKSHOPS ATTENDED

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- 11/2022 Western Algebraic Geometry Symposium (WAGS), University of California Riverside
- 04/2022 Anabelian Days down in Georgia (ADDING), University of Georgia
- 04/2022 Western Algebraic Geometry Symposium (WAGS), Colorado State University
- 08/2021 Pacific Institute for the Mathematical Sciences (PRIMA) 2021 Summer School: Rational curves and moduli spaces in arithmetic geometry, virtual
- 07/2021 Trieste Algebraic Geometry Summer School (TAGSS) 2021 - Hyperkähler and Prym varieties: classical and new results, ICTP, virtual
- 05/2021 Mathematics Teacher-Scholar Symposium, Reed College, virtual
- 04/2021 Western Algebraic Geometry Symposium (WAGS), virtual
- 02/2020 Oregon Number Theory Days, Oregon State University
- 07/2019 Workshop on Algebra and Representation Theory Held on Oregon Grounds (WARTHOG) Summer School on Foundations of Tropical Geometry, University of Oregon
- 01/2019 Joint Mathematics Meeting (JMM), Baltimore