

Colleen Robichaux

Curriculum Vitae

1409 W Green Street
Urbana IL 61801
✉ cer2@illinois.edu

Education

- In progress **Ph.D. in Mathematics**, *University of Illinois at Urbana-Champaign*, Urbana, IL, Honors: NSF Graduate Research Fellow.
- 2016-2018 **M.S. in Mathematics**, *University of Illinois at Urbana-Champaign*, Urbana, IL.
- 2011-2016 **B.S. in Mathematics with a concentration in Secondary Education**, *Louisiana State University*, Baton Rouge, LA, Honors: University Medalist, Astronaut Scholar.

Research Interests

Combinatorics in relation to commutative algebra, geometry, and algorithms

Papers

Publications

- December 2019 (with Jenna Rajchgot, Yi Ren, Avery St. Dizier, Anna Weigandt) *Degrees of symmetric Grothendieck polynomials and Castelnuovo-Mumford regularity*, to appear in Proceedings of the American Mathematical Society, arXiv:1912.04477.
- August 2019 (with Harshit Yadav, Alexander Yong) *Equivariant cohomology, Schubert calculus, and edge labeled tableaux*, to appear in Facets of Algebraic Geometry: A Volume in Honour of William Fulton's 80th Birthday, Cambridge University Press, London Mathematical Society Lecture Note Series, arXiv:1908.11224.
- April 2019 (with Anshul Adve, Alexander Yong) *Complexity, Combinatorial Positivity, and Newton Polytopes*, The 31st International Conference on Formal Power Series and Algebraic Combinatorics, Ljubljana, Slovenia (FPSAC 2019), appearing in Séminaire Lotharingien de Combinatoire 82B (2019), Article #52, 12pp.
- May 2019 (with Anshul Adve, Alexander Yong) *Vanishing of Littlewood-Richardson polynomials is in P*, Computational Complexity, Vol. 28(2) (2019), 241–257.
- March 2016 (with Christian Gaetz, Michelle Mastrianni, Rebecca Patrias, Hailee Peck, David Schwein, Ka Yu Tam) *K-Knuth Equivalence for Increasing Tableaux*, Electronic Journal of Combinatorics, Vol. 23(1) (2016), P1.40.

Preprints

- June 2019 (with Harshit Yadav, Alexander Yong) *The A·B·C·D·s of Schubert calculus*, arXiv:1906.03646.
- October 2018 (with Anshul Adve, Alexander Yong) *Complexity, Combinatorial Positivity, and Newton Polytopes*, arXiv:1810.10361.

Talks and Poster Presentations

- **An Efficient Algorithm for Deciding the Vanishing of Schubert Polynomial Coefficients.** Enumerative Combinatorics session, CMS Winter Meeting 2020, Zoom. (December 5, 2020)
- **An Efficient Algorithm for Deciding the Vanishing of Schubert Polynomial Coefficients.** Combinatorics Seminar, University of Florida, Zoom. (November 10, 2020)
- **Schubert Polynomials and Computational Complexity.** Theory of Computation Seminar, University of Illinois at Urbana-Champaign, Zoom. (October 28, 2020)
- **Combinatorics and Generating Functions.** Summer Illinois Mathematics Camp Talk, Zoom. (June 26, 2020)
- **CM regularity and Kazhdan-Lusztig varieties.** AlCoVE Poster Session, Zoom. (June 16, 2020)
- **The A·B·C·Ds of Schubert calculus.** Western Sectional Meeting, Combinatorics of Reduced Decompositions of Elements of Coxeter Groups and Related Topics, California State University, Fresno, Fresno CA. (May 2, 2020 – cancelled)
- **Equivariant cohomology, Schubert calculus, and Edge labeled tableaux.** Spring Eastern Sectional Meeting, Recent Advances in Schubert Calculus and Related Topics, II, Tufts University, Medford, MA. (March 21, 2020 – cancelled)
- **The A·B·C·Ds of Schubert calculus.** AMS Spring Southeastern Sectional Meeting, Combinatorics Related to Geometry and Representation Theory, IV, University of Virginia, Charlottesville, VA. (March 15, 2020 – cancelled)
- **CM regularity and Kazhdan-Lusztig varieties.** MAAGC 2020 Poster Session, University of Virginia, Charlottesville, VA. (March 13, 2020 – cancelled)
- **CM regularity and Kazhdan-Lusztig varieties.** ALGECOM Poster Session, University of Illinois at Urbana-Champaign, Urbana, IL. (March 7, 2020)
- **Degree of Grothendieck polynomials and Castelnuovo-Mumford regularity.** AWM Mini Symposium, University of Illinois at Urbana-Champaign, Urbana, IL. (February 8, 2020)
- **Degree of Grothendieck polynomials and Castelnuovo-Mumford regularity.** Combinatorial Algebraic Geometry session, CMS Winter Meeting 2019, Toronto, ON. (December 8, 2019)
- **Degree of Grothendieck polynomials and Castelnuovo-Mumford regularity.** Algebra, Geometry, and Combinatorics Seminar, University of Illinois at Urbana-Champaign, Urbana, IL. (November 21, 2019)
- **Schubert Polynomials and Computational Complexity.** Undergraduate Seminar, University of Illinois at Urbana-Champaign, Urbana, IL. (October 25, 2019)
- **Schubert Polynomials and Computational Complexity.** New Facets of Algebraic Geometry Contributed talk, University of Michigan, Ann Arbor, MI. (October 18, 2019)
- **A conversation about Algebraic Combinatorics and Computational Complexity.** GROW 2019 Plenary Talk, University of Illinois at Urbana-Champaign, Urbana, IL. (October

