

Natalie Hobson

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UGA Department of Mathematics

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Research Interests

Algebraic geometry: moduli space of curves, vector bundles of conformal blocks, the Grassmannian variety. **Combinatorial algebraic geometry:** cohomology, tropical geometry.

Mathematics education: student cognition in undergraduate mathematics, covariational reasoning, inverses, graphing and representations.

Education

Ph.D., Mathematics, University of Georgia, Athens, GA, Expected May 2017.

Advisor: Angela Gibney

M.A., Mathematics Education, University of Georgia, Athens, GA, Expected May 2017.

Advisor: Kevin Moore

M.S., Mathematics, University of Georgia, Athens, GA, August 2013.

B.S., Mathematics, University of Washington, Seattle, WA, March 2012.

Advisor: Sara Billey

Minors: Education and Diversity

Thesis: *Voting theory and Dedekind's problem*

Publications and Preprints

“Quantum Kostka and the rank one problem for sl_{2m} .” Submitted August 2015. Preprint available on arXiv: 1508.06952.

“Conformal blocks in type C at level one.” May 2016. Preprint available on arXiv: 1605.06184.

Teaching Experience

- **Instructor of Record**, University of Georgia, Athens, GA.
 - Math 2001: Geometry for Elementary Teachers, Spring 2016.
 - Math 2250: Calculus I for Scientists and Engineers, Fall 2015, Spring 2015.
 - Math 1113: Precalculus, Fall 2014.
- **Head Teaching Assistant and Counselor**, Summer Institute for Mathematics at the University of Washington (SIMUW), Seattle, WA, June-August 2010, 2011, 2012, 2014.

Awards and Grants

- **NSF RTG Fellowship**, (Algebraic Geometry, Algebra and Number Theory Research and Training Group), Fall 2016-Summer 2017.
- **Outstanding Graduate Teaching Award**, Department of Mathematics, Spring 2016.
- **AMS Travel Grant**, Spring 2016.
- **Scholarship of Teaching and Learning (SoTL) Mini-Grant**, Center for the Integration of Research, Teaching, and Learning, University of Georgia, Fall 2015.
- **NSF RTG Fellowship**, Department of Mathematics, University of Georgia, Summer 2015.
- **NSF VIRGE Fellowship**, Department of Mathematics, University of Georgia, August 2012- May 2013.

- **Award for Excellence in Academics and K-12 Outreach**, University of Washington, June 2012.

Presentations

Mathematics Research:

- “Vector bundles of conformal blocks in type C at level one” poster.
 - MAAGC (Mid-Atlantic Algebraic Geometry and Combinatorics) Workshop. Drexel University, Philadelphia, PA, May 2016.
- “Vector bundles of conformal blocks in type C at level one”
 - AMS Central Sectional Meeting. Invited talk in session on *Algebraic Geometry and Interactions*, North Dakota State University, April 2016.
- “Quantum Kostka and the rank on problem for sl_{2m} ”
 - AMS-MAA Joint Mathematics Meetings, Seattle, WA, January 2016.
 - University of Washington Combinatorics Seminar, Seattle, WA, October 2015.
- “A brief introduction to Schubert calculus”
 - UGA Mock AMS Conference, July 2015.
- “A construction on the moduli space of genus zero curves with n marked points”
 - UGA Tuesday Algebraic Geometry Student Seminar, January 2015.
- “Moduli *stack* of genus g , smooth, projective, connected curves”
 - UGA String Theory VIGRE Research Group, April 2014.
- “Moduli of complete conics”
 - UGA Graduate Student Seminar, February 2014.
- “The fundamental group of $SO(3)$ ”
 - UGA Mock AMS Conference, July 2013.

Mathematics Education Research and Pedagogy:

- Pathways Precalculus Implementation Workshop
 - Kennesaw State University, May 2016.
- “The effects of a content course on preservice teachers’ views of mathematics and mathematics teaching and learning”
 - 50th Anniversary of Mathematics Education at UGA Conference, May 2016.
- “Providing students experiences to model novel situations”
 - AMS Southeastern Sectional. Invited talk in session on *Active Learning in Undergraduate Mathematics Education*. University of Georgia, March 2016.
- “Preservice teacher preferences and performance in a mathematics content course”
 - Invited talk in CIRTL (Center for Integration of Research, Teaching, and Learning). Attendees from over 23 universities.
- “Graphing habits: *I just don’t like that*”
 - MAA Conference on Research in Undergraduate Mathematics Education, Pittsburg, PA, February 2016.
- “Pre-service teachers’ inverse function meanings”
 - MAA Conference on Research in Undergraduate Math Education, Pittsburg PA, February 2015.
 - With Teo Paoletti, Irma E. Stevens, Kevin R. LaForest, and Kevin C. Moore
- “Studying students’ preferences and performance in a cooperative mathematics classroom”
 - AMS-MAA Joint Meetings, San Antonio, TX, January 2015.
 - With Sayonita Gosh-Hajra
- “Undergraduates’ inverse function meanings”
 - UGA Math Teaching Seminar, January 2015.
 - With Teo Paoletti, Irma E. Stevens, Kevin R. LaForest, and Kevin C. Moore
- “Workshop on math circles”

- UGA Interdisciplinary Research Conference, February 2014.
- “Effective teaching practices”
 - UGA Graduate Student Seminar, November 2013.