6, 2019) (joint with Alexander Yong)

- **The A·B·C·Ds of Schubert calculus.** ALGECOM Poster Session, Washington University in St. Louis, St. Louis, MO. (September 21, 2019)
- **Complexity, Combinatorial Positivity, and Newton Polytopes.** FPSAC Poster Session 1, Ljubljana, Slovenia. (July 1, 2019)
- **Enumerative Geometry and Combinatorics.** Summer Illinois Mathematics Camp Talk, University of Illinois at Urbana-Champaign, Urbana, IL. (June 17, 2019)
- **Complexity, Combinatorial Positivity, and Newton Polytopes.** ALGECOM Poster Session, Loyola University Chicago, Chicago, IL. (May 25, 2019)
- **Complexity, Combinatorial Positivity, and Newton Polytopes.** Combinatorics Seminar, Washington University in St. Louis, St. Louis, MO. (April 12, 2019)
- **Complexity, Combinatorial Positivity, and Newton Polytopes.** Graduate Student Combinatorics Conference, University of Pennsylvania, Philadelphia, PA. (April 6, 2019)
- **Complexity and Combinatorial Positivity.** AWM Mini Symposium, University of Illinois at Urbana-Champaign, Urbana, IL. (February 9, 2019)
- **Complexity, Combinatorial Positivity, and Newton Polytopes.** Algebra, Geometry, and Combinatorics Seminar, University of Illinois at Urbana-Champaign, Urbana, IL. (March 28, 2019)
- **Vanishing of Littlewood-Richardson polynomials is in P.** Workshop on Representation Theory, Combinatorics, and Geometry Contributed Talk, University of Virginia, Charlottesville, VA. (October 20, 2018)
- **Vanishing of Littlewood-Richardson polynomials is in P.** ALGECOM Poster Session, University of Michigan, Ann Arbor, MI. (March 24, 2018)
- **Vanishing of Littlewood-Richardson polynomials is in P.** Algebra, Geometry, and Combinatorics Seminar, University of Illinois at Urbana-Champaign, Urbana, IL. (November 15, 2017)

Teaching

University of Illinois at Urbana-Champaign

Spring 2018 Teaching Assistant in Calculus II (MATH 231) Merit Program

- Active learning environment
- Designed worksheet and activities for each lesson

Fall 2017 Teaching Assistant in Calculus I (MATH 220) Merit Program

- Active learning environment
- Designed worksheet and activities for each lesson

East Ascension High School

Spring 2016 Student Teacher in Geometry, Algebra II

- Inquiry-based learning environment
- Planned curriculum and lessons

- Wrote assessments and materials

Louisiana State University

Summer 2015 Instructor

- MATH Circle Camp for middle and high school students
- Designed and led activities

Service and Outreach

- Association of American Universities (AAU) PhD Initiative Mathematics Committee Member, (2020–)
- IGL Undergraduate Outreach, Graduate Mentor (2018–)
 - Organized Four Color Theorem activity at International Prep Academy (March 2020)
 - Led SACNAS and Friends activity, 3D printing and modeling (February 2020)
 - Led Julia Robinson Day activity, Grape Codes (February 2020)
 - Led Franklin STEAM academy science night activity, Brunnian links (August 2019)
 - Training of Undergraduates (Fall 2019), automata, Brunnian links, platonic solids, 4-color theorem
 - Led Illinois Council of Teachers of Mathematics math contest activity, Comparing Algorithms (May 2019)
 - Assisted with Franklin STEAM Academy Family STEAM Night activity, Platonic Solids (April 2019)
 - Led Tri-Point High School STEM day activity, Decoding an Automaton (April 2019)
 - Led Rantoul High School field trip activity, Can It Tessellate (March 2019)
 - Assisted with Southern Illinois High school field trip activity, Decoding an Automaton (March 2019)
 - Training of Undergraduates (Spring 2019), automata, algorithms, tessellations activities
 - Training of Undergraduates (Fall 2018), platonic solids, fractals, Brunnian links activities
- IGL Outreach, Founded IGL Undergraduate Outreach (August 2018)
- Sloan University Center of Exemplary Mentoring, Graduate Student Mentor (August 2018–May 2019)
- Illinois Geometry Lab (IGL), Outreach Manager and Leadership Team Member (2017–)
- Girls Engaged in Math and Science (GEMS), Led origami activity with (9-12) students (March 2018)
- Sonia Math Day, Planned and led Brunnian links and hexaflexagons activities with for (9-12) students (November 2017, April 2018)
- iSTEM, Led partitions activity with (9-12) students (August 2017)
- First Lego League Robotics Competition, Led platonic solids activity with K-3 aged children (January 2017, 2018)
- Science at the Market, Led platonic solids activity with K-3 aged children (October 2016)

Awards, Honors, and Fellowships

2018-2022 NSF Graduate Research Fellowship

2020 Irving Reiner Memorial Award in Algebra
2016-2017 GAANN Fellowship
2015-2016 Astronaut Scholarship

 **Computer skills**

Programming Java, Python, SAGE, Macaulay2