Talks for Undergraduates and High School Students:

- “Constructing Cones” lesson plan for grades 4-10.
 - SciREN (Scientific Research and Education Network), Sandy Creek Nature Center, Athens, GA, April, 2016.
- “The Hidden World of Polytope”
 - UGA Math Club, February 2016.
- “Introduction to Algebraic Geometry: Seeing Geometry in your Abstract Algebra Class”
 - Davidson College, Davidson, NC, November 2015.
- “Symmetric functions and tableaux”
 - Davidson College, Davidson, NC, November 2015.
 - University of Portland, Department of Mathematics, Portland, OR, November 2015.
- “Horn’s Conjecture: Solving problems with puzzles”
 - University of Puget Sound, Department of Mathematics and Computer Science, Tacoma, WA, October 2015.
- “Tableaux and hives: Mathematicians’ puzzles”
 - UGA Math Club, September 2015.
- “Realizing reality on the drawing board”
 - MAA MathFest, Washington DC, August 2015.
 - Summer Institute for Mathematics at the University of Washington, Seattle, WA, July 2015.
- “The geometry of our eyes”
 - UGA Math Club, January 2015.
- “The projective plane”
 - Summer Institute for Mathematics at the University of Washington, Seattle, WA, July 2014.
- “The game of NIM”
 - UGA High School Math Circle, December 2013.
- “Pigeon holes!”
 - UGA High School Math Circle, January 2013.
- “Mathematics of voting”
 - University of Washington’s *MathDay*, Seattle, WA, March 2012.

Research with Undergraduates

- MSRI-UP (Undergraduate Program). REU on Sandpile Groups, Berkeley, CA, June-July 2016.
 - Research Assistant. Daily lectures. Advice students’ group projects. Design lesson plans in Sage.
 - Director: Luis Garcia-Puente
- Fusion coefficients for type C_2 conformal blocks REU, Mathematics Department at Fordham University, New York, NY, May-June 2014.
 - Research Assistant. Morning lecture on Lie algebras and afternoon problem sessions.
 - Director: David Swinarski
- Undergraduate Poster Session Judge: Applied Mathematics, January 2016.
 - AMS-MAA Joint Mathematics Meetings
- Undergraduate Paper Session: Mathematical Biology, August 2015.
 - Paper Session Judge
 - MAA MathFest, Washington DC.
- Wake Forest & Davidson REU in Number Theory, July 2015.
 - Graduate student panelist

Teaching Research Communities

- Math Teaching Seminar at University of Georgia, Fall 2014-Present.
 - Founder and organizer.
 - Organize monthly speakers on topics related to teaching practices and student learning in undergraduate mathematics. Seminar speakers have included faculty and graduate students and representatives from the Center for Teaching and Learning at UGA.
- Scholarship of Teaching and Learning (SoTL) Faculty Learning Community at UGA, Fall 2014-Present.
 - Monthly meetings with five graduate students across academic departments. This group is led by assistant dean of the graduate school, Judy Milton.
 - Individual project concluded with publication in a SoTL journal and multiple conference talks.

Other Mathematics Outreach

- Athens Area Girls Math Team, August 2015- Present.
 - Head Coach
 - Lead weekly team meetings with ten elementary girls grades 2-4 while mentoring two high school helpers. Activities include: Singapore Primary mathematics activities books, ken-ken puzzles, and original group activities.
- UGA High School Summer Math Camp, June 2013.
 - Graduate Small Group Leader on Graph Theory Session
- UGA High School Math Circle, January 2013- Present.
 - Graduate Student Contact
- UGA High School Math Tournament, November 2013, 2014.
 - Volunteer
- Montlake Elementary Math Circle, Seattle, WA, July 2011-March 2012.
 - Math Circle Leader
 - Weekly circle meetings. Activities from “Mathematical Circle Diaries” by Anna Burago.

Conference Proceedings

- “Graphing habits: *I just don’t like that*” (with K. Moore, T. Paoletti, & I. Stevens) 19th Annual Conference on Research on Undergraduate Mathematics Education 2016 Proceedings.
- “Pre-service teachers’ inverse function meanings” (with T. Paoletti, I. Stevens, K. LaForest, & K. Moore). 18th Annual Conference on Research on Undergraduate Mathematics Education 2015 Proceedings.
- “Exploring preferences, performance, and opinions of pre-service teachers in a cooperative mathematics content course” (with S. Ghosh-Hajra). Submitted to Teaching and Learning Inquiry.

Conferences and Workshops

Mathematics Research:

- Chip Firing and Tropical Curves. MSRI Graduate Student School. July-August 2016.
- MAAGC (Mid-Atlantic Algebraic Geometry and Combinatorics) Workshop, Drexel University, Philadelphia, PA, May 2016.
- AMS Central Sectional Meeting, University of North Dakota, Fargo, NC, April 2016.
- AMS-MAA Joint Mathematics Meetings, Seattle, WA, January 2016.
- Georgia Algebraic Geometry Symposium (GAGS), Emory University, Atlanta, GA, October 2015.
- Western Algebraic Geometry Symposium (WAGS), University of Washington, Seattle, WA, October 2015. Poster Presentation: “Quantum Kostka and the rank one problem for sl_2m .”

- Algebraic Geometry Northeastern Symposium (AGNeS), Brown University, Providence, RI, October 2015. Poster Presentation: “Quantum Kostka and the rank one problem for sl_2 .”
- Algebraic Geometry Graduate Student Boot Camp, University of Utah, Salt Lake City, UT, July 2015.
- Women and Mathematics Program, Institute for Advanced Study (IAS), Princeton, NJ, May 2015.
- AMS-MAA Joint Mathematics Meetings, San Antonio, TX, January 2015.
- AMS Southeastern Sectional Meeting, University of North Carolina, Greensboro, NC, November 2014.
- Georgia Algebraic Geometry Symposium (GAGS), University of Georgia, Athens, GA, October 2014.
- Moduli and Automorphic Forms, Humbolt University, Berlin, Germany, May 2014.
- Algebraic Geometry Northeastern Symposium (AGNeS), Stony Brook, NY, April 2014.
- Georgia Algebraic Geometry Symposium (GAGS), University of Georgia, Athens, GA, October 2013.
- AMS-MAA Joint Mathematics Meetings, San Diego, CA, January 2013.

Teaching and Pedagogy

- Pathways Precalculus Implementation Workshop
 - Assistant to Marilyn Carlson, Kennesaw State University, Atlanta, GA, May 2016.
- Workshop on the Scholarship of Teaching and Learning (SoTL), University of Georgia, Athens, GA, September 2015.
- UGA Interdisciplinary Research Conference, Athens, GA, February 2015.
- UGA STEM Institute on Teaching and Learning, The UGA Office of STEM Education, Athens, GA, March 2015.
- UGA Interdisciplinary Research Conference, Athens, GA, February 2014.

Mathematics Education Research

- MAA Conference on Research in Undergraduate Mathematics Education (RUME), Pittsburgh, PA, February 2016.
- Mentoring and Partnership for Women in RUME, Pittsburgh, PA, February 2016.
- MAA MathFest, Washington DC, August 2015.
- UGA College of Education Graduate Student and Faculty Research Conference, Athens, GA, February 2015. Poster Presentation: “Changing cones: Students’ images of a dynamic situation.”
- MAA Conference on Research in Undergraduate Mathematics Education (RUME), Pittsburgh, PA, February 2015.
- Mentoring and Partnership for Women in RUME, Pittsburgh, PA, February 2015.

Professional Involvement and Leadership

- Chapter of AWM at UGA, August 2015-Present.
 - Founder and President
- Tuesday Algebraic Geometry Student Seminar (TAGSS) at UGA, Spring 2015.
 - Founder and organizer (with Dan Mckenzie)
- Chapter of AMS at UGA, Fall 2013- July 2015
 - President
- Mathematics Education Student Association (MESA) at UGA, Fall 2013-Present.
 - Reviewer for *The Mathematics Educator*.

Service to the Department

- Annual Mathematics Department Fall Picnic, Coordinator, 2013, 2014.
- Euler All Stars, UGA Math Department Intramural Softball Team, Founder and Coach, Fall 2012.

Professional Affiliations

American Mathematics Society, 2012-Present.

Association for Women in Mathematics, 2012-Present.

National Council of Teaching of Mathematics, 2013-Present.

Technical Skills

Software for Research: Macaulay2.

Software and Resources for Teaching: Desmos, Webwork, GeoGebra, Geometers Sketch Pad, Piazza, Remind101, iTunesU.